SOUTH AFRICA'S CONTESTED TRANSITION TO ENERGY DEMOCRACY:

Lessons and Struggles from the Renewable Energy Independent Power Producer Procurement Programme

by
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Thesis presented in fulfilment of the requirements for the degree Doctor of Philosophy in the Faculty of Economic and Management Sciences at Stellenbosch University

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March 2021

Declaration

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March 2021

Acknowledgements

Funding support for the initial phase (2016 – 2017) of this research was provided by the National Research Foundation. Thereafter, a partnership between the Sustainability Institute and the Agence Française de Développement (French Development Agency) enabled the continuation of the research between 2017 and 2021. I am grateful for this institutional and financial assistance from both the Sustainability Institute and the AFD. A special thanks is owed to Gaël Giraud, the then Chief Economist of the AFD, for his intellectual leadership in shaping this inquiry into the prospects for energy democracy in South Africa. Thank you to Loyola de Costa and Laurent Bergadaa for coordinating this research partnership with the AFD.

The Centre for Complex Systems in Transition (CST) at Stellenbosch University has served as an intellectual home that I am proud to be part of. I am deeply grateful for the inspiration and enrichment that this research centre has provided me over the course of my PhD. Thank you in particular, to Rika Preiser, for your wise words, prudent advice and intellectual fellowship. At the School of Public Leadership at Stellenbosch University, a special thank you to Beatrix Steenkamp, whose office has been a safe and nurturing space since I first arrived at the Sustainability Institute in 2013.

Thank you also to my colleagues in the *Renewable Energy for Transitions* (RE4T) research group at the CST. I am indebted to Holle Wlokas who has been a guide as I navigated the complexities of the renewable energy sector, and a thinking partner with whom I have dreamt about the role of research in South Africa's energy transition. Thank you to Nina Callaghan for constant encouragement and for enriching our research community so deeply. Thank you to the many postgraduate students who have participated in the RE4T research group and contributed to our collective research endeavour. Finally, thank you to Mark Swilling, my supervisor and mentor, for your immense support, enduring belief in me, as well as the shared vision and intellectual partnership that we have cultivated over the last eight years.

Beyond the CST, I am grateful for the research partnership with Jesse Hoffman and Maarten Hajer at the Urban Futures Studio at Utrecht University. Our intellectual collaboration has allowed me to grow and advance as an early career researcher in ways that would not have otherwise been possible. Thank you also to Jonas Torrens for the friendship we were able to build between our annual meetings at the International Sustainability Transitions conferences.

This research would not have been possible without the involvement of research participants and all those that I worked with in the ZF Mgcawu District Development Coordinating Forum in Upington. Thank you for the invaluable insights, and to the Forum for allowing me to experiment and learn alongside you.

Many friends in different parts of the world have been great supporters and champions during the course of this PhD. Thank you to Anna-Marie, Judy-Ann, Abigail, Romy, Carina, Emeline, Kristi, Amanda, Cris, Jeanine, Nicky and Natalie, Eric and Eva, for believing in me. Thank you to my partner Liebrecht, for being a bit of a graphic designer, but even more so, for your immense love and for carrying me through the challenging final

stages of this thesis. Also, thanks to Manda and Wilhelm who provided a nourishing home and productive work environment during the months of lockdown in 2020. Words cannot express my gratitude to my lifelong, best friend, Gracie, who has a mind like a diamond. Thank you too, for taking such deep care in reading and editing this thesis; the final product would not have been possible without this investment, nor your sustained support throughout the duration of this project. Finally, I am grateful to my family: my brother Kevin and my grandmother Marjorie, and my parents, David and Julie, for the love, and lifelong support of my education and professional development. Thank you to my Dad, for always being proud of my achievements, your affirmation has been vital to my successes in life. Thank you to my Mum, for reading to me as a child but even more so for instilling in me a diligence and fortitude to face life's challenges, and for always being there in the midst of them.

Abstract

South Africa is uniquely positioned in the unfolding global energy transition and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), launched in 2011, has made South Africa a RE frontrunner in the global South. As this thesis will demonstrate, the (laudable) concession by policymakers to include economic development (ED) in the configuration of the procurement programme set the REIPPPP on a trajectory that would trigger irrepressible tensions in South Africa's political economy of energy.

In this thesis, I investigate the manifold socio-technical interferences (that is, the tensions and unintended consequences) unleashed by the REIPPPP. I respond to the question of how, and to what extent, the REIPPPP has catalysed South Africa's transition to energy democracy. I do so by means of a transdisciplinary research methodology where the qualitative inquiry was shaped by the ambition of 'practicing social science that matters'. To make sense of the maelstrom that is South Africa's nascent energy transition, I present a multi-scalar account which moves from an overview of the dimensions of the global energy transition, to an exploration of the national energy policy context, before zooming in on the grounded, local dynamics of the REIPPPP via a case study of the ZF Mgcawu District Development Coordinating Forum, an experimental governance arrangement in the Northern Cape Province.

I do so by deliberately using the framing of 'energy democracy', which I employ as a strategic and normative orientation because it conceptualises a developmental approach to the energy transition. As I will demonstrate, the energy democracy perspective is instructive for interpreting, and indeed leveraging, the developmental potential inscribed in the REIPPPP's rules. I further employ a theory of socio-technical change that functions as a conceptual framework emphasising the centrality of governance and policy in sustainability transitions. This framing underscores how socio-technical change is the outcome of the experimental practices of societal actors to encode normative goals of positive and desirable futures into the policy assemblages and governance practices deployed by diverse coalitions of actors to marshal the requisite resources and expertise to shape and steer collective action.

The inquiry into the nature of South Africa's unfolding energy transition reveals the co-existence of two different logics according to which the REIPPPP, as a policy assemblage, was designed and implemented, namely, the corporate and social logics of RE development. The analysis in this thesis traces the historical emergence and resultant antinomies of these two logics of RE development and how they shaped the conditions of possibility according to which the REIPPPP was assembled. I submit that the REIPPPP in its current formulation (assembled as a blend between the corporate and social logics) is *not* sufficient for realising the dual imperatives of decarbonisation and development thereby meaningfully advancing energy democracy in South Africa. I argue that the specific 'rules of the game' shaping this energy transition play a substantial role in limiting South Africa's prospects for energy democracy. Moreover, the extent to which these 'rules of the game' continue to be based upon an imbalance between the corporate and social logics, further limits these prospects.

Opsomming

Suid-Afrika is uniek geposisioneer in die ontvouende wêreldwye energie-oorgang en die onafhanklike hernubare- elektrisiteitsverskaffer-verkrygingsprogram ("REIPPPP"), wat in 2011 van stapel gestuur is, maak van Suid-Afrika ’n voorloper op die gebied van hernubare energie (HE) in die wêreldwye Suide. Soos hierdie tesis sal demonstreer, is die REIPPPP, deur die (lofwaardige) toegewing deur beleidmakers om ekonomiese ontwikkeling by die samestelling van die verkrygingsprogram in te sluit, op ’n trajek geplaas wat onherroeplike spanning in Suid-Afrika se politieke ekonomie van energie tot gevolg gehad het.

In hierdie tesis ondersoek ek die veelvuldige sosio-tegniese steurings (dit wil sê, die spanning en onbedoelde gevolge) wat ontketen is deur die implementering van Suid-Afrika se eerste program vir hernubare energie op nutskaal. Ek antwoord die vraag rakende hoe en tot watter mate die REIPPPP Suid-Afrika se oorgang tot energiedemokrasie gekataliseer het. Ek doen dit deur middel van ’n transdissiplinêre navorsingsmetodiek waar die kwalitatiewe ondersoek gevorm is deur die ambisie om ‘sosiale wetenskap wat saak maak’ te beoefen. Om sin te maak van die maalstroom van Suid-Afrika se ontluikende energie-oorgang, bied ek ’n veelskaalse verslag aan wat wissel van die wêreldwye energie-oorgang tot ’n spesifieke Suid-Afrikaanse gevallestudie. Die verslag bied ’n oorsig van die Suid-Afrikaanse energie-oorgang met behulp van die volgende skale: die dimensies van die wêreldwye energie-oorgang en die konteks van die nasionale energiebeleid en dan, meer spesifiek, die gegronde, plaaslike dinamika van die REIPPPP deur middel van ’n gevallestudie van die ZF Mgcawu Distrik-ontwikkelingskoördineringsforum, ’n eksperimentele bestuurstruktuur in die Noord-Kaap.

Ek gebruik die konsep van ‘energiedemokrasie’ doelbewus as ’n strategiese en normatiewe oriëntasie omdat dit ’n ontwikkelingsbenadering aan die energie-oorgang verleen. Soos ek sal demonstreer, bied die energiedemokrasieperspektief insig op die interpretasie en gebruikmaking van die ontwikkelingspotensiaal wat in die REIPPPP se reëls vervat is. Verder maak ek gebruik van ’n relasionele teorie van sosio-tegniese verandering wat dien as ’n konseptuele raamwerk wat die sentrale rol van bestuur en beleid in volhoubaarheidsoorgange beklemtoon. Hierdie benadering benadruk hoe sosio-tegniese verandering die resultaat van die eksperimentele praktyke van spesifieke samelewingsakteurs is. Dit is deur middel van eksperimentele praktyke wat samelewingsakteurs poog om die normatiewe doelwitte van ’n positiewe en wenslike toekoms in die beleidsamestellings en bestuurspraktyke, wat deur uiteenlopende koalisies van akteurs gebruik word om die nodige hulpbronne en kundigheid te versamel om kollektiewe optrede te vorm en te stuur, te kodeer.

Die ondersoek na die aard van Suid-Afrika se ontvouende energie-oorgang onthul die saambestaan van twee verskillende logika waarvolgens die REIPPPP as beleidsamestelling ontwerp en geïmplementeer is, naamlik, die korporatiewe en sosiale logika van HE-ontwikkeling. Die analise in hierdie tesis volg die spoor van die historiese ontstaan en die gevolglike antinomieë van bogenoemde twee logika van HE-ontwikkeling, asook hoe beide logika bygedra het tot die moontlikheidsvoorwaardes waarvolgens die REIPPPP saamgestel is. Ek argumenteer dat die REIPPPP in sy huidige formulering (saamgestel as ’n mengsel van die korporatiewe en

sosiale logika) *nie* voldoende is vir die verwesenliking van die tweedoelige imperatiewe van dekarbonisering en ontwikkeling en, sodoende, betekenisvolle bydrae tot die bevordering van energiedemokrasie in Suid-Afrika maak nie. Verder argumenteer ek dat die 'spelreëls' wat in hierdie geval die aard van die energie-oorgang bepaal, 'n beduidende rol speel in die beperking van Suid-Afrika se vooruitsigte op energiedemokrasie. Bowendien word hierdie vooruitsigte verder beperk deur die mate waartoe hierdie 'spelreëls' aanhoudend gebaseer word op 'n wanbalans tussen die korporatiewe en sosiale logika.

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AIDC	Alternative Information and Development Centre	IRESEN	Research Institute in Solar Energy and New Energies
AMCU	Association of Mineworkers and Construction Union	IRP	Integrated Resource Plan
ANC	African National Congress	LED	Local economic development
B-BBEE	Broad-based black economic empowerment	MEC	Minerals energy complex
BW	Bidding window	MLP	Multi-level perspective
CFE&RI	Centre for Entrepreneurship	MPRDA	Mineral and Petroleum Resources Development Act
CLO	Community liaison officer	NDP	National Development Plan
CDP	Community development plans		
COP	Conference of Parties	NDC	Nationally Determined Contribution
CPA	Communal Property Association	NERSA	National Energy Regulator of South Africa
CSI	Corporate Social Investment	NGO	Non-governmental organisation
CSIR	Council for Scientific and Industrial Research	NGP	New Growth Path
CSP	Concentrated solar power	NIP	National Infrastructure Plan
CSR	Corporate social responsibility	NPO	Non-profit organisation
DBSA	Development Bank of Southern Africa	NUMSA	National Union of Metalworkers of South Africa
DCF	Development Coordinating Forum	PCCCC	Presidential Climate Change Coordination Commission
DEA	Department of Environmental Affairs	PICC	Presidential Infrastructure Coordinating Committee
DFI	Development finance institution	PPA	Power Purchase Agreement
DIS unit	Development Impact Support unit	RE	Renewable energy
DMRE	Department of Mineral Resources and Energy	REFIT	Renewable energy feed-in tariff
DoE	Department of Energy	REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
ED	Economic development	RfP	Request for proposals
EIA	Environmental Impact Assessment	SALGA	South African Local Government Association
EnD	Enterprise development	SAPVIA	South African Photovoltaic Industry Association
EROI	Energy Return on Energy Invested	SAWEA	South African Wind Energy Association
ESG	Environment, social and governance	SDGs	Sustainable Development Goals
FDI	Foreign direct investment	SED	Socio-economic development
FiT	Feed-in tariff	SEDA	Small Enterprise Development Agency
GDP	Gross domestic product	SIPs	Strategic infrastructure projects
GHG	Greenhouse gas	SMME	Small and medium sized enterprise
IDC	Industrial Development Corporation	SNM	Strategic niche management
IDP	Integrated Development Plan	SOE	State-owned enterprise
IEP	Integrated Energy Plan	SLTO	Social license to operate
ILO	International Labour Organisation	Solar PV	Solar photovoltaic
IPAP	Industrial Policy Action Plan	SROI	Social Return on Investment
IPP	Independent power producers	SSEG	Small-scale embedded generation
IPP Office	Independent Power Producer Office	TM	Transition management
IRENA	International Renewable Energy Agency	ToR	Terms of Reference

Part A
INTRODUCTION AND RESEARCH DESIGN

Chapter 1
Thesis introduction and overview

1.1. Introduction

South Africa is uniquely positioned in the unfolding global energy transition. This transition entails a shift from the dominance of fossil fuels to a new renewable energy (RE) system to power the global political economy. The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) has made South Africa a RE frontrunner in the global South. Launched in 2011, the REIPPPP is South Africa's flagship RE policy framework that has enabled unprecedented investments in utility-scale RE, as much as R 209.7 billion by 2019 (IPP Office, 2019). Moreover, given the unique design of the procurement framework, it serves as a critical reference point for other RE policies beyond South Africa, to explicitly link intersecting climate and socio-economic development (SED) agendas.

Despite these efforts, South Africa is yet to achieve a fundamental transformation of its coal-based political economy. A low-carbon development trajectory – one that addresses the intersecting challenges of structural inequality, abject poverty and widespread unemployment (Government of South Africa, 2013) – remains evasive. Currently, the country is caught in something of an interregnum: a 'gap' or hiatus, a liminal space between past and future, characterised by uncertainty and contestation and where old systems fight to retain power and new systems struggle to emerge. The carbon-intensive socio-technical electricity regime remains stubbornly resistant to reform, even as it is increasingly destabilised by a failing fleet of aging coal-fired power stations and multiple crises at Eskom, the national utility (Ting & Byrne, 2020). Yet the necessary political commitment to catalyse the substantive transition to a low-carbon economy is chiefly absent. At the same time, ruptures in the country's heavily centralised energy regime – demonstrated most catastrophically by the financial, governance, and technical failures of Eskom – have given impetus to a nascent energy transition, kickstarted by the REIPPPP's inception. Adding to this momentum, the South African government has, for the first time, through the publication of its Integrated Resource Plan (IRP) in 2019, committed to extensive decommissioning of the country's coal-fired power stations, together with further investments in RE over the next two decades (Department of Mineral Resources and Energy, 2019). This marks a decisive turning point in the political economy of energy in one of the world's most unequal and carbon-intensive countries.

So, while South Africa's transition from a coal-based economy to one powered by RE is indeed underway, it is sluggish and highly contested and, ultimately, controlled by political leadership and inappropriate policy directives in national government. The country's historically entrenched capital accumulation strategy, the 'minerals energy complex' or 'MEC', which manifests as the coal-based socio-technical electricity regime, is ingrained in the very identity of South Africa's political economy (Fine & Rustomjee, 1996; Baker, 2015a). This socio-technical regime co-evolved alongside an electricity policy and governance paradigm characterised by the concentration of political authority, policy directives, and administrative oversight at the national

government level. Eskom, the regime-incumbent, is a key actor in the MEC, tethering the political economy to coal and minerals extraction (Ting & Byrne, 2020), maintaining a stronghold over electricity generation and transmission (Baker & Burton, 2018), and dominating the electricity policy planning process (Baker & Phillips, 2019).

South Africa faced an electricity supply-side crisis in the late 2000s and was under pressure to respond to global climate change commitments. In light of this, the South African government initiated a process to design a policy instrument for the procurement of utility-scale RE, which culminated in the launch of the REIPPPP in 2011. The design of the REIPPPP took place within the regulatory framework governed by the Department of Energy (DoE) (which later became the Department of Mineral Resources and Energy (DMRE) in 2019)[1], in accordance with the IRP 2011. The resulting policy instrument and the 'rules of the game' it stipulated were configured in response to the electricity sector's challenges at the time, and in the prevailing context of the (established and stable) electricity policy and governance regime. Additionally, the programme was conceptualised as the country's flagship emissions reductions strategy following the South African Renewables Initiative which was touted at the 17th Conference of Parties (COP 17) hosted in Durban, by the South African government (Rennkamp, 2019). The Independent Power Producer (IPP) Office was set up as something of a 'custodian' of the REIPPPP, mandated to mobilise investment to finance the provision of electricity from RE sources and to oversee the implementation of this carefully designed set of policy rules.

It is critical to note that these key decisions by the South African government took place at exactly the moment when investments in low-carbon technologies were gaining momentum (Swilling, 2020). As such, South Africa quickly ranked as one of the most attractive RE investment destinations. What followed might well be described as a 'green rush': investors and developers flocked to South Africa to compete in a series of bid windows between 2011 and 2015, as announced by the DoE and administered by the IPP Office. Since its inception, the REIPPPP has attracted unprecedented investment through a transparent and competitive procurement mechanism and has contributed towards South Africa's climate mitigation efforts. Yet its impacts (both realised and potential) on the South African political economy go beyond this.

Importantly, the REIPPPP was tasked with the *further* ambition of realising the National Development Plan (NDP) 2030. To this end, requirements for economic development (ED) comprise a full 30% of its bidding criteria (IPP Office, 2019). While these were made subordinate to the requirements for competitive (price) bidding, the emphasis on ED criteria is nevertheless an unprecedented departure from South Africa's standard 10% ED component in public procurement. The consequences of the inclusion of these ED requirements into the policy framework must not be underestimated. They are lodged within a procurement programme that, on the whole, aligns with the financial, governance, and institutional logics of the dominant socio-technical

[1] In this thesis, I will refer to the Department of Energy given the timeframe within which the research was conducted, that is, prior to the amalgamation of the Department of Energy with the Department of Mineral Resources, that then became the Department of Mineral Resources and Energy (DMRE).

electricity regime, and so could be read as an innocuous addition that merely caters to the community acceptance and the maintenance of a social license to operate (SLTO) of these RE infrastructures in the disparate localities where IPPs operate (Nkoana, 2018). Yet this would be a mistake. As this thesis will demonstrate, the (laudable) concession by policymakers to include ED in the configuration of the procurement programme set the REIPPPP on a trajectory that would trigger irrepressible tensions in South Africa's political economy of energy, destabilising the prevailing policy monopoly (and its incumbents) that has so long confined the country to a carbon-intensive development trajectory and frustrated its low-carbon transition ambitions.

In this thesis, I investigate the manifold tensions and unintended consequences unleashed by the implementation of South Africa's first utility-scale RE programme. I trace these to the co-existence of two different logics according to which the REIPPPP was conceptualised, designed and implemented, namely, the corporate and social logics. I respond to the question of how, and to what extent, the REIPPPP has catalysed South Africa's transition to energy democracy. To make sense of the maelstrom that is South Africa's nascent energy transition, I present a multi-scalar account which moves from an overview of the dimensions of the global energy transition, to an exploration of the national energy policy context, before zooming in on the grounded, local dynamics of the REIPPPP via a case study of the ZF Mgcawu District Development Coordinating Forum (hereafter referred to as 'the Forum'). I do so by deliberately using the framing of 'energy democracy', which I employ as a strategic and normative orientation because it conceptualises a developmental approach to the energy transition. As I will demonstrate, the energy democracy perspective is instructive for interpreting, and indeed leveraging, the developmental potential inscribed in the REIPPPP's rules.

This research is operationalised through a transdisciplinary research methodology, in an ambition to 'practise social science that matters' (Chapter 2), and deploys a conceptual framework that emphasises the centrality of governance and policy in sustainability transitions (Chapter 3). The multi-scalar account begins with an overview of the dimensions of the global energy transition (Chapter 4), followed by an analysis of the energy policy landscape in South Africa (Chapter 5), and an investigation of a place-based multi-stakeholder collaboration in the ZF Mgcawu District Municipality in the Northern Cape (Chapter 6).

This case study is the culmination of over two years of my engaged participation in the Forum and details the efforts by local and regional stakeholders to respond to the implementation challenges of the REIPPPP. The Forum can be framed as a 'governance experiment' in which actors explored ways to contend with dynamics particular to this district municipality, but also to innovate strategies that might shift the general mechanisms of oversight and engagement unlocked by the REIPPPP. And indeed, the Forum's experiment with collaborative ways of working – to achieve the full developmental potential of place-based investments unlocked by the ED requirements of the REIPPPP – illuminated, for a brief time, a vision of a radically different scenario of collaborative regional development activities and potentialities. Ultimately, though, as the dull compulsion of the underlying logic of the 'rules of the game' prevailed, stakeholders retreated to business-as-usual roles defined by compliance and risk aversion. The value of this case study (in the context of the REIPPPP specifically,

and South Africa's energy transition more generally) is that it tentatively sketches the contours of a policy and governance paradigm that might better 'fit' the increasingly dispersed and decentralised nature of RE infrastructures. The focus in this thesis was one particular governance experiment in the REIPPPP, namely the Forum in the ZF Mgcawu District in the Northern Cape. As will be elaborated in section 2.4, engagement with industry associations and diverse stakeholders in the RE sector contributed towards a rich understanding of the governance and developmental challenges in the REIPPPP (see section 5.6). These engagements highlighted the existence of a number of different of responses from stakeholders in the REIPPPP (from provincial and district level governments, and IPPs) to content with the governance and developmental challenges in the REIPPPP. In different regions it appeared that unique strategies had been employed and different kinds of coordination responses had been initiated in other RE hotspots across the country. However, for the purposes of this research, investigating these further was beyond the scope of the research project.

With these experiential and conceptual resources from the case study of the ZF Mgcawu District Development Coordinating Forum firmly in hand, I then unpack and analyse the unintended consequences, contradictions and emergent potentialities unlocked by the REIPPPP (Chapter 7). I do this from the vantage point of energy democracy and through the conceptual framework developed in Chapter 3. This enables me to make sense of the 'ontological trouble' (that is the unintended consequences, contradictions and emergent potentialities unleashed by the REIPPPP in the form of dispersed and decentralised utility-scale RE infrastructures) as 'socio-technical interferences' – generative and instructive triggers for informing the re-imagination and re-configuration of utility-scale RE policies that might advance energy democracy in South Africa (Chapter 8).

1.2. Background and motivation

Before outlining the problem statement (section 1.3) and guiding questions and objectives (section 1.4) for this research, three broad aspects that have motivated this qualitative inquiry are made clear. First, I 'set the scene' by describing the global challenge of transitioning to a more just, equitable, and sustainable development pathway, and the centrality of energy's role therein (section 1.2.1). Energy has everything to do with the global interregnum in the transition towards a more sustainable world: energy shapes *why* we currently face a climate emergency, but also *how* we cultivate alternative imaginaries and configure enabling policy frameworks and governance strategies. Second, I describe the nascent energy transition in South Africa and provide an empirical overview of the REIPPPP (section 1.2.2). Third, I substantiate my paradigmatic grounding in a complexity perspective, and present the sustainability transitions literature as my theoretical vantage point (section 1.2.3). Following from this complexity orientation, I elaborate upon my own positionality and research ambitions in an effort to justify the choice of transdisciplinary research methodology and the qualitative inquiry driving this thesis (section 1.5).

1.2.1 Setting the scene: a global interregnum in the transition towards a sustainable world

Radical transformation is required to transition our global society towards more just, sustainable and equitable development pathways (Steffen, Richardson, Rockstrom, Cornell, Fetzer, Bennett, Biggs, Carpenter, de Vries, de Wit, Folke, Gerten, Heinke, Mace, Persson, Ramanathan, Reyers & Sorlin, 2015; Barnosky, Ehrlich & Hadly, 2016). Urgent responses and vicious resistance abound: pockets of innovation driven by radical visions of just, equitable and sustainable futures mushroom in the midst of seemingly insurmountable hegemony and incumbency in dominant political, social and economic systems (Bauman, 2012). Historically, an interregnum archetypally described periods of discontinuity between the toppling of one regime and the ascension of successors. More recently, the metaphor has gained traction to contend with the co-existence of dominant forces clinging to power alongside the struggles by new systems to emerge (Bauman, 2012). In this way, it is an instructive metaphor for describing the sustainability imperative of this current historical moment: on the one hand, we witness deep and violent resistance to transformation and on the other, we are without alternatives that viably contend with the status quo. The political weight of the commitment to addressing this is encapsulated by the global Sustainable Development Goals (SDG) which (in principle) signify consensus at the highest levels of international cooperation.

The starting point for this thesis is the centrality of energy (in the form of distinctive socio-technical regimes) in a global political economy that unleashed 'the Great Acceleration' and has – counter-intuitive as it may sound at first – *exacerbated* the polycrisis (the myriad, inextricably linked sustainability crises threatening social-ecological systems) that is the Anthropocene (Steffen *et al.*, 2015).

Throughout history, energy has shaped human society (Smil, 2017). It is fossil fuels, the likes of coal, oil, and gas, that have powered modern civilisation since the advent of the Industrial Revolution (Mitchell, 2011; Daggett, 2019). Fossil fuels are deeply entangled in the socio-technical systems that conduct contemporary life. They have made possible a global political economy, that is the political institutions, infrastructure configurations, cultural practices, and economic systems that have, on the whole, advanced human wellbeing, while simultaneously catapulting society towards critical ecological thresholds. The particular character of this global political economy has dangerously undermined the planetary boundaries within which social-ecological systems can safely operate (Steffen, *et al.*, 2015). Embedded therein, the current global energy system harbours a deep flaw that is exemplified by the paradox of fossil fuels. On the one hand, carbon economies have powered economic growth that has alleviated global poverty levels, extended service delivery, and created livelihood opportunities for populations across the globe. On the other, this same fossil fuel-induced economic growth has contributed massively to rampant resource consumption, environmental degradation, and climate change. Fossil fuels have also allowed carbon economies to concentrate political and economic power and, in this way, have provided the resource base for structural inequality (Hickel, 2017; Hoffmann, Arifi, Bazaz, Davies, Hajer, Revi, Späth & Swilling, forthcoming). In short, the system is not working, and so a

fundamental shift, or change, or reconfiguration, of the socio-technical energy systems that constitute modern life, is required. This is what it means to call for a 'transition'.

Increasingly, support for this global energy transition is galvanising around decarbonisation and the uptake of low-carbon, RE technologies (Bernstein & Hoffmann, 2018a). This is demonstrated by extensive public and private investments in RE, which hit USD 272.9 billion in 2018 and USD 282.2 billion in 2019, far outstripping investments in new fossil fuel generation (Frankfurt School-UNEP Centre/BNEF, 2020). In fact, the 2018 capacity investment in RE was triple that in new fossil fuel generation. According to REN21 (2019), RE had another record-breaking year in 2019, as installed power capacity grew more than 200 gigawatts (GW) – its largest increase ever (REN21, 2020). Investment in 2018 in RE power technologies accounted for 65% of all new generating capacity (excluding large hydropower) (REN21, 2019). In 2019 these figures rose with nearly 78% of the generating capacity that was added globally is accounted for by wind, solar, biomass, waste, geothermal and small hydro (Frankfurt School-UNEP Centre/BNEF, 2020). Extensive investment has corresponded with precipitous price reductions, in particular, for solar photovoltaic (solar PV) and wind energy (Frankfurt School-UNEP Centre/BNEF, 2020). While this is positive, it nonetheless falls short: as climate projections demonstrate, current decarbonisation efforts need to be vastly accelerated in terms of pace and scale to curb rising global temperatures and to halt catastrophic ecological destruction (REN21, 2019).

As we learn from history, energy transitions entail more than merely substituting one form of energy with another (Gismondi, 2018). Instead, the shift from the dominance of a particular energy resource to another implies fundamental co-constitutive changes in societal structures. The energy transition from fossil fuels to RE will entail a massive socio-technical re-ordering and transform the foundations of industrial civilisation (Jasanoff & Kim, 2013; IRENA, 2019).

Despite the abundance of RE resources, the advancement in technologies to harness them and the design of policy frameworks to deploy them, society faces an energy impasse (Wilson, 2017). As we contend with the imperative for radical and fundamental change, we are thwarted by layers of resistance: from the prevailing socio-technical systems that favour the fossil fuels that power the carbon economies and in turn direct the global development trajectory shaping the future. What with the continued dominance of carbon economies entrenched in fossil fuels, it appears improbable that we will realise a transition to a low-carbon economy on the scale and within the timeframes required by the climate crisis (Wilson, 2017).

Fundamentally, this energy impasse is rooted in our collective inability to imagine futures outside of, beyond, without, fossil fuels (Jasanoff & Kim, 2013; Di Muzio, 2015; Escobar, 2015; Wilson, 2017; Hajer & Versteeg, 2018; Hajer & Pelzer, 2018). Caught in this state of existential liminality, the wavering between two worlds, it is vital to interrogate the place of energy in society, in order to *see* the energy impasse and the opportunities opened up by RE, and to recognise the present as a moment of radical indeterminacy, filled with potential

(Wilson, 2017). Tackling this impasse, the global interregnum, and taking sustainability transitions seriously, requires a re-imagination of the political and economic systems that fossil fuels have made possible.

The term 'energy democracy' serves as an instructive nascent socio-technical imaginary that can be defined as a collectively held and performed vision of a desirable future that invigorates and widens political claims on the energy transition (Jasanoff & Kim, 2015; Angel, 2016). As a movement and concept, energy democracy foregrounds the divergent materiality of RE infrastructures in our efforts to cultivate generative and sustainable imaginaries of the future. Here, the divergent materiality of RE infrastructures refers specifically to the perceptible, material characteristics of the array of socio-technical RE configurations that exist in space, across diverse physical locations. Pointing out the opportunities opened up by the shifting spatiality of RE infrastructures, energy democracy advocates claim that dispersed and decentralised infrastructures might also enhance transformative and democratic outcomes in the energy transition.

What is now clear is that the rapid growth of RE infrastructures across all world regions has accelerated the energy transition and also inspired the socio-technical imaginaries that have started to emerge from the energy democracy movement (Swilling, 2020). In this thesis, I engage with energy democracy as a strategic orientation, essentially as a developmental approach to the energy transition, with a strong emphasis on place-based institution building and the activation of 'just transition' processes. Whereas, in its narrowest framing, the goal of the energy transition is (simply) to decarbonise the economy to align with global trends, the goal of energy democracy is a (much more fundamental) just transition to a decarbonised economy that is more inclusive, socially just, and environmentally sustainable. Decarbonisation alone will not deliver 'a transformed world', but if it is infused with the ambitions of energy democracy and animated through a multiplicity of just transition processes, the shift from fossil fuels to RE might trigger ruptures that drive the material and political change required for a sustainability transition (Pinker, 2018).

1.2.2 Empirical context: South Africa's energy transition kickstarted by the REIPPPP

A central feature of South Africa's political economy is the existence of a deeply entrenched system of capital accumulation that has depended on the MEC, and more specifically the historic abundance of cheap coal and cheap labour (Fine & Rustomjee, 1996; Büscher, 2009; Power, Newell, Baker, Bulkeley, Kirshner & Smith, 2016). Beyond just embodying the obduracy, or resistance to change, within the electricity sector itself, the MEC continues to create strong path dependencies for South Africa's future socio-economic development trajectory (Baker, 2015a; Ting & Byrne, 2020).

Lodged within this wider political economy, the electricity sector can be understood as a 'socio-technical regime', one comprised of a set of resources, institutions, market practices, and regulatory frameworks that sustain the dominance of its carbon-intensive and coal-dependent features (van der Merwe, 2017). The historic structuring of the electricity sector was a mechanism used by the Apartheid government to centralise governance and concentrate political and economic power (Baker, 2015a; Parr, Swilling & Henry, 2018). The

electricity sector remains highly centralised to this day but is now characterised by a state of crisis (Bischof-Niemz & Creamer, 2019). In line with this centralisation, the electricity sector, and the policy processes shaping it, have been dominated by Eskom, the monopolistic state-owned electricity utility that has, until fairly recently, accounted for as much as 95% of South Africa's electricity generation, 90% of which is coal-fired (Burton, Lott & Rennkamp, 2018). In 2019 and early 2020, South Africa faced 'loadshedding' initiated by Eskom to prevent the system from crashing. This was not the first time the nation had faced loadshedding: a supply-side crisis, compounded by shifting demand patterns and lagging economic growth, led to rolling blackouts between 2000 and 2008 (Chettiar, Lakmeeharan & Koch, 2009), and again in 2015 (McEwan, 2017; Van der Merwe, 2019). According to the national utility, "loadshedding is a highly controlled process implemented by the System Operator to ensure the security of the power system and to prevent a national blackout. Inconvenient as it is, loadshedding is the only way to protect the entire electricity system" (Eskom, 2020a). Loadshedding is a disruptive and costly reminder of Eskom's technical, financial and governance failures, wreaking havoc on an economy that is already highly constrained (Plooy & Brent, 2017; Bischof-Niemz & Creamer, 2019). With the electricity sector so deeply embroiled in the political economy of South Africa, any strategies to achieve the dual goals of decarbonisation and development must thus have electricity reform at their core.

The introduction by the South African government of the REIPPPP in August 2011 signalled a potential turn towards a low-carbon development trajectory. It has helped to focus attention on the connection between decarbonisation and the structural transformation of the country's political economy. Importantly however, is that the REIPPPP is not the only directed policy initiative to potentially contribute to this low-carbon development trajectory. South Africa's long-term development strategy is encapsulated in the National Development Plan 2030 (NDP) which sets in place a framework to address the country's triple challenge of poverty, inequality and unemployment. Relevant to the push for a low-carbon transition, there are a number of complementary and supporting policies in place. For example, South Africa's Low-Emissions Development Strategy (2050) details the country's commitment to achieving the goals of the Paris Agreement. Another significant institutional structure in the national government is the Presidential Climate Change Coordination Commission (PCCCC). Similarly, the National Climate Change Response Policy and the forthcoming Climate Change Bill signal high-level commitment to a low-carbon development strategy; although their efficacy in reducing emissions and redirecting South Africa's development trajectory is not a foregone conclusion. The REIPPPP must be engaged within this wider context, and in this thesis, the REIPPPP constitutes the core focus of the investigation given its prominence in South Africa's political economy of energy.

Unsurprisingly, the REIPPPP has triggered significant contestation about the future of the historically coal-based and energy-intensive electricity sector. In part, the REIPPPP can be understood as a policy mechanism to address the twin challenges of achieving climate change targets and responding to the electricity supply crisis in the late 2000s (Montmasson-Clair & Ryan, 2014; Oyewo, Aghahosseini, Ram, Lohrmann & Breyer,

2019). Equally significant, however, is the way in which the procurement framework has taken on a developmental agenda by including a number of ED targets within the otherwise price-competitive auction scheme (Eberhard & Naude, 2016). Note, though, that the participation of independent power producers (IPPs) in the generation of utility-scale, grid-connected electricity has taken place without displacing the regime of historically centralised energy governance, including the continued dominant role of Eskom (Bischof-Niemz & Creamer, 2019). Even so, the spatial dispersion of IPPs across the country is a break from the conventional concentrated geographic location of South Africa's coal-fired power plants, predominantly in the Mpumalanga Province (Dubresson & Jaglin, 2016; McEwan, 2017).

The REIPPPP is internationally recognised for its unique configuration, and the manner through which both price-competitiveness and a fulfilment of ED requirements were built into the framework (Eberhard & Naude, 2016; Schmidt, Matsuo & Michaelowa, 2017). The ED components include job creation, local content, ownership, management control, preferential procurement, enterprise development (EnD) and socio-economic development (SED) (IPP Office, 2019). The ED scorecard, included in the request for proposals (RfP) compiled by the DoE and used by developers as a guide for their bid submission, includes various targets and thresholds to assess the development's contribution to the REIPPPP's development ambitions.

The assessment and awarding of bids is done according to a 70:30 split: 70 points on price and 30 on ED. Bids assembled by prospective developers are submitted to the IPP Office for assessment, in response to sealed-bid windows communicated by the DoE which specify megawatt (MW) allocations for each RE technology: solar PV, concentrated solar power (CSP), biomass, hydro, and wind. Within each of these technology categories, the bid that provides the lowest price is allocated the full 70 points and then this is adjusted down for all the other bids. These scores according to price are then integrated with the scoring for the 30 ED points. Once all bids have been evaluated, submissions are ranked from highest to lowest. Cut-offs are determined when all the volume allocations for each technology have been filled. Thereafter, preferred bidders are announced and projects can be implemented. Successful bidders enter a contractual arrangement with Eskom, which purchases electricity through a 20-year Power Purchase Agreement (PPA) at the tariff set out in the IPPs' respective bid proposals.

Complying with the RfP entails a cumbersome, expensive, risky, complex, and multifaceted bid development process for potential developers. Assembling a submission to the IPP Office requires extensive technical and financial capabilities, with a hefty social development dimension. Interested parties must be constituted to form a consortium of stakeholders, formalised through a series of contractual agreements. These arrangements need to be in place *in advance,* in order for the bid to be assessed by the IPP Office; once preferred bidders are announced, these contractual agreements are operationalised and result in the construction of a RE project. Thereafter, the implementation and oversight of the programme is undertaken by the IPP Office. While these intersecting contractual frameworks and legally binding agreements are what

legitimise each IPP development, in practice, a whole host of stakeholders are implicated in their implementation, from bid development to construction and operations.

In accordance with the IRP 2011, between 2011 and 2015, four ministerial determinations were announced by the DoE and overseen by the IPP Office (IPP Office, 2019). Through these four bid windows, the programme procured 6 323 MW of RE from 92 utility-scale, grid-connected projects of various technologies, but predominantly wind and solar PV (GreenCape, 2020). On the whole, the programme has demonstrated continual learning and iteration (Montmasson-Clair & Ryan, 2014). There have been a number of adjustments since the first round. For example, the disclosure of the ceiling price and the lack of capacity caps in the first round resulted in high prices, and so capacity caps for each technology were set per successive bidding round. Additionally, price caps were adjusted downwards and not disclosed to ensure competition within the volume allocations across the various technologies (Montmasson-Clair & Ryan, 2014).

Table 1 MW Procured, operational and determined (from IRP 2011) (Source: adapted from GreenCape (2020) and IPP Office (2019))

TECHNOLOGY	PROCURED	OPERATIONAL	DETERMINED
Wind	3 357	1 980	6 360
Solar PV	2 292	1 474	6 225
Concentrated solar power	600	500	1 200
Landfill gas	13	22	540
Small hydro	19	-	-
Biomass	42	-	-
Total	**6 323**	**3 976**	**1 4325**

The REIPPPP has been largely oversubscribed and highly competitive (Baker, 2015b; Kruger & Eberhard, 2018). By 2020, it had resulted in vast infrastructure developments across South Africa. Of the 92 approved projects, 64 have been connected to the national grid, totalling 3 976 MW of electricity generation capacity (IPP Office, 2019). The map below illustrates the geographic location of these projects across South Africa.

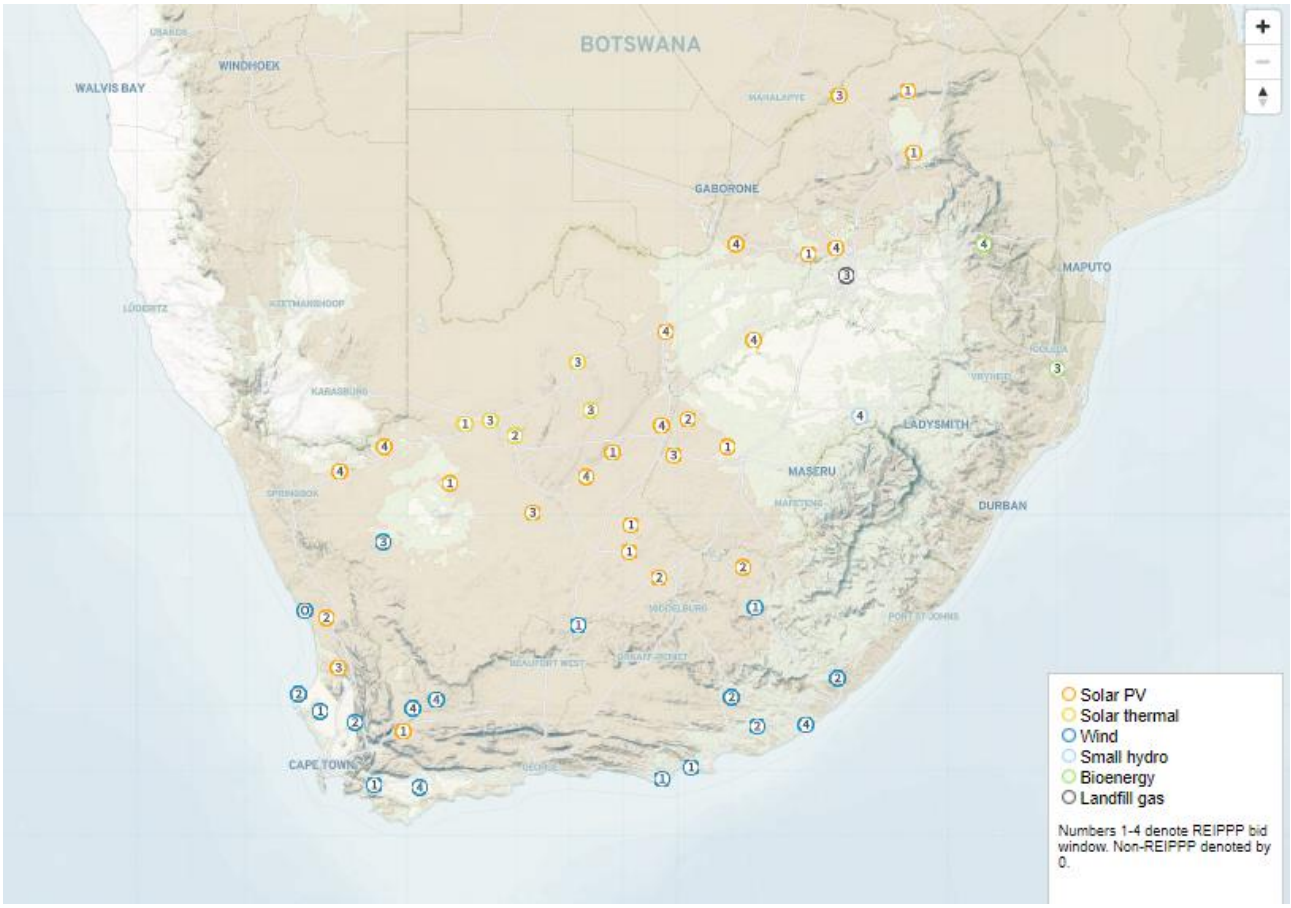


Figure 1 Utility-scale Renewable Energy Generation Sites across South Africa (EnergyDesk.Africa, 2020)

In the following three sections I briefly expand on this empirical picture, with further detail related to the financial dimensions of the REIPPPP, some of the difficulties associated with its employment agenda, and the particular attention it gives to communities.

1.2.2.1 Finance, cost, and investment dynamics

Despite the complexity of the bidding process and the stringent ED component, the REIPPPP has positioned South Africa as an attractive destination for private-sector investment in utility-scale RE (Baker, 2015b; Eberhard & Naude, 2016; Lawrence, 2020). Since 2011, the REIPPPP has demonstrated promising growth, attracting approximately R 209.7 billion through the 92 approved projects (IPP Office, 2019). Of this, 20%, or R 41.8 billion, was foreign direct investment (IPP Office, 2019)

A significant reduction in costs has also been witnessed, with a drop in prices evident across all technologies (Kruger & Eberhard, 2018; Bischof-Niemz & Creamer, 2019). According to IPP Office estimates (2019: 4), the "average portfolio cost for all technologies under the REIPPPP has dropped consistently in every bid window to a combined average of R 0,92/kwh in BW4" (the fourth bidding window). The price for wind power dropped by 50% and solar PV dropped by 75% between BW1 and BW4 (IPP Office, 2019). Significantly, these reduced prices now mean that the cost of RE over the life time of the plant is competitive when compared to the life cycle cost of new coal-fired power stations.

Despite its considerable success, the roll-out and expansion of the REIPPPP has not been straightforward – indeed, the most recent bid window, announced in 2015, was stalled until early 2018. Why? Primarily, Eskom, the designated electricity off-taker, refused to sign Power Purchase Agreements (PPAs), and thus inhibited the finalisation of agreements for 27 announced preferred bidders. This is despite the stipulations in the Electricity Regulation Act 2006 that mandate the DoE to make procurement determinations (Baker & Burton, 2018). Eskom's opposition to the inclusion of further IPPs must be seen within the context of the deepening techno-economic crisis threatening its current structure (Ting & Byrne, 2020), but is also emblematic of the sort of 'obduracy' that sustains the MEC.

1.2.2.2 Job creation and industry development

In a country faced by the intractable challenges of unemployment, poverty and inequality, a major procurement programme such as this has an undisputed imperative to contribute to the national development agenda. Through the ED scorecard, the REIPPPP is explicit in its commitment to employment and industrial development (IPP Office, 2019). Specifically, targets pertaining to preferential procurement and local content are oriented towards the support of domestic industry and its further expansion in support of the RE sector. Management control targets are in line with the country's Broad-Based Black Economic Empowerment (BBBEE) commitments. Additionally, job creation emphasises the necessity to drive local employment. As such, there have been various attempts to explore the impact of the REIPPPP on job creation, in conjunction with the development of an industrial sector that might drive the RE sector (Stands, 2015; Tyler & Steyn, 2018).

Mirroring employment and job creation dynamics in other sectors and industries, the REIPPPP has proved to be highly complex and politicised, not least because the numbers, which inform perspectives, are not always reliable or easily comparable. Tyler and Steyn (2018), in reviewing existing studies grappling with various aspects of the employment implications of RE, explain that the diverse claims and resulting misunderstandings are in part due to three intersecting issues. These are: the use of nonstandard employment metrics and categorisation methodologies; poor and inconsistent disclosure of study parameters; and uncertainty about future energy sector development paths (Tyler & Steyn, 2018). It is critical to recognise that these methodological inconsistencies have a role to play in shaping the claims made about the contribution of this fledging industry, in comparison to its well-established, and highly subsidised, carbon counterparts. Any inquiry into the employment implications must be located within this context. With that caveat established, the IPP Office reports (based on their employment metric, which draws on quarterly reporting from the IPPs) that the programme has created 40 134 job years[2] to date.

1.2.2.3 Economic development and community benefits

To date, the stipulated community benefit requirements have resulted in significant financial commitments towards local communities. This is mainly because three of the ED requirements in the RfP translate into

[2] Job year: the equivalent of a full time employment opportunity for one person for one year (IPP Office, 2019)

substantial 'place-based' investments, namely SED, EnD, and local ownership. After four bid window rounds, with a total of 92 approved wind, solar, hydro, landfill gas and biomass projects, the industry's collective commitment to community benefits amounts to upwards of R 50 billion. A total contribution of R 23.1 billion has been committed to SED, of which R 18.8 billion is specifically allocated to the local communities where IPPs physically operate (IPP Office, 2019). Commitments represented in community ownership structures (largely trusts) will receive a net income of R 26.9 billion over the life of the projects. EnD commitments total R 7.2 billion (IPP Office, 2019). Nonetheless, a summary of the aggregated financial commitment to ED drawing from the IPP Office's analyses at a programme level, falls short in capturing the complexity of community engagement practices.

1.2.3 Conceptual orientation: a complexity lens on sustainability transitions

The sustainability transitions literature represents the growing academic consensus on the need for transformations to sustainability (Scoones, Stirling, Abrol, Atela, Charli-joseph, Eakin, Ely, Olsson, Pereira, Priya, Zwanenberg & Yang, 2018). This literature has evolved as an attempt to understand the dynamics of long-term, multi-scalar change in complex socio-technical systems. It has also pioneered instructive frameworks, most notably the multi-level perspective (MLP), that explicitly aim to inform and enact systemic transitions that contribute towards sustainability (Loorbach, Frantzeskaki & Avelino, 2017).

The transitions literature functions as my core theoretical vantage point, with the wider transitions community being the primary academic audience for this research. This is primarily due to two aspects of this field that make it particularly appropriate. In the first instance, this is because of the focus of this literature on the 'stuff' of change (i.e., infrastructure and technology). But more fundamentally, its rootedness in a 'complexity lens', that is, the significance of a complexity-based epistemology and ontology for engaging with the interconnected nature of social and ecological systems. The important point to make at this stage is that this complexity lens allows for a constructive engagement with 'assemblage thinking' (McFarlane & Anderson, 2011), a framing I employ fruitfully in the critical analyses in Chapters 7 and 8. Both of these concepts (the complexity lens and assemblage thinking) are unpacked in detail below.

Sustainability transitions, as a research field, integrates a diversity of theoretical perspectives (from institutional theory, science and technology studies, to innovation theory and evolution economics) and engages with socio-technical systems as the key unit and object of analysis (Zolfagharian, Walrave, Raven & Romme, 2019). With some recent exceptions (van der Merwe, 2017; Hansen, Nygaard, Romijn, Wieczorek, Kamp & Klerkx, 2018; Ockwell, Byrne, Hansen, Haselip & Nygaard, 2018; Ramos-Mejía, Franco-Garcia & Jauregui-Becker, 2018) the sustainability transitions literature has predominantly emerged from, and addresses, the challenges of developed nations (Loorbach *et al.*, 2017; Wieczorek, 2018). This research aims to contribute to the rectification of this imbalance.

While the broader field of sustainability science represents a larger and more fragmented body of knowledge, the transitions community is primarily concerned with the socio-technical systems that fulfil critical societal functions. These systems are understood as multi-dimensional and co-evolving. Indeed, this emphasis on the co-constitutive nature of infrastructure, technology, and institutions of society is what distinguished the field of sustainability transitions (Köhler, Geels, Kern, Markard, Onsongo, Wieczorek, Alkemade, Avelino, Bergek, Boons, Fünfschilling, Hess, Holtz, Hyysalo, Jenkins, Kivimaa, Martiskainen, Mcmeekin, Susan, Nykvist, Pel, Raven, Rohracher, Sandén, Schot, Sovacool, Turnheim, Welch & Wells, 2019). Technology and infrastructures operate as the material artefacts for transition agendas. Reforming socio-technical systems is fundamentally political and requires targeted policy frameworks and governance practices. But these are not realities that are independent from each other, with 'stuff' on the one hand and 'people' on the other, because infrastructures are also profoundly relational in character (Larkin, 2013). Further, institutions and infrastructures are *co-constitutive* of one another, hence the continual unfolding of socio-technical systems (Labussière & Nadaï, 2018).

By way of illustration, for Pinker (2018: 717):

> It takes ongoing and extensive relational work between humans, elements and material artefacts to assemble, re-assemble and maintain the processes that constitute micro-wind energy as a functioning infrastructural system—in which neither human agency nor the demands of the material artefacts alone determines the outcome.

The relationality of infrastructures manifests in the obduracy and lock-in of socio-technical systems, but equally in their open-endedness and potential for reconfiguration (Unruh, 2002; Larkin, 2013). It is these tensions and possibilities for change in socio-technical systems that inspire and shape my positioning as a scholar of sustainability transitions.

At a deeper level, it is the theoretical grounding in a complexity-based ontology that is particularly intellectually appealing in my effort to grapple with socio-technical transitions. Underlying the predominant framing in the field, that of the co-evolutionary, multi-faceted, and multi-scalar nature of transition processes, is a recognition of the fact that 'reality' is comprised of nested complex adaptive systems (Loorbach, 2007; Avelino & Rotmans, 2009; Van den Bergh, Truffer & Kallis, 2011). This understanding of the nature of reality is best described as a complexity-based ontology, that is, not a mechanistic, deterministic worldview (Preiser, Biggs, Vos & Folke, 2018; Preiser, 2019).

For Preiser *et al.* (2018: 45):

> a complexity-based ontology stops us from seeing humans as positioned outside or above nature, which is only valued in terms of its usefulness to social systems. Instead, humans are seen to be fundamentally embedded in natural systems and to profoundly affect the Earth system and its biosphere.

This emphasis, and indeed fundamental starting point, is a defining feature of the posthumanist and new materialist approaches (Fox & Alldred, 2015, 2020a; Braidotti, 2018; Springgay & Truman, 2018). These demonstrate "a recognition that (post)humans are not separate from, but an intrinsic part of, the material world, and that all matter—animate and inanimate—has vital, self-organising capacities" (Fox & Alldred, 2020b: 271). The importance of this relational and complexity-based ontology for transitions research is that it shines a light on the (otherwise largely invisible) assemblage of intricate and contingent interdependencies between socio-technical systems and broader social-ecological systems. It is for this reason, that a complexity lens on sustainability transitions serves as my guiding conceptual orientation in this inquiry.

A complexity-based ontology thus empowers a complex adaptive systems approach, and indeed, the characteristics of complex adaptive systems are evident in socio-technical systems, such as the energy sector. According to Preiser *et al.* (2018), complex adaptive systems have six features, namely that (1) they are constituted relationally, (2) have adaptive capacities, (3) come about as a result of dynamic processes, (4) are radically opened, (5) are determined contextually, and (6) have novel qualities that emerge through complex causality.

These organising principles shed light on the attributes that characterise complex adaptive systems, but also have implications for research and practice (Preiser *et al.*, 2018; Preiser, 2019). Firstly, a complexity-based ontology, by recognising the attributes of complex adaptive systems, implies a shift in the focus of study, informs the choice of methods and analysis, and poses normative challenges for engagement (Preiser *et al.*, 2018). A shift in the focus of study takes place with respect to five dimensions: (1) from characteristics of parts to systemic properties; (2) from objects to relations; (3) from closed to open systems; (4) from measuring to capturing and assessing complexity; and (5) from observation to intervention (Preiser *et al.*, 2018).

Seen together, these dimensions necessitate being alive to dynamic patterns of organisation, interaction, and emergence within nested systems (those that enclose other systems and are simultaneously enclosed by other systems) of hierarchies and networks. A research process grounded in a complexity-based ontology that emphasises these practices necessarily implies a "process of framing the boundaries of the system that is observer-dependent and entails intervention that is quite different from that of objective observation" (Preiser *et al.*, 2018: 53).

A complexity-based ontology also affects the choice of methods for research engagement, as it introduces a radically different way of thinking about the world, one that departs from mechanistic, deterministic mindsets that have dominated Enlightenment thinking (Preiser *et al.*, 2018; Preiser, 2019). Preiser *et al.* (2018) suggest the following practical considerations that should guide any inquiry into complex adaptive systems. Researchers should (Preiser *et al.*, 2018):

- Consider the nature and structure of relationships among components in a system,
- Anticipate that systems will change and adapt, even if this is not easily predictable,

- Be vigilant of feedback loops that can lead to tipping points of regime shifts,
- Recognise that these systems are inherently unpredictable and deeply uncertain,
- Factor in that external variables outside of the system can impact its behaviour,
- Accept that system functions might change when context changes, and
- Refrain from trying to trace cause-and-effect interactions in linear and isolated causal trajectories.

Regarding the normative challenges of a complexity-based ontology for research, "there is no stepping out of complexity, and thus, there is no framework or frameworks that can claim objective engagement" (Preiser *et al.*, 2018: 51). Preiser *et al.* (2018: 51) continue that "any engagement with complex adaptive systems is based on the act of choosing a specific entry point, framework, or approach". Choices about frameworks, entry points, and methods need to be deliberate and reasoned, but they cannot be used as the basis for making objective knowledge claims (Preiser *et al.*, 2018). A complexity-based ontology therefore positions knowledge as provisional and transformative, calling both for epistemic modesty and ethical discernment in the business of generating knowledge amid the uncertainties of the Anthropocene (Preiser *et al.*, 2018).

In sum (Preiser *et al.*, 2018: 54):

> Complex adaptive system-based approaches provide guidelines to proceed differently in this world and call for more inclusive and integrative modes of engaging with real-world problems that are cognisant of how human wellbeing is embedded in the biosphere.

Following Preiser *et al.*'s (2018) insights about the implications of complex adaptive systems for research methods and practice, it is worthwhile locating the transdisciplinary research methodology as an approach to research that provides an enabling framework better equipped to respond to the considerations listed above.

Put simply, inquiring into and engaging with the world from a complexity orientation necessitates a commensurate research methodology. Transdisciplinary research aligns strongly with the epistemological, ontological and ethical implications of such a complexity orientation. This has been argued in depth recently by van Breda (2019) who presented the need for 'methodological agility in the Anthropocene' and framed transdisciplinary research as a strategy for grappling with the complex social-ecological challenges of the epoch's polycrisis. In light of this, Chapter 2 will elaborate how the methodological approach took the form of a qualitative transdisciplinary inquiry and employed a repertoire, or ensemble, of methods for data collection, organisation and analysis.

Having clarified my complexity orientation and provided the overarching rationale for a transdisciplinary research methodology, I now move to elaborate assemblage thinking. While assemblage thinking is one of the most contested concepts in social science and is engaged with from a multiplicity of perspectives, I employ it from a methodological and analytical orientation (Prince, 2010; Baker & McGuirk, 2017; Briassoulis, 2017). Anderson and McFarlane (2011: 126) assert that assemblage thinking, as methodology, "suggests a certain

ethos of engagement with the world, one that experiments with methodological and presentational practices in order to attend to a lively world of difference". With reference to its analytical contribution in the field of critical policy research, Baker and McGuirk (2017: 5) describe how assemblage thinking "offers a way of revealing, interpreting, and representing the spatially, socially, and materially diverse worlds of policy and policy making". To do so requires methodological agility and "an open and exploratory ethos, infused with a willingness to follow the empirical, sometimes, unexpected, leads" (Baker & McGuirk, 2017: 14). In short, assemblage thinking has strong affinities with a transdisciplinary inquiry rooted in a complexity-based ontology, and plays out as a methodological style as well as an analytical style of representing and engaging with the world (Kinkaid, 2019). Importantly, as Bueger (2013: 65) explains:

> In representing assemblages the scholar is inevitably entailed in the enactment of an assemblage. Scholars perform the world in distinct ways and not others. Representing an assemblage in an academic narrative hence always entails a political choice.

My research ambition can be described, to borrow Flyvbjerg's (2001) words, as 'practising social science that matters'. As a transitions scholar, I locate my research undertaking within broader efforts to advance transformations to sustainability. Doing research for 'a transformed world' demands a methodology that moves beyond generating only theoretical knowledge or technical know-how, to cultivating sound judgement for understanding and engaging with complex sustainability challenges. A transdisciplinary research approach embodies what Flyvbjerg (2001) presents as 'phronetic' social science since it is concerned with prudence, sound judgement, and thoughtful action in the face of complex challenges. I delve into how important it has been for my methodological praxis in Chapter 2.

Transdisciplinary research is aimed at finding strategies that address real-world problems through knowledge co-production and the bridging of academic and societal practice (Wickson, Carew & Russell, 2006; Hadorn, Hoffmann-Riem, Biber-Klemm, Grossenbacher-Mansuy, Joye, Pohl, Wiesmann & Zemp, 2008; Lang, Wiek, Bergmann, Stauffacher, Martens, Moll, Swilling & Thomas, 2012). A transdisciplinary research methodology is also appropriate as it responds directly to Preiser *et al.*'s (2018) provocation about the normative implications of a complexity-based ontology for knowledge generation. Knowing that there is no neutral ground for research, and not being able to step outside complexity, means admitting positionality and recognising context. Again, transdisciplinary research allows one to do just this, to 'attend to a lively world of difference'. With an emphasis on the constellation of roles that researchers embody in their collaborative interventions into 'real-world' problems, a transdisciplinary methodology cultivates reflexivity on the part of the researcher (Augsburg, 2014; Berger, 2015; Ness & Harnesk, 2018; Temper, McGarry & Weber, 2019; Wolff, Cockburn, De Wet, Bezerra, Weaver, Finca, De Vos, Ralekhetla, Libala, Mkabile, Odume & Palmer, 2019). Moreover, it expands the ways in which validity and verifiability are conceptualised as it strives for both scientifically robust and societally relevant research contributions (Lang *et al.*, 2012; Mitchell, Cordell & Fam, 2015; Klenk & Meehan, 2017).

My induction into sustainability science and transdisciplinarity began in 2013 when I enrolled in the Postgraduate Diploma in Sustainable Development at Stellenbosch University. My training as a transdisciplinary researcher in the field of sustainability transitions was further cultivated during my MPhil in Sustainable Development, also offered through Stellenbosch University. As a PhD candidate at the Centre for Complex Systems in Transition (CST) at Stellenbosch University, this commitment to transformative, collaborative research has deepened. My academic training continues to be enriched by my involvement in a research institution that has pioneered theoretical contributions about complex adaptive systems and advanced a global South perspective on transdisciplinary research. Strongly influenced by the institutional and academic culture at the CST, I am able to surface my normative orientation to research, seeing research as an engaged and political undertaking to actively bring about change, but equally, to challenge deeply held assumptions and generate new understanding.

1.3. Problem statement

South Africa's carbon-intensive political economy is dominated by a socio-technical electricity regime that generates and consumes coal-based electricity. This socio-technical electricity regime is characterised by the concentration of political authority, policy directives, and administrative oversight amongst a set of tight-knit (although not always coherently aligned) state institutions at national government level. Materially, this socio-technical electricity regime has long been spatially concentrated as well, involving the production of electricity from coal extracted from abundant deposits located in the Mpumalanga Province. However, since the South African government's introduction of policies to support RE-based electricity generation, the material basis of the electricity system is beginning to shift towards the inclusion of spatially dispersed and decentralised RE infrastructure into the national electricity grid.

Driven by a number of global and domestic factors, South Africa has set targets to achieve carbon emissions reductions and to enhance electricity supply security through the deployment of RE technology. In pursuit of these ends, the design of a brand-new procurement programme, the REIPPPP, enables private RE developers to compete to sell electricity to Eskom, thereby feeding into the national electricity grid. The IPP Office was appointed as the custodian and implementing agent of the REIPPPP, mandated with ensuring compliance by IPPs. This innovative institutional entity is constituted through a partnership between the Department of Energy, National Treasury, and the Development Bank of Southern Africa. Since its inception in 2011, at just the time when RE was in ascendance globally, the REIPPPP has materialised 92 large-scale RE projects dispersed across South Africa, built, owned, and operated by IPPs. The efficacy, transparency, and novelty of this competitive procurement programme has been internationally acclaimed. This international acclaim however, is also partly due to the fact that the 'rules of the game' of the REIPPPP are configured to include additional economic development targets, going beyond South Africa's standard public procurement stipulations, and diverging from international RE procurement practices.

The implementation of the REIPPPP, that is the execution of the 'rules of the game', has resulted in various unintended consequences, contradictions, and emergent potentialities, particularly with respect to the governance of place-based investments by IPPs in local communities across South Africa where significant development challenges are faced. In particular, tensions have been triggered by the way in which criteria in the REIPPPP are oriented towards corporate participation on the one hand (favouring price-competitive, risk-averse, and compliance-based behaviour by IPPs), while making a sizeable concession to economic development on the other (signifying an implicit recognition of the developmental potential of dispersed and decentralised RE infrastructures). Thus, it is clear that the REIPPPP has been conceptualised according to different logics of RE development. Seen together the significance of these interconnected logics is that the developmental potential embodied in the REIPPPP, and accentuated by the shifting socio-spatial dynamics of the unfolding energy transition, is constrained, thereby limiting the REIPPPP's capacity to meaningfully contribute to an energy transition that realises decarbonisation and development.

The sections below (1.4.1 and 1.4.2) outline the overarching research question and supporting sub research questions. Thereafter, the objectives of this research – in other words, the theoretical, empirical, methodological, and pragmatic goals of an inquiry into the governance of South Africa's energy transition – are described (section 1.4.3 and 1.5). Having clarified the research questions and objectives, I conclude this chapter with a survey of its various contributions (section 1.6) and an overview of the thesis (section 1.7).

1.4. Research questions and objectives

Before articulating the final research question, I describe its evolution and various iterations. This PhD research process did not proceed in a linear or stepwise fashion. Instead, pursuing a transdisciplinary research methodology, I set out to inquire with curiosity and openness (Darbellay, 2015; Haider, Matteo, Julie, Hamann, Masterson, Meacham, Merrie, Ospina, Schill & Sinare, 2017; Sovacool, Axsen & Sorrell, 2018). I proceeded with a basic level of understanding of South Africa's socio-technical energy regime and a high-level grasp of the REIPPPP. My initial interest was piqued by the increased focus, within South Africa's relatively small energy research network, on the ED requirements of the REIPPPP and their resultant developmental impacts for communities hosting IPPs (Tait, Wlokas & Garside, 2013; McDaid, 2014). Following early engagements with prominent researchers in this network (from the Energy Research Centre (ERC) and Graduate School of Business (GSB) at the University of Cape Town (UCT), as well as from the Centre for Renewable and Sustainable Energy Studies (CRSES) at Stellenbosch University (SU)), I pursued this general line of inquiry as I initiated fieldwork. This initial phase of the inquiry might be captured in the following question: *What are the developmental impacts of IPPs in small towns and rural communities where IPPs are located?*

Following the logic of abductive reasoning (elaborated upon further in Chapter 2) meant that, as I encountered a complex empirical reality, my theoretical framings shifted (Dubois & Gadde, 2002). This had the effect of maturing my research questions over time, which were redirected and refined as the research inquiry

advanced. I found it challenging to resist the desire for a stable, certain research question, and to instead sustain an "obstinate curiosity" (Goldfischer, Rice & Black, 2020: 7) and radical openness to shifting viewpoints and sometimes contradictory and unsettling realities (Temper *et al.*, 2019). Ultimately, this desire for clarity on a single, simple question was nullified with every encounter with the complexities of the context in which I was conducting research, but also as I expanded my theoretical base. As I confronted surprising observations or opposing perspectives, I was forced to evolve my conceptual lenses to better fit with the empirical realities. Similarly, as I forayed into new theoretical territories, I learnt new concepts which added to an increasingly colourful kaleidoscope of ideas.

The continual dialogue between theoretical concepts and empirical observations is what shifted the questions throughout the inquiry. The initial research question interrogating the developmental impacts of the REIPPPP turned out to be too narrow in focus. Maintaining some emphasis on the development impacts of IPPs, the question was expanded to ask: *How might IPPs be better integrated into the local economies where they are situated?*

Whereas the first research question was underpinned by a somewhat pessimistic assumption (that IPPs' activities do not result in optimal development outcomes in local communities) and oriented towards generating primarily systems knowledge (clarified in 2.2.2), the second iteration of the question took on a more constructive stance and shifted towards target and transformation knowledge (Hadorn *et al.*, 2008). In the first question, the development impact of the IPPs was treated as somewhat of a foregone conclusion, and answering it would have been limited to evidencing an already widely-held perspective in the South African media and research community (namely, that ED investments by IPPs do not result in meaningful development impacts (McDaid, 2014; Wlokas, 2015)). The second iteration of the research question drew on literature relating more to economic development and urban governance, with a focus on how various flows of investment into local economies might be better aligned to achieve more effective local service delivery and local economic development (LED) (Nel & Rogerson, 2015; Hoogendoorn & Visser, 2016). Looking into finance and economic development necessarily implied a stronger focus on questions of political economy and the forces shaping the design and implementation of certain policy frameworks within the dominant socio-technical regime.

As I observed shifts in the energy research community more globally, my interest in the political economy of energy deepened and took me towards the emerging literature on just transitions and energy democracy (Newell & Mulvaney, 2013; Jasanoff, 2018). I also noted how these concepts were beginning to gain traction in the South African energy policy context. A third iteration of the research question was the most normatively charged: *What are the prospects for energy democracy in South Africa?* I refer to this version as being more normatively charged as it captures the phase in the inquiry where the notion of energy democracy became explicit and served to guide the analysis going forward.

Each iteration informed the next; depicting them here is a useful record of the how the inquiry matured over time. They can also be seen to embody aspects of systems, target, and transformation knowledge, though with different emphases (the distinction between these different forms is elaborated in section 2.2.2). On the whole, the emergent nature of the overarching research question, as a cumulation of these prior iterations, demonstrates how complex societal problems become the impetus for jointly-defined scientific research questions.

In formulating the final composition of the research question, I returned to the enduring thread of governance and the manner in which complex transition processes are managed at various levels (Bolton & Foxon, 2015). On reflection, the recurring tension, or research 'problem', was a sense of socio-spatial incongruence in how the energy transition was manifesting across multiple planes in South Africa and how this seemed to stem from antinomies between the driving logics lodged within the REIPPPP's design. The research question stated below (section 1.4.1) is thus a culmination of a number of preceding questions and encapsulates the way in which transdisciplinary research questions are negotiated in the midst of complex sustainability realities.

1.4.1 Overarching research question

The research question driving this transdisciplinary inquiry is the following:

How, and to what extent, has the REIPPPP catalysed South Africa's transition to energy democracy?

1.4.2 Sub research questions

In light of the above overarching research question, this thesis aims to answer the following sub research questions:

Part A: Introduction and research design

1. In line with the praxis of phronetic social science, how was this transdisciplinary inquiry conceptualised and operationalised? (Chapter 2)

Part B: Literature analysis and conceptual framework

2. What theoretical concepts and conceptual framework are instructive for analysing the energy transition? (Chapter 3)
3. What are the dimensions of the global energy transition and what precedent do these set for the emergence of an energy transition in South Africa? (Chapter 4)

Part C: Empirical findings

4. How did the REIPPPP become embedded and evolve in the context of South Africa's political economy of energy? (Chapter 5)

5. How did the ZF Mgcawu District Development Coordinating Forum, respond to the unintended consequences, tensions, and contradictions in the design and implementation of the REIPPPP? (Chapter 6)

Part D: Interpretation, discussion, and recommendations

6. Seeing the REIPPPP as a policy assemblage, what interferences has it triggered in South Africa's political economy of energy? (Chapter 7)
7. What research insights and policy recommendations can be distilled for the design and implementation of utility-scale RE that might advance energy democracy in South Africa? (Chapter 8)

Before presenting the overarching research question, I elaborated its previous iterations and reflected on the 'final' version described in this thesis as the emergent outcome of a complex transdisciplinary research process. This was preceded by a clarification of my conceptual orientation and the extent to which a complexity lens shaped my epistemological, ontological, and ethical approach to research. Much like the evolution of the overarching research question, articulating the sub research questions was by no means a straightforward exercise that resulted in coherent, perfectly aligned questions. Instead, through the iterative and reflexive process of refining a research problem, crafting research questions and clarifying corresponding research objectives, I acknowledged their provisional nature and their contingent relationship with complex societal contexts. Therefore, I opted to ask research questions in broadly layman's terms and then answer these in broadly academic terms.

1.4.3 Research objectives

The objectives of the thesis include the following:

1. To contribute to the literature on sustainability transitions through the development of a distinctive strategic perspective on energy democracy as a developmental approach to energy transitions.
2. To generate deeper understanding about the governance of South Africa's energy transition through a rich account of the design and implementation challenges of the REIPPPP.
3. To contribute towards the advancement of a global South perspective on a transdisciplinary research methodology.
4. To inform the design and implementation of future RE procurement frameworks that might support the realisation of energy democracy in South Africa.

1.5. Introduction to the research design and methodology

Figure 3 below visualises the research design and transdisciplinary research methodology. This is further detailed in Chapter 2. The rationale for a transdisciplinary research methodology was substantiated earlier in this introduction (section 1.2.3). Here (Figure 2), I provide an overview of the research phases over the entire timeframe of the PhD process.

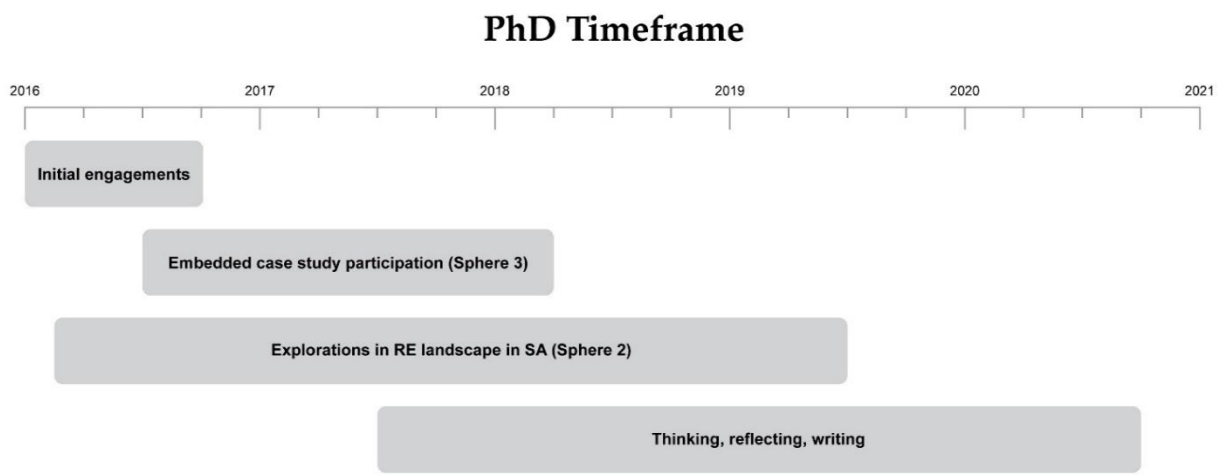


Figure 2 Research timeframe

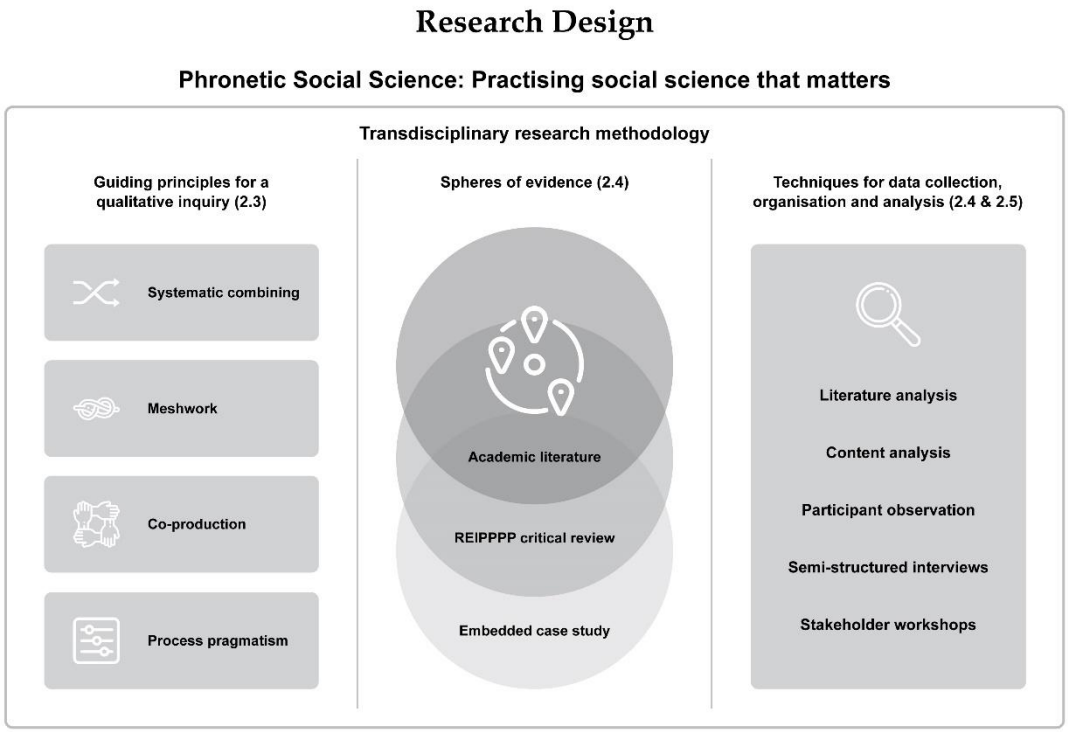


Figure 3 Research design

1.6. Contributions and significance of the research

Wellington (2013) explores what forms an original contribution can take as part of doctoral research, building on the original efforts by Philips and Pugh (2000) to grapple with what 'originality' means. Wellington (2013) defines seven different ways to demonstrate an original contribution. Wellington's (2013: 1496) categorisation of original contribution includes the following:

1. building new knowledge, e.g., by extending previous work or 'putting a new brick in the wall';

2. using original processes or approaches, e.g., applying new methods or techniques to an existing area of study;
3. creating new syntheses, e.g., connecting previous studies or linking existing theories or previous thinkers;
4. exploring new implications, for either practitioners, policy makers, or theory and theorists;
5. revisiting a recurrent issue or debate, e.g., by offering new evidence, new thinking, or new theory;
6. replicating or reproducing earlier work, e.g., from a different place or time, or with a different sample;
7. presenting research in a novel way, e.g., new ways of writing, presenting, disseminating.

These are instructive for conceptualising an expansive and generative perspective on the original contributions of the research and for this reason, I define my original contributions according to this framework.

	CONTRIBUTION	FEATURES
1	**Building new knowledge**	The case study of the Forum is a novel one having never been documented in previous academic studies. Thus, it presents a unique perspective on the implications of place-based investments by IPPs, and more broadly the challenges related to the implementation of the REIPPPP. The thesis, with its nested account of the global energy transition, the review of the South African energy transition and the grounded account of the Forum, together constitute a new contribution to the academic literature of energy transition processes, particularly in the global South. The analysis of the REIPPPP, enabled by the theory of socio-technical change, as a policy assemblage is a unique contribution and a novel analysis of this policy instrument. As such, it provides significant explanatory power about the provenance and evolution of the REIPPPP in particular, and RE policies in general. An analysis of the REIPPPP with respect to the manifestation of the social and corporate logics of RE development offers new knowledge about the nature of the South African energy transition. The knowledge contribution around the existence of these inter-connected logics of RE development are in turn relevant to the energy transitions literature more broadly.
2	**Using original processes or approaches**	The thesis presents a unique conceptualisation of a transdisciplinary research praxis that builds on the body of literature advocating for transdisciplinary research in the context of sustainability science. The distinctive features of the methodological praxis elaborated in the thesis are a unique perspective that has the potential to be engaged as a theory of change in other research processes going forward.
3	**Creating new syntheses**	The thesis employs assemblage thinking to bridge the literature on transitions, policy and governance in a novel way. In doing so, it helps to connect these bodies of literature in unique ways which results in the theory of socio-technical change explored in this thesis.

4	**Exploring new implications, for practitioners, policy makers, theorists**	The primary contribution of this thesis is examining the implications of the particular design and implementation of the REIPPPP in the context of the ZF Mgcawu District Municipality. This is done from the perspective of energy democracy where the unintended consequences, tensions, and emergent potentialities of the REIPPPP are brought to life through the grounded reality of the Forum. These are then made sense of as socio-technical interferences, which offer insights into the design of RE procurement programmes in support of energy democracy.
5	**Revisiting a recurrent issue, offering new evidence, new thinking, new theory**	While South Africa's energy transition is indeed a recent and largely nascent one, the REIPPPP has attracted significant academic interest, in particular, the economic development component thereof. In this way, it might be considered a recurrent issue, one that not only remained unresolved, but indeed, ever more challenging as the industry expands and matures.
6	**Replicating or reproducing earlier work**	This thesis did not aim to replicate or reproduce existing work but rather make use of theories and concepts within the broad sustainability transitions field in a context where they have been under-represented. It thus contributes to the application of sustainability transitions thinking to energy transition processes in the global South.
7	**Presenting research in a novel way**	This thesis is a product of a unique and novel qualitative inquiry. While the thesis is in the format of a traditional thesis, I have endeavoured to bring myself into the process as much as possible, being honest and reflexive about how this study has my unique 'signature' (see section 1.2.3 and section 2.3).

While the framing of these seven dimensions of original contribution provides a variegated and multi-dimensional approach to evaluating the usefulness of an academic study, it falls short in accounting for the contributions beyond a strictly scientific domain. To this end, it is generative to consider the significance of the study in ways that span the science-policy-society interface. To do so, I explore various dimensions (conceptual, theoretic, empirical, methodological, and pragmatic) of the study's significance.

Conceptually, this thesis advances the literature on sustainability transitions and energy transitions. It does so by exploring the relational aspects of transition processes. It problematises the unfolding directionality of South Africa's energy transition and argues that a transformative agenda of decarbonisation and development is needed for the radical restructuring of the political economy. It is important to note the relatively limited representation of empirical realities in the global South in the broader energy transitions literature. It is therefore my hope that the contribution that this thesis builds towards, is a deeper engagement with research emerging from the global South, in this case, specifically from South Africa. Furthermore, in terms of the theoretical contribution of this thesis, I acknowledge that the explanatory power of the conceptual framework developed may have limitations. For example, there is scope to complement the focus on sustainability transitions, policy and governance, with the inclusion of literature on social innovation and institutional work in the energy transition, for example. This limitation points to generative future research in the context of energy transition processes in the global South where these, and other bodies of literature, might provide fruitful avenues for theoretical advancement.

Empirically, this study illuminates the governance challenges within the REIPPPP by documenting a specific governance experiment that tried to contend with the programme's implementation at local level. The outcome of this thesis is a rich analytical account of an attempt to shift the trajectory and implications of a policy framework driving the South African energy transition. The inquiry into the REIPPPP and the case study of the Forum are demonstrative of the opportunities and associated challenges of decentralised and distributed RE infrastructure.

Methodologically, the thesis offers insights into the appeal, and indeed appropriateness, of transdisciplinary research in the global South, specifically as a way of approaching embedded research and co-production. It suggests that this kind of research approach might more fruitfully align with the sort of alternative governance approaches required to support and enable sustainability transitions.

Pragmatically, the study also contributes by presenting some practical policy considerations for the future design and implementation of utility-scale RE procurement programmes.

Weaving each of these contributions together, this thesis is a contribution to the 'situational intelligence' (a concept elaborated in section 2.2.1) required in this current moment in South Africa's energy transition. As the country faces an ever-worsening economic crisis, that is in many ways underpinned by a poorly performing electricity system, urgent policy choices are required to configure procurement frameworks to address these multiple, intersecting crises. This thesis offers some tentative insights about the potential and limitations of the REIPPPP in realising South Africa's prospects for energy democracy, and an energy system that might underpin more inclusive, sustainable, and equitable forms of collective life.

1.7. Overview of the thesis

The thesis is comprised of eight chapters which are organised into four parts.

Part A provides the introduction to the thesis and the research design.

In this introductory chapter, Chapter 1 of Part A, I described the background and motivation to the study through three aspects, namely the global interregnum in the transition to a sustainable world, the manner in which the REIPPPP has kickstarted an energy transition in South Africa, and how a complexity les informs my theoretical orientation and methodological approach. I also introduced the research questions and objectives, as well as the intended contributions, significance, and possible limitations of the study.

The research question driving Chapter 2 is: *In line with the praxis of phronetic social science, how was this transdisciplinary inquiry conceptualised and operationalised*? In response, I elaborate upon the virtues of a transdisciplinary research methodology for the purposes of a qualitative inquiry into the dynamics of South Africa's energy transition. I begin by outlining the evolution of my methodological praxis, guided by the notion of phronetic social science and animated through four guiding principles: systematic combining, meshwork, co-production, and process pragmatism. Thereafter I detail the collection, organisation, and analysis of the

data used to substantiate my claims about interferences triggered by the REIPPPP and what these mean for South Africa's transition to energy democracy. In doing so, I describe the strategies (in terms of practical methods and guiding principles) which equipped me to traverse a broad terrain of evidence spanning three spheres: an extensive body of academic literature, an investigation of the energy policy landscape in South Africa (primarily the REIPPPP), and immersion in a governance experiment 'on the ground' (the ZF Mgcawu District Development Coordinating Forum). This chapter also covers ethical considerations and a critical reflection of the experience of being a transdisciplinary researcher navigating the fluidity, and indeed tension, of a multiplicity of roles and functions during the course of the PhD process.

Part B covers the literature analysis and conceptual framework.

For Chapter 3, I ask the question: *What theoretical concepts and conceptual framework are instructive for analysing the energy transition?* To this end, in Chapter 3, I develop the study's operative conceptual framework through a literature analysis that begins first with elucidating my normative orientation towards energy democracy. Thereafter, I analyse the sustainability transitions literature, and then integrate policy and governance literature to construct a conceptual framework. The intention of this chapter is to provide a framework for describing and analysing multi-scalar energy transition processes, by looking at the global energy transition, how it mirrors and shapes South Africa's distinctive political economy of energy and nascent energy transition, and how these dynamics come to bear in a regional governance experiment (the Forum).

Recognising the significance of an international perspective, Chapter 4 asks: *What are the dimensions of the global energy transition and what precedent do these set for the emergence of an energy transition in South Africa?* Thus, in Chapter 4, I explore the dimensions of the global energy transition as the necessary first step towards understanding the dynamics of South Africa's energy transition and its place-based implications in the Forum. In this analysis of the academic and grey literature on the global energy transition, I present 'fossil capitalism' as the dominant political economy of energy and argue that distinctive characteristics of fossil fuels have engendered the socio-spatial relations, and associated political and economic institutions, that constitute modern life. I then investigate the democratic foundations of RE in Germany and Denmark in the early 2000s that leveraged the decentralised nature of RE technologies to advance locally-driven democratic agendas. I refer to this logic of RE development as a 'social logic' and contrast this to a 'corporate logic' that later eclipsed this modality. Thereafter, I explore the evolution of the global energy transition and the shifts in prevailing policy frameworks that have accelerated the expansion of RE across the globe. Assessing this policy evolution – from the feed-in tariffs that spawned the RE sector, to the competitive auctions that expanded corporate-oriented RE policies – I argue that the RE boom, as it began in frontrunner countries, was defined by a social logic, which was then overtaken by a corporate logic. It is from this vantage point that I then present the dimensions of the global energy transition currently, in terms of financial investment, technological advancement, and policy developments that are associated with this corporate logic of RE development. The final two components of this chapter point to the flailing fossil economy, the global climate, and sustainability

policies that, together, provide an opening for potentially reclaiming the democratic foundations of RE and strengthening progressive alternative imaginaries (such as that of energy democracy) for the energy transition.

Part C presents the empirical findings from the critical review of the REIPPPP and the embedded case study of the ZF Mgcawu District Development Coordinating Forum.

Having set in place a perspective on the global energy transition, Chapter 5 moves to explore the South African energy policy landscape and, in particular, the configuration and development of the REIPPPP. Therefore, for this chapter I ask: *How did the REIPPPP become embedded and evolve in the context of South Africa's political economy of energy?* The critical review of the REIPPPP that follows builds on the description of the dynamics of the global energy transition in the previous chapter to demonstrate how these came to bear in the design and implementation of the RE procurement programme. An exploration of the historical relations of incumbency in the minerals energy complex and the explication of the period of contestation leading up to the launch of the REIPPPP provide explanatory insights into how the procurement programme was moulded to South Africa's domestic socio-economic development challenges. This is supported by an examination of the prevailing energy governance and development planning regime in South Africa, into which RE infrastructures were assimilated. The chapter concludes with a of synthesis three broad governance challenges that have manifested as a result of the design and implementation of the REIPPPP.

Having set in place the national level dynamics, the following chapter drills into the regional and place-based implications of the REIPPPP. In this way, Chapter 6 asks: *How did the ZF Mgcawu District Development Coordinating Forum, respond to the unintended consequences, tensions and contradictions in the design and implementation of the REIPPPP?* In response, Chapter 6 presents a detailed case study of the ZF Mgcawu District Development Coordinating Forum in the Northern Cape of South Africa. The Forum is a regional coordination entity initiated by the IDC is 2015 that set out to address the governance challenges unleased by the REIPPPP (broadly defined in the previous chapter) within five local municipalities in the ZF Mgcawu District Municipality. This exploration deepens the understanding of these developmental and governance implications and demonstrates an experimental, innovative governance response to the challenges experienced by stakeholders within the REIPPPP. Thereafter, the case study serves as a lens through which to interrogate the ramifications of a particular policy design, from an energy democracy perspective.

Part 4 contains the discussion, analysis and recommendations for research, policy, and practice.

Bringing the thesis together through an integrative synthesis and analysis, Chapter 7 asks: *Seeing the REIPPPP as a policy assemblage, what interferences has it triggered in South Africa's political economy of energy?* The analysis is done in view of the framing of energy democracy, and enabled by the conceptual framework developed in Chapter 3. In response, the chapter first analyses the REIPPPP as a policy assemblage and then interrogates five 'socio-technical interferences'. The five socio-technical interferences triggered by the REIPPPP pertain to how it has contributed towards (1), evolving the 'just transition' discourse; (2), aligning

energy policy and climate action, (3), integrating economic development into energy policy, (4) breaking with centralised energy governance, and (5) enhancing regional collaboration.

Finally, in Chapter 8, the overarching research question is answered, drawing from the cumulative insights presented in the preceding chapters. Thus, Chapter 8 presents an overarching response to the following question: *How, and to what extent, has the REIPPPP catalysed South Africa's transition to energy democracy?* The chapter summaries each element of the thesis, progressing through Chapters 2 to 7, to demonstrate how the inquiry has addressed its stated questions and objectives. Finally, Chapter 8 concludes the thesis and suggests ways forward for research, policy, and practice.

Chapter 2
Practising social science that matters: a transdisciplinary inquiry

2.1 Introduction

This chapter explores the philosophical underpinnings and methodological approach that shaped my research process and culminated in this thesis. The first section (2.2) explores Flyvberg's (2001) concept of phronetic social science and its ineliminable connection with complex sustainability challenges. The second section (2.3) builds on this paradigmatic ambition of 'doing social science that matters' and outlines the rationale for a qualitative transdisciplinary research methodology. The four core principles that shaped the research are presented, namely, systematic combining, meshwork, co-production and process pragmatism. I argue that these principles illuminate the quality of the research praxis, giving voice to various dimensions of the iterative and emergent qualitative inquiry. Following this is a detailed description of the three spheres of research (section 2.4) that together constitute the broad 'landscape of evidence' assembled between April 2016 and April 2019. The techniques for data collection, organisation and analysis are then outlined (section 2.5), together with an overview of the phases of research. Finally, my positionality as a research and its ethical implications and reflected upon (section 2.6).

The ambition of this chapter is to substantiate my orientation to research (to make sense of how and why I followed the emergent process that I did) in a way that demonstrates a robust and credible research inquiry that fulfils the transdisciplinary research goals of scientific rigour and societal relevance (Regeer & Bunders, 2009).

2.2 Phronetic social science

Flyvbjerg's (2001) concept of phronetic social science has become instrumental in how I conceptualise and embody a transdisciplinary sensibility and engage the world through a complexity orientation (Preiser *et al.*, 2018). Sustainability science increasingly advocates for transformative and transgressive approaches to researching complex sustainability challenges (Fox, 2003; Lotz-Sisitka, Wals, Kronlid & McGarry, 2015; Lotz-Sisitka, Ali, Mphepo, Chaves, Macintyre, Pesanayi, Wals, Mukute, Kronlid, Tran, Joon & McGarry, 2016; Moser, 2016; Temper *et al.*, 2019; Vargas Roncancio, Temper, Sterlin, Smolyar, Sellers, Moore, Melgar-Melgar, Larson, Horner, Erickson, Egler, Brown, Boulot, Beigi & Babcock, 2019). As Muhar *et al.* (2013: 122) demonstrate, sustainability and the challenges of the polycrisis present an opportunity for reorienting and transforming academic research and learning. Addressing complex sustainability problems demands shifting from a 'science for society' approach to 'science with society' (Muhar *et al.*, 2013; Swilling, 2014).

The goals of transdisciplinary research are to produce both robust scientific knowledge and societally relevant insights (Regeer & Bunders, 2009). However, transdisciplinary research has been criticised as merely putting a new spin on participatory action research, or aiming to simply produce 'actionable' knowledge (Klenk, 2018).

Participatory action research has an explicit focus that is "to collaborate on the diagnosis of a problem and the development of a solution for research partners" (Mason, 2015: 498). The explicit focus on action and solutions is what distinguished this approach to co-production around problems defined and experienced by communities. Transdisciplinary research is similarly problem-driven in the defining of research problems in response to complex societal challenges. However, transdisciplinary research is not limited to the production of actionable knowledge and "moves beyond the confines of 'joining-up' individuals with pre-determined social positions and using integrative research methods to produce salient, legitimate and credible knowledge for decisionmakers" (Klenk, 2018: 317) Instead, transdisciplinary research is better framed as "a process of becoming, and not solely a means to an end" (Klenk, 2018: 317).

It thus becomes necessary to illuminate the foundational, paradigmatic notion of phronetic social science at the heart of transdisciplinary research. By doing so, the distinctiveness of the transdisciplinary approach becomes apparent: it deliberately aims to cultivate a praxis of sound judgement, discernment and insight, and thoughtful action in the face of complex sustainability challenges. Moreover, enacting and embodying *phronesis* in the research process goes beyond the extraction of information according to pre-determined frameworks and questions (as per conventional scientific research), and moves towards a joint inquiry by diverse actors into seemingly intractable problems, in order to find contextually-appropriate pathways forward. These pathways forward may indeed be actionable interventions but more importantly, include insight into the structural nature of complex social-ecological challenges and deeper awareness about the positionality of and interplay between actors.

2.2.1 Aristotle's intellectual virtues

Flyvbjerg (2001) explores the concept of phronetic social science, building on Aristotle's distinction between the three intellectual virtues of *episteme*, *techne* and *phronesis*. *Episteme* is understood as epistemology or scientific knowledge and *techne* as technology or technical knowledge. Each of these intellectual virtues can be broadly interpreted as resembling a different form of intellectual work; *episteme* resembles, to a large extent, the ideal modern scientific project, while *techne* represents craft and the application of technical skills. *Phronesis* is worth looking at in a bit more detail. Flyvbjerg (2001: 56) explains that "whereas *episteme* concerns theoretical know-how and *techne* denotes technical know-how, *phronesis* emphasises practical knowledge and practical ethics". Even though the original concept has no analogous contemporary term, it can be translated as ''prudence'' or ''practical common sense'' (Flyvbjerg, 2001: 57). The significance of *phronesis* as one of three intellectual virtues is that "the person possessing practical wisdom (*phronimos*) has knowledge of how to behave in each particular circumstance that can never be equated with or reduced to knowledge of general truths" (Flyvbjerg, 2001: 57). As such, "*phronesis* is a sense of the ethically practical rather than a kind of science" (Flyvbjerg, 2001: 57). For Flyvbjerg (2001: 57), it is the "intellectual activity most

relevant to practice". This sense of what is ethically practical requires consideration, judgement, and choice, all of which have significant implications for practising social science from a transdisciplinary perspective.

Importantly, *phronesis* is a skill cultivated over time - it is only through experience and practice that it can be learned. Hursthouse (1999), in the context of virtue ethics, frames *phronesis* as 'situational intelligence' or 'the ability to read the room'. This ability 'to read the room', to discern likely consequences of certain actions or inactions for different actors is a competency that forms from experience. Thus, practising transdisciplinary research as phronetic social science was an experiential unfolding, where I was indeed wiser at the end than when I began. By way of example, ultimately, my experience with the Forum taught me that while the group spoke about the need for formal procedures and coherent long-term strategies, what was even more vital were safe spaces for sharing and trust building. In this way, engagements tended to follow the unfolding needs of the group, rather than holding strictly to pre-determined objectives. This played out for example in Forum workshops where, instead of keeping the group fixed to the pre-agreed agenda and structure, we followed the energy in the group around conversations that might not have fitted neatly with the purpose of the workshop, but were necessary to clarify implicit assumptions, address points of tension or contribute towards shared understanding.

2.2.2 Practising transdisciplinary research as phronetic social science

Flyvbjerg's (2001) intention is to develop an alternative conception of social science, one based on context, judgement, and practical knowledge, one that transcends the conventional tension between the natural and social sciences. The principal objective for social science that embodies a phronetic approach is to carry out research aimed at both social commentary and social action, that is, a research praxis (Flyvbjerg, 2001: 60). A central question in conducting social science as *phronesis* is 'what should we do?'. As such, this goes beyond mere understanding or critique, to also integrating questions pertaining to judgement, choice, and thoughtful action. Social science research, then, has the goal of producing input "to the ongoing social dialogue and praxis in a society, rather than to generate ultimate, unequivocally verified knowledge" (Flyvbjerg, 2001: 139). Flyvbjerg (2001: 140) goes on to say that

> Phronetic social science explores historic circumstances and current practices to find avenues to praxis. The task of phronetic social science is to clarify and deliberate about the problems and risks we face and to outline how things may be done differently, in full knowledge that we cannot find ultimate answers to these questions or even a single version of what the questions are.

Thus, importantly, the praxis of transdisciplinary research is distinguished by an epistemic humility. This is significant in the context of the discussion of research questions (section **Error! Reference source not found.**) being provisional and contingent.

The intention of phronetic social science is to help build society's capacity to elucidate where we are, where we want to go, and what is desirable, according to the diverse values and interests represented therein. Transdisciplinary research requires the application of intellectual virtues that go beyond theoretical and technical know-how, to cultivating practical wisdom about how to engage with complex sustainability challenges and shaping a praxis that might bring about "a transformed world" (IRENA, 2019). In essence, transdisciplinary research embodies this question of 'what should we do?'. As the field of sustainability science has expanded in recent decades, transdisciplinarity has also risen in interest and popularity, which is unsurprising given its suitability as a methodology to approach complex sustainability challenges (Scholz, Lang, Wiek, Walter & Stauff, 2006; Pohl & Hadorn, 2007; Hadorn *et al.*, 2008; Jahn, 2008; Swilling, 2014; Fam, Palmer, Riedy & Mitchell, 2017; Padmanabhan, 2018; van Breda & Swilling, 2019).

It is here that the concept, 'assemblage thinking', is worth expanding on, both for the bearing it has on transdisciplinary research generally and for its strong influence in this particular study. In short, assemblage thinking is concerned with how things come to be, how relations between human and non-human elements are formed, hold together, evolve, morph and mutate. In approaching social realities with assemblage thinking, research 'problems' present "enduring puzzles about process and relationship" (Bueger, 2013: 60). For Bueger (2014: 60), "assemblage thinking provides a parsimonious and open ontological vocabulary meaningful for conducting empirical research". Following Preiser *et al.* (2019), for empirical research, assemblage thinking implies studying 'the practices of relating' and the concepts of assemblage should "be taken as a vocabulary that offers us a contingent system of interpretation which allows us to make empirical statements" (Bueger, 2014: 65) about these 'enduring puzzles'. Embodying assemblage thinking in a transdisciplinary inquiry "implies an attention to detail and the mundane activities of doings and saying by which realities are enacted, relations are built and orderings take place" (Bueger, 2013: 65). This rootedness in context and aliveness to multiplicity is significant since, for Russell, Pusey and Chatterton (2011: 578) "theories become almost meaningless, and often depoliticised, when abstracted from the contexts that created them".

Jahn, Bergmann and Keil (2012: 4) position transdisciplinarity as

> a reflexive research approach that addresses societal problems by means of interdisciplinary collaboration as well as the collaboration between researchers and extra-scientific actors; its aim is to enable mutual learning processes between science and society; integration is the main cognitive challenge of the research process.

Polk (2015: 111) presents an alternative orientation to transdisciplinary research, defining it as "participatory and stakeholder-based forms of knowledge production that are characterised by the inclusion of both multiple disciplines and practice-based knowledge and expertise in the knowledge production process". This is because transdisciplinary research is "consistent with the idea of an intrinsic interwovenness or co-evolution of science and society" (Regeer & Bunders, 2009: 28). Furthermore, transdisciplinary research advocates that the

responsibility for solving unstructured societal problems does not lie with one particular domain, but rather comes out of the co-production of knowledge. Thus, transdisciplinary research aims to address sustainability challenges through knowledge co-production and the bridging of academic and societal practice.

The grand challenges of sustainability transitions form the impetus for jointly-defined scientific research questions. These questions can be aimed at generating different forms of knowledge. Transdisciplinary research is a form of participatory knowledge co-production, aimed at generating systems, target, and transformation knowledge (Regeer & Bunders, 2009):

- Systems knowledge corresponds to understanding about the problem context and state of affairs
- Target knowledge refers to desirable futures and collective goals
- Transformation knowledge focuses on the strategies for how to bring about such change

Pohl, Hadorn and der Wissenschaften Schweiz (2007) set out four key principles for transdisciplinary research. The first, "elaborating knowledge of immediate social relevance" (Pohl & Hadorn & der Wissenschaften Schweiz, 2007: 6), is about coming to terms with complexity by considering the knowledge relevant to practice-oriented problem-solving. It is "necessary to find out what kind of systems perceptions underly a project, what normative targets it has set itself, and what potential societal transformation it aims towards" (Pohl *et al*., 2007: 6). The final three principles of transdisciplinary research are "achieving effectiveness through contextualisation" by developing knowledge which is embedded in scientific and real-world contexts; "achieving integration through open encounters" by being cognisant of one's own perspectives within a space of engagement amongst varied stakeholders; and finally "developing reflexivity through recursiveness" by ensuring space for project iterations, refinements, or adjustments (Regeer & Bunders, 2009: 6). With respect to positionality (the stance of positioning of the researcher in relation to the social and political context of the inquiry), Flyvbjerg (2001: 61) notes that "phronetic researchers can see no neutral ground, no 'view from nowhere,' for their work". An aliveness to context and positionality is strongly emphasised by phronetic social science, assemblage thinking, and is indeed also what distinguishes transdisciplinary research.

2.3 Guiding principles for a qualitative inquiry

Transdisciplinary research as 'social science that matters' was the philosophical foundation and normative orientation of this research. It provides the justification for a qualitative research methodology operationalised by a repertoire of methods for data collection, organisation, and analysis. Four principles (each of which is described in turn in sections 2.3.1 to 2.3.4) constitute the methodological praxis I cultivated during the five-year process. Each of these principles shed light on distinctive yet intersecting dimensions of the qualitative inquiry.

Before turning to these principles, it is important to first justify the framing of this research as a qualitative *inquiry* into the complex, political, and dynamic social reality of South Africa's electricity sector. This 'definitional issue' of whether to engage with qualitative *research* or qualitative *inquiry* is located within a

complex historical discourse around the very 'business' of social science. Broadly, qualitative research is a set of interpretive activities deployed across diverse disciplines that is aimed at learning about complex social realities and is rooted in pragmatist traditions (Leavy, 2014; Denzin, 2016; Saldaña & Omasta, 2017; Labussière & Nadaï, 2018). Saldaña (2015) distinguishes inquiry from research, by positioning the former as the act of wayfaring, and the latter as a systematic investigation. Denzin and Lincoln (2018: 44) explain that research is distinctive from inquiry and that "*inquiry* implies an open-endedness, uncertainty, ambiguity, praxis, pedagogies of liberation, freedom, resistance".

For Saldaña (2015: 3), "qualitative inquiry, by nature, is a customised, inductive, emergent process that permits more of the researcher's personal signature in study design, implementation and write up". Leavy (2014: 1) presents the "essence of qualitative inquiry as a way of understanding, describing, explaining, unravelling, illuminating, chronicling, and documenting social life—which includes attention to the everyday, to the mundane and ordinary, as much as the extraordinary". These perspectives capture how a qualitative inquiry is "a site of multiple interpretive practices" (Denzin & Lincoln, 2018: 46) which necessitates discernment on the part of the researcher.

Saldaña (2015) elaborates what it entails to think qualitatively, that is, the qualities and 'methods of mind' required to consolidate insights gained through the research process. He describes qualitative thinking as a (Saldaña, 2015: 3) including

> the canon of logical reasoning methods, such as inference-making and deduction, as well as more artistic constructions of life, such as symbolism and metaphor. There is no one way to think qualitatively, rather, it is a repertoire of methods, consciously applied on an automatic or as-needed basis, and some of them working subconsciously and brought forward to consciousness in a serendipitous moment of connection, synthesis or crystallisation – i.e., consolidation.

Thinking qualitatively encapsulates the thinking patterns and mental operations that are cultivated throughout a qualitative inquiry; for example, the act of "purposively adopting different lenses, filters and angles as we view social life so as to discover new perceptions and cognitions about the facets of the world we're researching" (Saldaña, 2015: 4).

Embodying qualitative thinking in the research process requires researchers to "use creativity, sensitivity and flexibility as we try to make sense of life as it unfolds" (Mayan, 2016: 11). A qualitative inquiry invites context, complexity, contradiction, and ambiguity. Moreover, it necessitates strategic decisions on the part of the researchers to position themselves within a research context and thus open a window onto the process of change at hand (Shore, Wright & Però, 2013).

The distinctive qualities of this qualitative inquiry can be better understood with reference to the following four dimensions mentioned above:

- ‘Systematic combining’ describes the abduction approach to theoretical development.
- ‘Meshwork’ describes the art of threading connections between diverse encounters, moving as wayfaring across multiple planes.
- ‘Co-production’ refers to the creation of appropriate arenas in order for actionable, situated knowledge to be created.
- And finally, ‘process pragmatism’ emphasises continual reflection and recalibration during a research process.

Together these features substantiate my situated research praxis based on judgement, choice, and consideration. Each applied differently across the broad landscape of evidence (see Figure 4). For example, an abductive logic underpinned the entire process, whereas co-production and process pragmatism related most strongly to the embedded case study and series of multi-stakeholder engagements. Meshwork captures the work of intermediation as I moved as something of a ‘wayfarer’ between contexts.

2.3.1 Systematic combining: the dance of empirical observation and theoretical development

Systematic combining is an approach to case study research that recognises the continual and iterative confrontation between theory and the empirical world that takes place throughout the research process (Dubois & Gadde, 2002, 2014). The tension between theory and concepts on the one hand, and a real-world context on the other, is however a generative confrontation and continual source of learning. Framed as a ‘dance’, implies fluidity, movement and reciprocity, instead of linear, one directional interaction. As a dance between empirical observation and theoretical development, this approach to research makes sense of how theoretical frameworks, empirical fieldwork, and case analysis evolve simultaneously and indeed in support of one another (Dubois & Gadde, 2014).

Conceptualised by Gadde and Dubois (2002, 2014), systematic combining is an abductive approach to case study research, in that there is a continual back and forth movement between empirical observation and theoretical development. Abduction is a mode of reasoning that differs from inductive and deductive inference and relies strongly on creativity and associative thinking (Dubois & Gadde, 2014). It entails the ability to form associations, by relating empirical observations to theory and concepts, and results in plausible, valid interpretations. For Danermark, Ekström, Jakobsen and Karlsson (2002: 93):

> Besides comprehensive knowledge of established alternative theories, models and frames of interpretation, abduction requires a creative reasoning process enabling the researcher to discern relations and connections not evident or obvious – to formulate new ideas about the interconnection of phenomena, to think about something in a different context, an ability to ‘see something as something else’.

Informed by Dubois and Gadde's (2014) approach, I cultivated a tight and evolving assemblage of conceptual frameworks, theoretical concepts, and bodies of literature. This emerged in parallel with the empirical fieldwork, and in response to the service of the empirical realities and tensions I encountered. The result of this generative confrontation and continual integration was that new dimensions were continually revealed. Moreover, to a large extent, the empirical reality drove the theoretical development and the maturation and clarification of the conceptual framework.

Systematic combining is empowering in the way in which it recognises the primacy of a rich empirical context that then converges with diverse theoretical concepts and, through a process of integration and cross-fertilisation, results in the generation of instructive case studies. Dubois and Gadde (2014: 1280) reflect on how often the case 'selects' the research, and not the other way around, in the sense that "sometimes interesting empirical observations connect a researcher with a particular reality that provides opportunities for identification of exciting research phenomena".

An abductive strategy – that is, moving between empirical exploration and theoretical development – implies agency and resourcefulness on the part of the researcher. This was certainly true for this research, where I engaged to some extent as a 'bricoleur' (Haapala & White, 2018; van Breda & Swilling, 2019), collecting and arranging insights and observations in the midst of non-linear, emergent, and multi-scalar encounters. Moving through the process, I made use of diverse and creative strategies that rose up as I was confronted with new ideas. In this way, transdisciplinary research became much more about cultivating resourcefulness rather than deploying a predetermined and pre-developed suite of theoretical concepts or methodological tools.

2.3.2 Meshwork: wayfaring amidst diverse encounters

Klenk (2018) proposes the image of meshwork as a metaphor to describe stakeholder-engaged research. Here, meshwork becomes an empowering lens through which to "describe research practices that are more responsive to the unique pattern of relations that are encountered during research" (Klenk, 2018: 316). Meshwork productively positions transdisciplinary research as "a process of becoming, and not solely a means to an end, i.e. producing 'actionable' knowledge" (Klenk, 2018: 317). In this way, diverse encounters and multifaceted participation along the way are just as valuable as the possible outputs of a transdisciplinary initiative for fostering transformation. Klenk's (2018) application of the meshwork analogy to transdisciplinary research builds on Ingold's (2011) work which conceptualises life as "that lived along lines of becoming". 'Lines' imply emergence, openness, contingency, continuity, history, and narrative (Ingold, 2011). Transdisciplinary meshwork thus reframes research as an attunement to difference, bearing witness to intersecting encounters, and threading together patterns of relations and insights.

Ingold's (2011: 85) concept of wayfaring is also empowering for moving through, and making sense of, a research inquiry in the face of various entanglements. Wayfaring signals a meandering through social contexts

and an aliveness to the features of the landscape. As van Breda and Swilling (2018) describe, the research process is designed as it unfolds; it emerges from and within a fluid context.

Cunliffe (2018: 1433) provides an evocative account of research as wayfaring, saying:

> Wayfaring humanifies the researcher because it requires that we recognise that we are alive, embedded in a landscape (physical, organizational, etc) and always becoming and learning. As human beings, we are open and sensitive to what's happening around and beyond us because "lives are led not inside places but through, around, to and from them, from and to places elsewhere" (Ingold, 2011: 148). We are in touch with our surroundings as our feet come in contact with the ground: as we talk with people, observe meetings, navigate buildings, etc. Wayfaring is the embodied experience of walking/moving along paths in our research landscapes paying attention—where attend means to wait and be open to what may unfold. We can prepare for the activity of walking/research with a backpack of tentative interests and ideas, with a commitment to the craft or art of inquiry rather than to a fixed position, control or prediction. The latter is destination-oriented in the sense the researcher is transported (moved from point to point) along a ready-formed path—often in a disengaged way observing, classifying and categorising objects along the way. As an embodied feeling person moving in the landscape, the wayfarer threads her way through the world following different paths, moving with others and noticing sound, feeling and the features of our social landscape that need traversing, climbing and re-mapping.

Cultivating the sensibility as a wayfarer was instrumental for threading, untangling, and reconnecting as I traversed multiple spheres of evidence (discussed later in section 2.4 below). Much like the dance between theoretical insights and empirical observations, a similar sensibility was cultivated amidst the diverse encounters that characterised the research experience.

2.3.3 Co-production: facilitating arenas for shared undertakings

Co-production goes beyond stakeholder engagement towards the shifting of institutional arrangements that structure the relationships between knowledge and power, science and society, and state and citizens (Wyborn, Datta, Montana, Ryan, Leith, Chaffin, Miller & van Kerkhoff, 2019; Turnhout, Metze, Wyborn, Klenk & Louder, 2020). Co-production emphasises the "joint responsibility of involved actors as relevant sources of situated and scientific knowledge, in situ, context based, problem solving" (Polk, 2015: 111). Polk goes on to describe that "co-production occurs through practitioners and researchers participating in the entire knowledge production process including joint problem formulation, knowledge generation, application in both scientific and real-world contexts, and mutual quality control of scientific rigor, social robustness and effectiveness". Schuttenberg and Guth (2015: 1) position co-production as "an inclusive, iterative approach to creating new information; it is distinguished by its focus on facilitating interactions between stakeholders to develop an integrated or transformational understanding of a sustainability problem".

Harvey *et al.* (2019) unpack the 'promises of co-production', citing two contrasting interpretations of the value of co-production emerging from the literature. Firstly, co-production is framed as a concept that "offers new ways of knowing and representing the world across social and natural orders" (Harvey *et al.*, 2019: 2). In this understanding, co-production challenges conventional disciplinary distinctions and invites "a more conscious reflection on how science and society constitute one another" (Harvey *et al.*, 2019: 2). A second interpretation presented in the literature is the value of co-production as an instrument for creating 'usable knowledge' on pressing sustainability challenges and ensuring these insights inform relevant decision-making processes (Harvey *et al.*, 2019). These two interpretations surface a tension between the *outputs* of co-production (being new knowledge or tangible solutions) and seeing the *process* of co-production as an outcome in and of itself. The former represents an instrumental perspective and the latter a more ontological and normative emphasis on co-production as emergent in the interactions between actors (Harvey *et al.*, 2019).

Following from the discussion of the 'promises of co-production' elaborated by Harvey *et al.* (2019), Pohl *et al.* (2010) suggest two main approaches to operationalising co-production and structuring diverse interactions between stakeholder groups. The process of co-production can either be brokered by boundary organisations or cultivated within facilitated spaces of collaboration. In the second example, instead of intermediaries brokering between stakeholders across boundaries, co-production can be cultivated within 'an agora'. In this case, stakeholders participate in a permeable, collaborative endeavour that requires careful facilitation and structuring (Harvey *et al.*, 2019; Pohl *et al.*, 2010).

For my methodological praxis, the normative value of co-production as an emergent process outweighed the instrumental value of a more instructive perspective. Even so, they are not mutually exclusive, and indeed both were operationalised. Co-production was cultivated as a means to an end *and* an end in itself, through a process that leaned more towards the 'agora' framing of co-production. This follows the view that co-production, as a mode of transdisciplinary engagement that emphasises joint responsibility and shared investment by stakeholders across the science-policy interface, cannot take place in conventional forums or institutional structures. As such, a significant subset of the literature on transdisciplinary research concerns the creation of conducive settings within which knowledge co-production can take place (Drimie, Hamann, Manderson & Mlondobozi, 2018; Fritz & Binder, 2018; Marshall, Dolley & Priya, 2018; Pereira, Frantzeskaki, Hebinck, Charli-joseph, Drimie, Dyer, Eakin, Galafassi, Karpouzoglou, Marshall, Moore, Olsson, Zwanenberg & Vervoort, 2020). This literature focuses on the relational spaces and transformative arenas that support change processes. For Pereira *et al.* (2020), the potential of co-production is that it might shift arenas of engagement from relational spaces to transformative spaces.

2.3.4 Process pragmatism: prioritising reflexivity and recalibration

Mainstream literature on transdisciplinary research strongly pushes for solutions-oriented research that responds to jointly-produced problem statements (Roux, Nel, Cundill, O'Farrell & Fabricius, 2017). A narrow

understanding of this preference for solutions, outputs, and impacts, has the potential to limit the contributions of research when it is approached as a process of becoming, like it is in this thesis. Here, insights from process pragmatism are helpful in honouring research as process. In doing so, process pragmatism prioritises attention to positionality, reflexivity and recalibration.

Process pragmatism emphasises the primacy of context, of open-endedness, and of contingency in cultivating responses. A pragmatic philosophy emphasises that "all assumptions and beliefs should be thoroughly examined and critiqued in the context of the present with the potential for revision when necessary" (Harney, McCurry, Scott & Wills, 2015: 319). This has implications for acting in a research context because, if it is conducted "according to a set of preconceived assumptions about any given reality, it shuts own opportunities for *new* problems, ideas and solutions to be identified through the process" (Harney *et al.*, 2015: 324). Harney *et al.* (2015: 318) describe a process pragmatist as an engaged practitioner "skilled in the art of relationship building, listening, collaborating and acting with others". Process pragmatism calls for humility, reflexivity, and prudence in shaping and reshaping the research processes. Additionally, it relinquishes a strict focus on hard and fast research outputs, and instead elevates the significance of the research process itself and the identification of more pragmatic, tentative contributions. In this way, process pragmatism points to a wider view of what impact and solutions there might be—for, as Latour (2017: 26) states, "to describe is always not only to inform but also to alarm, to move, to set into motion, to call to action, perhaps even to sound the death knell". This dimension of the methodological praxis was significant for continually emphasising reflexivity and recalibration, most evident in the domain of my involvement with the Forum. As will be detailed in Chapter 6, the facilitated intervention with the Forum faced many challenges which ultimately meant that the join undertaking we embarked on in the Forum could not be realised. Nonetheless, continual adjustment of expectations and activities meant the 'all was not lost' for the Forum.

2.4 Techniques for data collection across three spheres of evidence

The methodological praxis, described through the four guiding principles spelled out in section 2.3., was cultivated as I moved between three spheres of evidence between 2016 and 2019: an extensive body of literature, a policy-level analysis of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), and an embedded case study of the Forum. This movement, or dance as I described it in section 2.3.1, between grounded empirical realities and theoretical contributions was justified as a strategy to contribute towards validity and rigour in this qualitative inquiry (Creswell & Miller, 2000). Recognising that "evidence has to be produced, constructed, represented" (Denzin & Lincoln, 2018: 51), traversing this broad landscape of evidence ensured a convergence amongst multiple sources of information, together with vital opportunities for corroboration, clarification, and reflection. This reliance on multiple forms of evidence is conventionally described as 'triangulation', where researchers triangulate across data sources, theories, methods, and perspectives (Creswell & Miller, 2016).

In reality, this landscape of evidence was by no means a static topography but, for the purposes of representation, is presented here in the form of relatively stable spheres of evidence. The first sphere of evidence was the extensive body of academic literature I assembled that provides the basis for the conceptual framework (Chapter 3) and the account of the global energy transition (Chapter 4). The second sphere of evidence was the policy-level review, comprising multi-level engagements across South Africa's energy sector between 2016 and 2019. The third sphere of evidence was the embedded case study of the Forum that was conducted between April 2016 and April 2018.

Traversing this landscape of evidence was made possible by the methodological praxis elaborated in section 2.3, and animated by a repertoire of data collection techniques, suitably applied to each of these contexts. Within each sphere of evidence, tables are included that detail its constituting elements, for example, the elaboration of participant observation (2.4.2.1) within the second sphere of evidence translates as a list of events, meetings and workshops that were pertinent to the research process. In the presentation of findings in later chapters, some of these elements are referenced to demonstrate linkages to the empirical work, hence the inclusion of a corresponding code for citation purposes. Importantly, the list of research encounters included here falls short in capturing the extent of a rich and multi-faceted inquiry, however, they do signify the most relevant and significant encounters in the overarching research journey.

Figure 4 below, first introduced in section 1.5, visualises the interplay between the methodological praxis, the three spheres of evidence and the respective research methods.

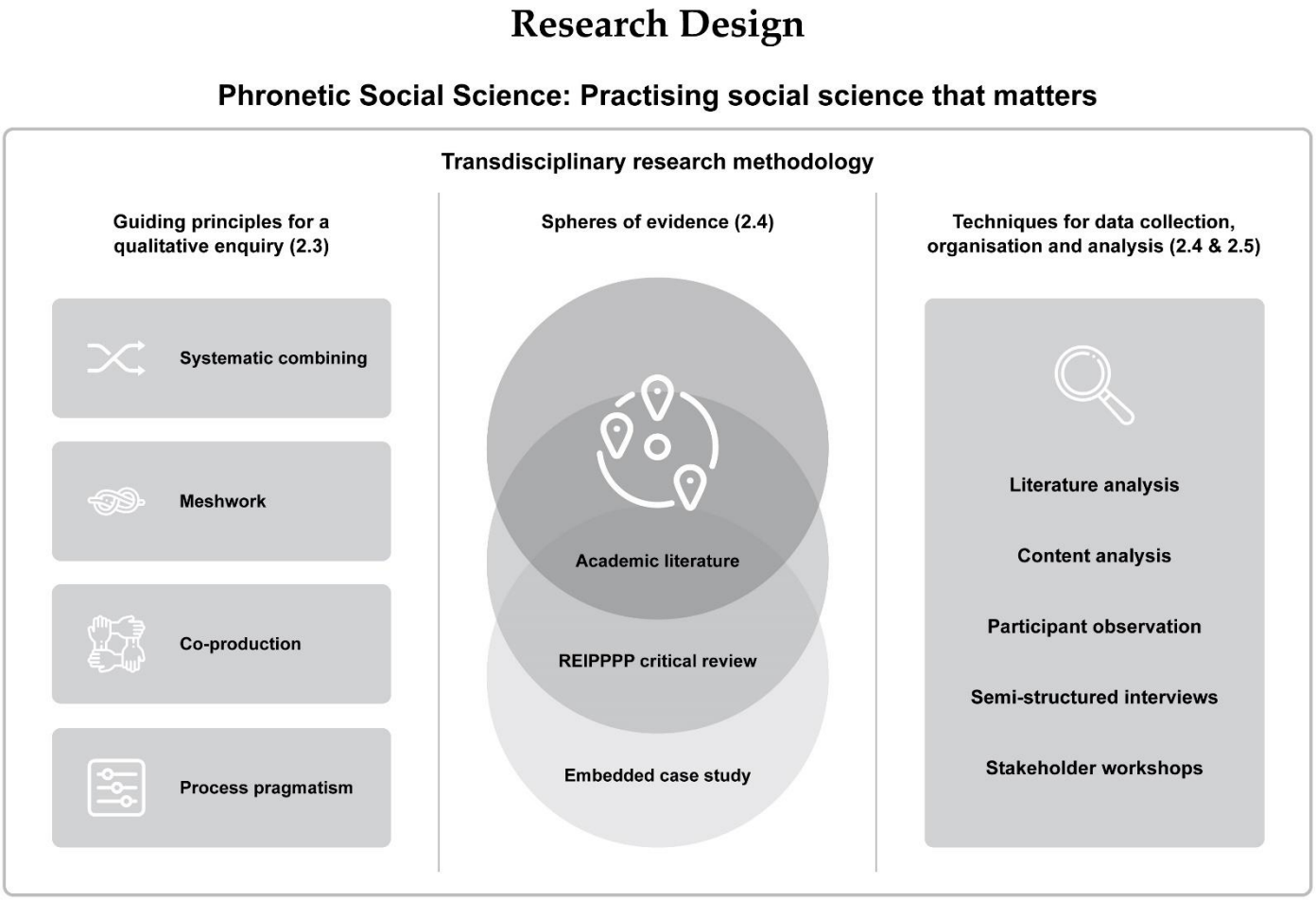


Figure 4 Research design

2.4.1 Assembling an extensive body of academic literature

Academic literature was pivotal in this qualitative inquiry, as it provided theoretical entry points and conceptual vantage points for interrogating the empirical realities of South Africa's energy transition. Applying an abductive mode of inference meant, however, that my consultation with academic literature did not take place in a stepwise, linear fashion. Instead, a fluid dialogue between empirical observations drove theoretical exploration, and in turn, insights gleaned from literature informed further empirical investigation. This 'systematic combining' is most clearly demonstrated in the distinctive phases in the inquiry, as notated in the evolution of the research question (section 1.4).

A retrospective analysis of the assembled bodies of literature results in Figure 5 which captures distinctive clusters of literature positioning this inquiry.

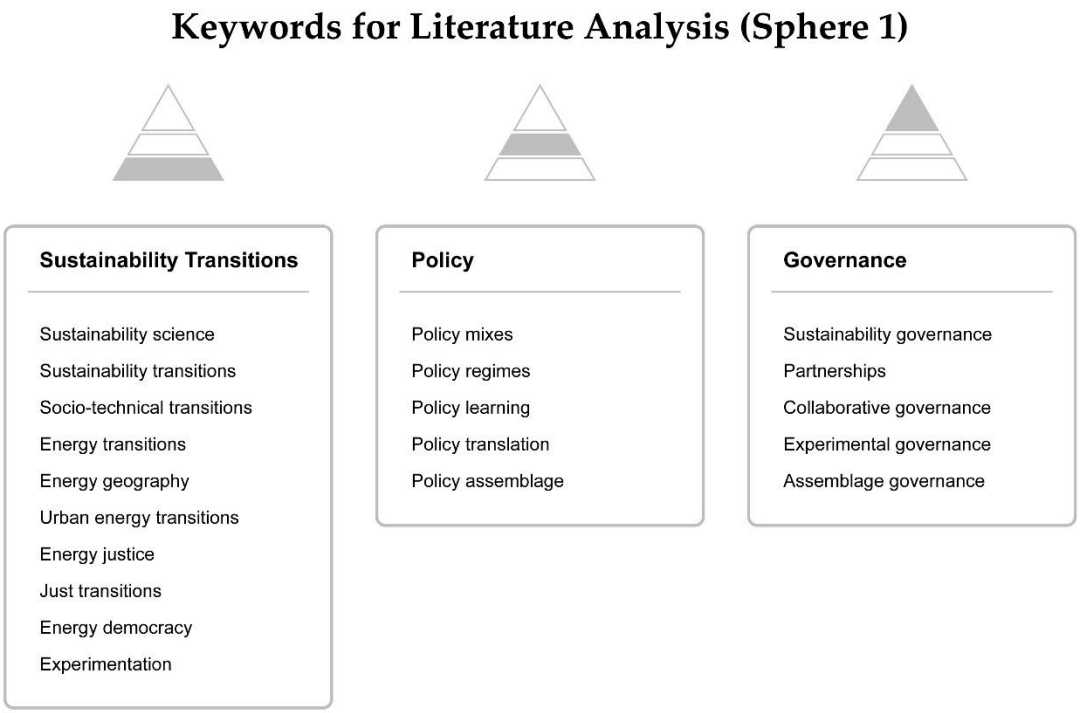


Figure 5 Keywords for Literature Analysis (Sphere 1)

2.4.1.1 *Literature analysis*

Figure 6 (detailed later in section 3.3) illustrates the interconnected bodies of literature constituting the conceptual framework. In section 1.2.3, I described how the field of sustainability transitions serves as my core field of academic study, it follows, therefore, that this field of literature was the foundation upon which the conceptual framework was developed. Similarly, I approached related concepts such as policy and governance from the vantage point of the transitions literature.

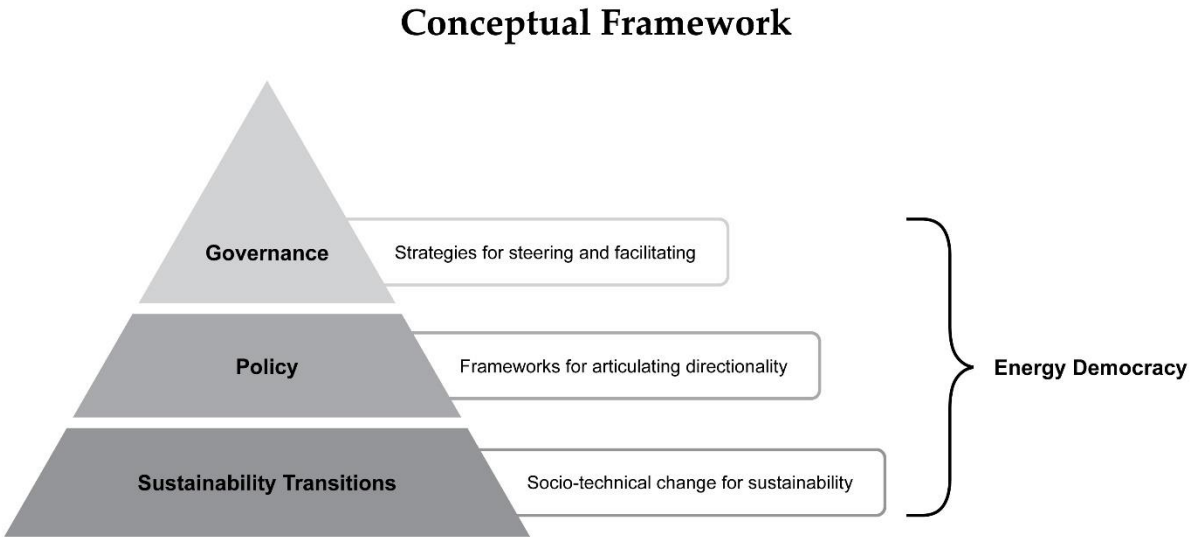


Figure 6 Conceptual framework

2.4.1.2 Content analysis

In this inquiry I aim to build a comprehensive understanding of the REIPPPP in the context of the global energy transition. This has involved extensive content analysis of sources, including media articles, policy documents, minutes from public meetings, statements by policy makers, reports by civil society organisations, legal documents, and so on. Gathering and analysing this grey material was ongoing throughout the course of the research and proved vital in keeping abreast of unfolding dynamics in the country's energy policy landscape. Assimilating a broad spectrum of information about South Africa's energy transition was also integral in elucidating my own positionality as a South African researcher.

2.4.2 Sustaining multi-level engagements in a critical review of South Africa's RE policy landscape

Developing an in-depth understanding of the REIPPPP necessitated going beyond the analysis of academic and grey literature on South Africa's energy transition. In an effort to elicit diverse perspectives and build a rich account of the REIPPPP, I was intentional about sustaining engagements across the energy sector. These spanned civil society organisations, industry associations, policy makers, and development finance institutions. Together, these enabled the refinement of a critical review of the REIPPPP as a policy instrument for the procurement of utility-scale renewable energy (RE) electricity, as well as of the development challenges resulting from its design and implementation.

High-level policy engagements bookmarked my research inquiry. At the onset, I met with a group of officials from the Independent Power Producer Office (IPP Office) (including the then head of unit), which was valuable for gaining an overarching and strategic understanding of the programme, as well as the broad challenges faced in its implementation. Discussions with officials from the Development Bank of Southern Africa (DBSA) were instructive for understanding how the policy framework was developed, including the institutional and financial arrangements that activated the REIPPPP. The DBSA, as a key development finance institution (DFI) in South Africa, played a critical role in establishing the IPP Office and also participated as a funder in the REIPPPP. Fulfilling a number of roles in the executive and implementation of the programme, the DBSA remained a key stakeholder partner throughout the research inquiry. This partnership was formalised in a Memorandum of Understanding (MoU) between the DBSA and the Centre for Complex Systems in Transition (CST) at Stellenbosch University, which was active between 2017 and 2019. This enabled a knowledge partnership between the Renewable Energy for Transitions (RE4T) research group at the CST (of which I was a core member as a postgraduate researcher), and the DBSA, with respect to research on the developmental implications of the REIPPPP. In practice, the knowledge partnership entailed regular interaction between researchers in the RE4T group and officials within the Innovation Department and other departments at the DBSA. Researchers from the CST participated in various internal DBSA workshops where we were able to share

insights from fieldwork conducted in the context of the REIPPPP. As part of the arrangement, I also spent a week on site at the DBSA, meeting with officials from various departments involved in the REIPPPP. This level of access and interaction was catalytic for my learning process.

Another crucial arena was my involvement in the working groups and public events of the relevant industry associations. Independent Power Producers (IPPs) in South Africa have the option of joining industry associations that represent their interests within wider policy processes. The South African Wind Energy Association (SAWEA) and the South African PV Association (SAPVIA) are active players in the energy policy landscape. As membership organisations, they allow members from various sectors to join the association and participate, according to a structured framework. As an individual from an academic institution with a research interest in the wind industry, I was eligible to join SAWEA and participate according to my member category. This meant I was entitled to various rights, including access to tailored industry updates and a members-only website and directory, discounts for industry events, and invitations to industry networking events. In addition to this, I was eligible for participation in SAWEA's internal working groups, which included the Economic Development Working Group.

I joined the SAWEA Economic Development Working Group in 2016 and remained an active member until the end of 2018. During this time, I participated in monthly meetings, focus workshops, and seminars, as well as SAWEA's annual wind energy conference, Windaba. This afforded me the opportunity to engage directly with wind industry stakeholders working across the country. When I joined SAWEA in 2016, there was an arrangement between SAWEA and SAPVIA allowing the two industry associations to host a joint Economic Development Working Group. As it happens, I made the choice to only join one industry association which thus enabled me to participate in the joint working group. During this period, the REIPPPP was highly constrained at a policy level, which had the effect of destabilising the industry. As a result, cooperation between SAWEA and SAPVIA (with respect to their joint Economic Development Working Group) broke down and I continued to participate in the SAWEA Economic Development Working Group. Sustaining this participation was vital for deepening my understanding of industry practices, motives, and challenges. Given the association's openness to representatives from research and consulting institutions, I was able to play a constructive and generative role in the Working Group. Often, this entailed sharing insights from fieldwork, connecting representatives from IPPs with individuals in other parts of the industry, and offering reflections from academic literature to deepen discussions.

Becoming familiar with the inner workings of the RE industry meant that I was also able to participate in civil society initiatives and glean complementary, and often opposing, perspectives. There are a number of civil society and non-governmental organisations (NGOs) that focus on various issues related to South Africa's energy transition. Between 2016 and 2019, I regularly attended events organised by these NGOs, including the Alternative Information and Development Centre (AIDC), Project90by2030 and others. Other relevant platforms included the Just Transition strategy convened by the National Planning Commission (NPC).

Positioning myself as an active participant in the broader RE sector also meant that I attended research-oriented events, such as those organised by the Energy Research Centre at University of Cape Town (UCT), or the Graduate School of Business (GSB). It was through these engagements that I built up a wide network of contacts across South Africa's RE landscape. I now turn to the data collection techniques I employed across these engagements.

2.4.2.1 Participant observation

My primary mode of data collection was participant observation (detailed in Table 2). Negotiating access to various processes or initiatives was always carefully conducted. I was always upfront about my positionality as a PhD researcher, framing my interests as the developmental and governance implications of the REIPPPP, and stating that my intentions were to observe and learn and, where appropriate, to make contributions or ask questions. I conducted participant observation in the following events between 2016 and 2019. On these occasions, informal, off-record conversations were frequent and invaluable for building trust and familiarity with stakeholders. I made comprehensive fieldnotes and gathered supporting materials where possible.

Table 2 Participant observation (Sphere 2)

Events	Organiser	Date	Location	Ref
Academic Networking Seminar	Energy Research Centre, University of Cape Town	21 April 2016	Cape Town	A1
SAWEA Industry Roundtable Event on ED in the REIPPPP	SAWEA	23 May 2016	Johannesburg	A2
Workshop on Northern Cape Climate Change Risk and Vulnerability Assessment Workshop	Northern Cape Department of Environment and Nature Conservation	2 June 2016	Kimberly	A3
SAWEA Industry Roundtable Event on collaboration in the REIPPPP	SAWEA	26 August 2016	Cape Town	A4
Joint Community Working Group	SAWEA / SAPVIA	19 October 2016	Cape Town	A5
WindAC Africa Conference	WINDABA	31 October – 1 November 2016	Cape Town	A6
WINDABA	WINDABA	2 – 3 November 2016	Cape Town	A7
Karoo Futures Colloquium	*Cosmopolitan Karoo* research group, Stellenbosch University	7 – 8 November 2016	Stellenbosch	A8
Academic Networking Seminar	RE4T research group, Centre for Complex Systems in Transition, Stellenbosch University	8 March 2017	Stellenbosch	A9
Joint Community Working Group	SAWEA / SAPVIA	19 May 2017	Cape Town	A10
SALGA Small Town Regeneration Meeting	SALGA	25 May 2017	Gariep	A11
SALGA Karoo Small Town Regeneration Conference	SALGA	10 July 2017	De Aar	A12
Joint DFI meeting on innovation to support ED in REIPPPP	DBSA and AFD	11 August 2017	Johannesburg	A13

Events	Organiser	Date	Location	Ref
DFI workshop on innovative finance mechanisms for ED in REIPPPP	DBSA	18 October 2017	Johannesburg	A14
Launch of One Million Climate Jobs Campaign launch	AIDC	1 November 2017	Cape Town	A15
SAWEA Community Trust Workshop	SAWEA	26 March 2018	Johannesburg	A16
SAWEA Communities for Wind meeting	SAWEA	27 March 2018	Johannesburg	A17
NPC Energy Discussion Paper	NPC	12 April 2018	Cape Town	A18
Just Transition Roundtable	Project90by2030	18 April 2018	Cape Town	A19
Western Cape Stakeholder Dialogue Meeting for National Development Plan: Pathways for a Just Transition	NPC Just Transition Initiative	24 May 2018	Cape Town	A20
Symposium on a just coal transition for South Africa	ERC, University of Cape Town, IDDRI, Climate Strategies	27 February 2019	Cape Town	A21

2.4.2.2 Semi-structured interviews

It became necessary to have more tailored conversations with certain stakeholders as the inquiry unfolded. I conducted these as semi-structured interviews with the following individuals, detailed in Table 3. These individuals were chosen for their specialist knowledge, their position within the research context and their relevance to the particular phase of the research. Discussions were semi-structured, following a set of key broad questions tailored to the specific interview context. Semi-structured interviews were set up according to a snowball sampling technique and peppered throughout the research process.

Table 3 Semi-structured interviews (Sphere 2)

Semi-structured interviews	Organisation	Date	Location	Ref
Head of Sustainability Country Manager	Enel Green Power South Africa	15 February 2016	Johannesburg	B1
General Manager: Project Preparation General Manager: Infrastructure Finance - Energy, Environment & PPPs Chief Investment Officer, DBSA Head: Deal Execution (Transacting), Municipalities and Water Boards Head, IPP Office	DBSA and IPP Office	19 April 2016	Johannesburg	B2
Development consultant	Private	19 April 2016	Johannesburg	B3
Visual artist	Private	19 April 2016	Johannesburg	B4
Independent facilitator	Private	20 April 2016	Cape Town	B5
Community development practitioner	CDRA	3 May 2016	Cape Town	B6
Analysist: Renewable Energy Sector	GreenCape	3 May 2016	Cape Town	B7
Managing Director	Sustainable Energy Africa	3 May 2016	Cape Town	B8
Managing Director	Knowledge Pele	19 May 2016	Johannesburg	B9

Semi-structured interviews	Organisation	Date	Location	Ref
Programme Manager: Knowledge and M&E SED Manager	IPP Office	20 May 2016	Johannesburg	B10
Programme Development Specialist	DBSA	20 May 2016	Johannesburg	B11
Head: Deal Execution (Transacting), Municipalities and Water Boards	DBSA	20 May 2016	Johannesburg	B12
General Manager: Infrastructure Finance - Energy, Environment & PPPs	DBSA	20 May 20016	Johannesburg	B13
Associate Consultant	Synergy Global	1 June 2016	Kathu	B14
Community Liaison Office	REISA	1 June 2016	Kathu	B15
Director Strategic Services	Gamagara Local Municipality	1 June 2016	Kathu	B16
Activist	SAFCEI	14 June 2016	Stellenbosch	B17
Environmental Advisor	AngloAmerican	28 June 2016	Kathu	B18
Programme Development Specialist	DBSA	9 November 2016	Stellenbosch	B19
Business Development: Renewables	Consolidated Power Projects Energy Solutions	17 November 2016	Stellenbosch	B20
Senior Environmental Assessment Practitioner	CSIR	20 April 2017	Stellenbosch	B21
Provincial Executive Officer, Western Cape Director: Economic Development	SALGA	15 May 2017	Johannesburg	B22
Provincial Economic Development Manager	Soar Capital	26 May 2017	De Aar	B23
Manager: Department of Economic Development and Tourism	Northern Cape Provincial Government	26 May 2017	Kimberley	B24
Research Group Lead: Energy Industry	CSIR	2 June 2017	Pretoria	B25
Manager: Department of Economic Development and Tourism	Northern Cape Provincial Government	3 July 2017	Kimberley	B26
Manager: Development and Strategic Support	Emthanjeni Local Municipality	3 July 2017	De Aar	B27
CEO and senior consultant	Phuhlisani	11 September 2017	Cape Town	B28
Consultant	Imani Development	11 September 2017	Stellenbosch	B29
Consultant	Synergy Global	17 September 2017	Johannesburg	B30
Lead Innovation Specialist	DBSA	16 October 2017	Johannesburg	B31
Head: Deal Execution (Transacting), Municipalities and Water Boards Investment Officer	DBSA	16 October 2017	Johannesburg	B32
Institutional Turnaround Specialist	DBSA	16 October 2017	Johannesburg	B33
Business Developer	DBSA	16 October 2017	Johannesburg	B34
Head: Operations Evaluation	DBSA	17 October 2017	Johannesburg	B35
Product Development Specialist: Structured Products	DBSA	17 October 2017	Johannesburg	B36
Head: Infrastructure Planning Support	DBSA	17 October 2017	Johannesburg	B37
Lead Sector Strategy Specialist: Infrastructure Planning Support	DBSA	17 October 2017	Johannesburg	B38
Energy Specialist	DBSA	17 October 2017	Johannesburg	B39

Semi-structured interviews	Organisation	Date	Location	Ref
Economic Justice Programme Manager Research associate Programme officer	AIDC	1 November 2017	Cape Town	B40
CEO	Aurora Wind Power	21 November 2017	Vredenburg	B41
Independent facilitator	Private	30 October 2017	Cape Town	B42
Economic Development Manager	Acciona	22 November 2017	Cape Town	B43
Community Operations Manager	REISA	11 April 2018	Cape Town	B44
Special Projects Manager	Umoya Energy	11 April 208	Cape Town	B45
Head of Department: Local Government	Western Cape Provincial Government	14 June 2018	Cape Town	B46

2.4.3 Immersion in context through an embedded case study

Familiarising myself with the academic and grey literature on South Africa's energy transition and participating in various spheres from civil society to industry equipped me with a solid understanding of key dynamics. However, the REIPPPP only 'came alive' when I plunged into a messy, political, and contested real-world environment. The engagements at various other levels (including the policy and civil society levels described above) were vital in enriching and grounding these experiential insights, filling in details, illuminating tensions, and contradictions. To a large extent, I did not really 'know' the policy until I had buried myself into it – in its very grounded, material, human-scale implications – physically witnessing a particular form of development taking place in the shadow of just one of the mega-projects dispersed across South Africa. For the longest time, I had not been able to fully comprehend the policy's tensions or espoused failings and had felt a constant pull between the factions in the national discourse and policy deliberations. Only after having the grounding experience of directly engaging with, and participating in, a messy, complex, and contested reality that had resulted because of the policy, was I able to formulate an orientation of my own.

The experience of working with the Forum became the (phenomenological) reference point around which my insights are framed, and the exposure to a large swathe of projects and IPP activities across the Northern Cape constitutes my (empirical) frame of reference in all of these encounters. Thus, when participating in civil society and industry engagements, I was often able to make contributions or share insights from what I had understood from my extensive fieldwork. Given the access to resources that allowed me to visit remote towns and to make frequent and extensive visits to Upington over the course of two years, I was often in a strong position to comment, by virtue of having practical experience. In this way, the systems knowledge produced through the research inquiry was continually fed back into the system in which I was participating.

I attended regular industry events where the concerns of IPPs were addressed and worked through. I also had exposure to civil society deliberations about what was happening in the electricity sector. Further, by participating in South African Local Government Association (SALGA) and local government public meetings, including integrated development plan (IDP) hearings and community meetings, I gained insights into the experiences of the other diverse stakeholders. Like a travelling wayfarer, I had the chance to hear many sides

of the same story and to offer new perspectives. For example, when I was engaging with local municipalities, who would lament about the terrible conduct of IPPs, I was able to facilitate a tentative conversation about how, from the IPPs' point of view, they were operating within a heavily constrained regulatory environment. And vice versa in my interactions with IPPs and industry stakeholders, who would lament the inefficacies of local government, bemoaning their lack of capacity, and territorial- and sabotage-like behaviour.

The most sobering experiences of fieldwork were always those of being exposed to the lived realities of beneficiaries and communities where IPP investments are made. Levels of poverty, inequality, and unemployment are severe, the sense of hopelessness and disillusionment high. These are characteristics of the 'spaces of despair' in many of the marginalised and remote regions where IPPs in the Northern Cape are operating.

Having had this exposure, I realised that I might be able to move beyond just gaining systems knowledge, and begin to imagine, *with* stakeholders within the Forum, target and transformation knowledge too. This would be possible through a strategy where my research interests, resources, and capabilities might be well aligned. The Forum was a space where there was a wealth of knowledge about the realities of what was going on 'out there'; in other words, the participating municipal officials, community liaison officers, and others held a collective knowledge about the operating environment. That there were no community members participating might be seen as a shortcoming of the initiative; nevertheless, this was not the purpose of the forum.

The approach to data collection for this sphere of evidence was appropriate to that of a case study. Constructing a 'thick description' of the Forum (which is presented in Chapter 5) meant that I accumulated a vast amount of source material that required the patience for, and knowledge of, details (Flyvbjerg, 2001). At different stages of the research process, different methods and strategies were employed, informed by the dynamics at play in the context. This embedded research process comprised a grounded, immersive, and recursive process; a sensitivity to the granular details, to the minutiae of the research context; and a grappling with the everyday tensions and challenges of stakeholders. All of these insights were assimilated and informed the manner in which I engaged and interacted with the stakeholders. In many ways, I became absorbed in this process, which called on me to hold together an understanding of a broad range of positionalities, tensions, dynamics, mandates, and ideas. While on the one hand 'feeling part' of the research context, I was able to step back to reflect and traverse a broad landscape of evidence, cultivating a reflexive, iterative, and pragmatic approach to my involvement in the Forum, in particular. Additionally, because I remained connected to other research contexts, I was able to develop comparative insights or facilitate connection between different people.

The following phases are a useful delineation of the different phases of the research, visualised in Figure 7. These have been imposed retrospectively to segment different dynamics and activities at play at different moments through the process.

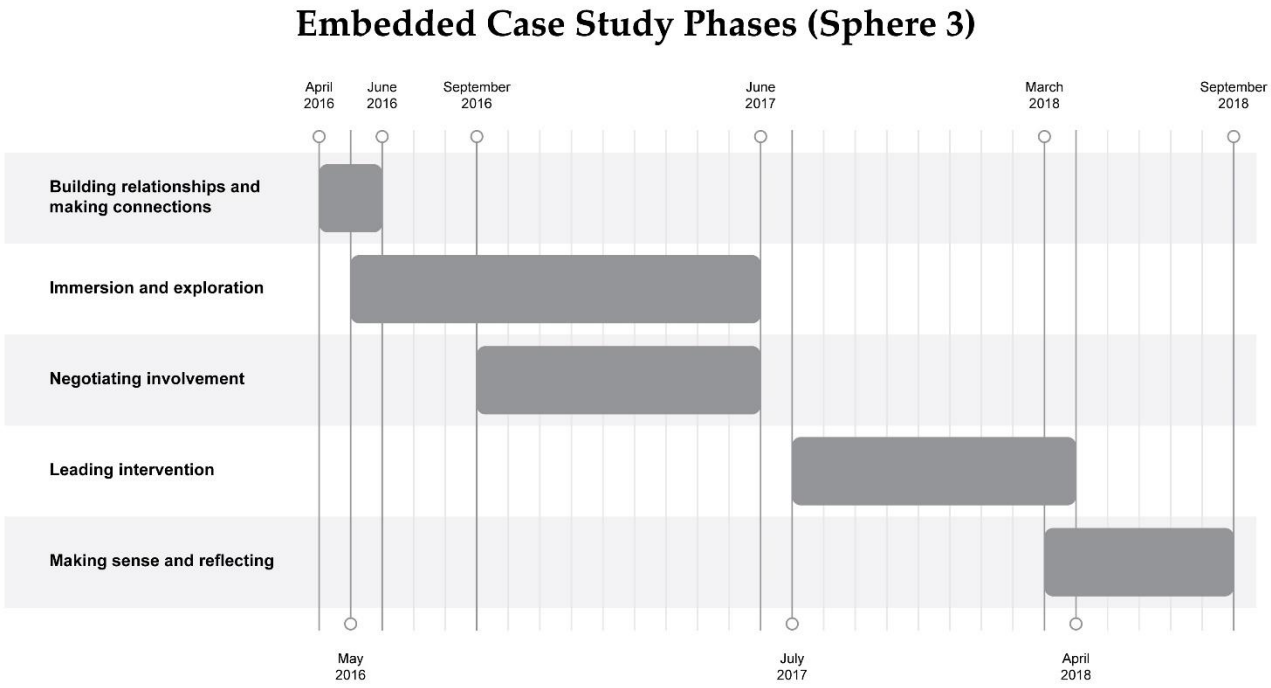


Figure 7 Embedded Case Study Phases (Sphere 3)

In March 2016, I was invited to visit the Northern Cape Province by a municipal official at the Kai !Garib Local Municipality. We had met at a conference in Stellenbosch and I subsequently arranged a fieldwork trip to the Northern Cape. During this first six-week fieldtrip, I became aware of the Forum and attended the Forum for the first time in May 2016. Between 2016 and 2018, I spent approximately 16 weeks staying in the Northern Cape, visiting communities, municipalities and IPPs in and around Upington.

Between April 2016 and April 2018, I participated in the Forum, attending monthly meetings. Between July 2017 and April 2018, I also facilitated an intervention comprised of workshops and semi-structured interviews, culminating in a perspective on long-term development and a framework for organising collective impact. The ambitions of this co-production process were to further cultivate and amplify existing feelings of mutual responsibility, joint inquiry, and shared purpose within the Forum. This constitutes the bulk of the empirical work in this thesis. The phases referred to above are important markers from a methodological perspective, however, they are also useful, later in Chapter 6, to chronical in much more detail, the evolution of the Forum itself, as well as my involvement therein. The two are deeply intertwined, thus, it is not possible to document the activities of the Forum without detailing the phases of my involvement. As will become clear in Chapter 6, it is this inexplicable connection that justifies the stylistic choices taken to present the research findings in the case study.

2.4.3.1 *Participant observation*

As is clear from the list of events in Table 4, I undertook to engage as widely as possible during my involvement with the Forum. The nature of my engagement was, at least at the onset, participant observation, where the focus was to gain insight into the Forum's ways of working, to assimilate into the group, to gain trust with stakeholders, to understand their positionality, their responsibilities. This was broadly the business of the first year of fieldwork but this took place alongside gaining a deeper understanding of the region, its socio-economic and political dynamics. Generating this thick understanding of the Forum was formative for how I later shaped the intervention, which I co-produced with the Forum, over the course of the second year. In this intervention, I reflected back at the Forum what I had heard from them as one of the major underlying issues, and then tailored an offering to try and address this need.

Table 4 Participant observation (Sphere 3)

Participant observation	Date	Location	Ref
Kai !Garib Local Municipality energy efficiency meeting	9 May 2016	Keimoes	C1
ZF Mgcawu District Municipality District meeting	11 May 2016	Upington	C2
Kai !Garib Local Municipality council meeting	12 May 2016	Keimoes	C3
Site visit to Lennartsville Primary School	16 May 2016	Keimoes	C4
Site visit to Kakamas emerging farmers	16 May 2016	Kakamas	C5
Kai !Garib Local Municipality IDP meeting	16 May 2016	Keimoes	C6
Kai !Garib Local Municipality IDP meeting	25 May 2016	Keimoes	C7
Kai !Garib Local Municipality IDP meeting	25 May 2016	Vredesvallei	C8
Kai !Garib Local Municipality IDP meeting	25 May 2016	Riemvasmaak	C9
Abengoa community meeting	29 June 2016	Kenhardt	C10
BioTherm community meeting	30 June 2016	Kalksloot	C11
Site visit to Eksteenskuil Coop	1 July 2016	Eksteenskuil	C12
Abengoa SMME development and community workshop	26 October 2016	Kalksloot	C13
Khai Ma Local Municipality Development Coordination Forum	27 October 2016	Pofadder	C14
Kai !Garib Local Municipality budget meeting	29 May 2017	Keimoes	C15
Kai !Garib Local Municipality IDP meeting	26 October 2017	Eksteenskuil	C16
Launch of Centre for Entrepreneurship and Rapid Incubator event	23 November 2017	Upington	C17

2.4.3.2 *Meetings and workshops*

Table 5 below indicates the Forum meetings and workshops which are relevant to this qualitative inquiry. The table includes a column where relevant documents were obtained, as part of the content analysis outlined in section 2.4.3.3. The workshops which comprised the facilitated process that I conducted with the Forum are highlighted in grey.

Table 5 Forum workshops and meetings (Sphere 3)

Forum events	Date	Location
Forum Workshop	26 July 2017	Belurana Hotel, Upington
Forum Meeting	30 August 2017	SEDA, Upington
Forum Workshop	27 September 2017	Belurana Hotel, Upington

Forum events	Date	Location
Forum Meeting	25 October 2017	CFE&RI, Upington
Forum Workshop	29 November 2017	CFE&RI, Upington
Forum Meeting	31 January 2018	CFE&RI, Upington
Forum Workshop	28 February 2018	CFE&RI, Upington
Forum Meeting	4 April 2018	CFE&RI, Upington
Forum Workshop	25 April 2018	CFE&RI, Upington

2.4.3.3 Content analysis

Table 6 details the full list of Forum workshops that were considered as part of the data collection and analysis. Content analysis was conducted to supplement my own empirical observations and insights. To do so, I gathered as much material as possible during the course of the research which I then stored and referred to as necessary. Pertinent documents are included in Table 6. However, this is not an exhaustive list of all the material that was collected and analysed during the research – others not listed included personal communications, public documents and media articles. Field notes were central to the empirical research. I took detailed notes and reflections during, or after, every research encounter. These extensive records were valuable accompaniments to the supporting documents I collected.

Table 6 Content analysis (Sphere 3)

Forum events	Date	Location	Material for Content Analysis	Ref
Forum Meeting	24 February 2016	SEDA, Upington	Meeting Minutes	D1
Forum Meeting	20 April 2016	SEDA, Upington	Meeting Minutes	D2
Forum Meeting	25 May 2016	SEDA, Upington	Meeting Minutes	D3
			Field notes	D4
			Terms of Reference for Establishment of Development Coordinating Forum within ZF Mgcawu District	D5
			Terms of Reference for the creation of the development strategy for the ZF Mgcawu District Municipality	D6
			Project Management Attributes for Development Coordinating Forum	D7
Forum Meeting	29 June 2016	SEDA, Upington	Meeting Minutes	D8
			Field notes	D9
Forum Meeting	27 July 2016	SEDA, Upington	Meeting Minutes	D10
Forum Meeting	31 August 2016	SEDA, Upington	Meeting Minutes	D11
Forum Meeting	28 September 2016	SEDA, Upington	Meeting Minutes	D12
			Field notes	D13

Forum events	Date	Location	Material for Content Analysis	Ref
Forum Meeting	26 October 2016	SEDA, Upington	Meeting Minutes	D14
			Field notes	D15
Forum Meeting	30 November 2016	SEDA, Upington	Meeting Minutes	D16
Forum Meeting	1 March 2017	SEDA, Upington	Meeting Minutes	D17
Forum Meeting	5 April 2017	SEDA, Upington	Meeting Minutes	D18
Forum Meeting	31 May 2017	SEDA, Upington	Meeting Minutes	D19
			Field notes	D20
Forum Meeting	28 June 2017	SEDA, Upington	Meeting Minutes	D21
			Field notes	D22
Forum Workshop	26 July 2017	Belurana Hotel, Upington	Workshop report	D23
			Field notes and reflections	D24
Forum Meeting	30 August 2017	SEDA, Upington	Meeting Minutes	D25
Forum Workshop	27 September 2017	Belurana Hotel, Upington	Workshop report	D26
			Field notes and reflections	D27
Forum Meeting	25 October 2017	CFE&RI, Upington	Meeting Minutes	D28
			Field notes	D29
Forum Workshop	29 November 2017	CFE&RI, Upington	Workshop report	D30
			Field notes and reflections	D31
Forum Meeting	31 January 2018	CFE&RI, Upington	Meeting Minutes	D32
			Field notes	D33
Forum Workshop	28 February 2018	CFE&RI, Upington	Workshop report	D34
			Field notes and reflections	D35
Forum Meeting	4 April 2018	CFE&RI, Upington	Meeting Minutes	D36
			Field notes	D37
Forum Workshop	25 April 2018	CFE&RI, Upington	Workshop report	D38
			Field notes and reflections	D39
			PRESENTATION OF FINAL REPORT: Perspective on Long Term Development Strategy for ZF Mgcawu Development Coordinating Forum, Guidelines to inform ways of working	D40
			Perspective on Long Term Development Strategy for ZF Mgcawu Development Coordinating Forum, Guidelines to inform ways of working	D41
Forum Meeting	30 May 2018	IDC, Upington	Meeting Minutes	D42
Forum Meeting	27 June 2018	IDC, Upington	Meeting Minutes	D43
Forum Meeting	1 August 2018	IDC, Upington	Meeting Minutes	D44
Forum Meeting	29 August 2018	IDC, Upington	Meeting Minutes	D45

2.4.3.4 Semi-structured interviews

Semi-structured interviews were conducted throughout the research inquiry and provided opportunities for focused, tailored discussions. These are listed in Table 7. As was the case for Sphere 2, explained in 2.4.2.2, these conversations were semi-structured and followed a set of key appropriate themes or questions. I documented the semi-structured interviews with detailed notes, and where appropriate or possible, summaries and notes derived from recordings.

Table 7 Semi-structured interviews (Sphere 3)

SS Interviews	Organisation	Date	Location	Ref
Director:	Kai !Garib Local Municipality	April 2016	Keimoes	E1
Executive Mayor **Municipal Manager** **Council Speaker**	Kai !Garib Local Municipality	9 May 2016	Keimoes	E2
Councillor	Kai !Garib Local Municipality	9 May 2016	Keimoes	E3
Site manager and community liaison officer	Neusberg Hydro	9 May 2016	Kakamas	E4
Manager, Department of Economic Development and Tourism	ZF Mgcawu District Municipality	10 May 2016	Upington	E5
Regional Officer	IDC Northern Cape	10 May 2016	Upington	E6
Executive Mayor	Kai !Garib Local Municipality	11 May 2016	Keimoes	E7
Manager: Local Economic Development	//Khara Hais Local Municipality	11 May 2016	Upington	E8
Municipal Manager	!Kheis Local Municipality	12 May 2016	Grobleshoop	E9
Community Liaison Officer	Abengoa	13 May 2016	Upington	E10
Chief Financial Office	Kai !Garib Local Municipality	17 May 2016	Keimoes	E11
Manager	Small Enterprise Development Agency, Northern Cape	17 May 2016	Upington	E12
Community Trustee	Aries Solar 1	26 May 2016	Kenhardt	E13
Site Manager	Aires Solar 1	26 May 2016	Kenhardt	E14
Project Director	ACWA Power	30 May 2016	Upington	E15
Community Liaison Officer	ACWA Power Bokpoort CSP	31 May 2016	Groblershoop	E16
Executive Mayor	!Kheis Local Municipality	31 May 2016	Groblershoop	E17
CEO	ACWA Power Bokpoort CST	31 May 2016	Groblershoop	E18
Site Manager	Airies Solar 1	30 June 2016	Kenhardt	E19
CEO	Talmar Impact Investments and Development	24 November 2016	Cape Town	E20
Regional Manager	DDP Valuators	24 May 2017	Bloemfontein	E21
Director	Kai !Garib Local Municipality	26 May 2017	Keimoes	E22
Manager: Spatial Planning	Kai !Garib Local Municipality	30 May 2017	Keimoes	E23
Head Town Planner,	Macroplan	30 May 2017	Upington	E24
Manager: Land Use Management **Head Town Planner**	//Khara Hais Local Municipality	30 May 2017	Upington	E25
Socio-Economic Development Specialist	IPP Office	2 June 2017	Pretoria	E26
Director: Economic Development	SALGA	2 June 2017	Pretoria	E27
Director	Kai !Garib Local Municipality	29 June 2017	Keimoes	E28

SS Interviews	Organisation	Date	Location	Ref
. Assistant Director: Development Planning and Land Use Management & Housing	ZF Mgcawu District Municipality	29 June 2017	Upington	E29
Head: Community Development	!Kheis Local Municipality	29 June 2017	Grobleshoop	E30
Independent Consultant	Private	29 June 2017	Grobleshoop	E31
Project Director	ACWA Power	30 June 2017	Upington	E32
Community Relations Officer	Solar Reserve	30 June 2017	Postmasburg	E33
Socio-Economic Development Specialist, Development Impact Support	IDC Northern Cape	3 July 2017	Kimberley	E34
EProgramme Manager for Economic Development and Planning	SALGA Northern Cape	3 July 2017	Kimberley	E35
Socio-Economic Development Specialist	IPP Office	22 September 2017	Pretoria	E36
Senior Local Economic Development Manager, Developmental Impact Support	IDC	31 October 2017	Cape Town	E37
Regional Officer	IDC Northern Cape	23 November 2017	Upington	E38
Senior Executive: Human Resources	ACWA Power	28 March 2018	Johannesburg	E39
Economic Development and Human Resources Manager	Lesedi Power Project	28 March 2018	Johannesburg	E40
Head of Sustainability	Enel Green Power South Africa	28 March 2018	Johannesburg	E41
Head: Strategic Stakeholder Relationships	Nedbank	29 March 2018	Johannesburg	E42
Community Liaison Officer	Abengoa	4 April 2018	Keimoes	E43
Chairperson	NOCCI Upington Business Chamber	5 April 2018	Upington	E44
Business Development Officer	Centre for Entrepreneurship and Rapid Incubator	5 April 2018	Upington	E45
Manager, Department of Economic Development and Tourism	ZF Mgcawu District Municipality	5 April 2018	Upington	E46

2.5 Organising and analysing data

During the course of this research inquiry, I accumulated a vast amount of qualitative data in accordance with the data collection methods employed across three spheres of evidence. This data was collected and organised as part of a growing database comprising academic articles, reports, meeting minutes, fieldnotes, photos, email correspondence, recordings and transcriptions, interpretive reflections, and other pertinent grey literature. This extensive database was securely stored and continually updated as I progressed through the various stages described in this chapter.

Given the evolution of the research problem, described in 1.3., I pursued a number of intersecting lines of inquiry during the research process and, as such, accumulated a truly vast library of qualitative data. This

provided an extensive and diverse resource base which I could reference as I progressed, all of which became assimilated into my overarching understanding of South Africa's energy transition and its location within the dynamics of a wider global energy transition.

Analysis and interpretation of this data was done in response to the overarching research question in 1.4.1. as well as the various sub research questions detailed in 1.4.2. The research questions and objectives focused the analysis and provided a rationale for my interpretation. Additionally, the choice of narrative structure for this analysis (comprising a nested account of the global energy transition, a review of South Africa's political economy of energy, and an embedded case study) provided a helpful framework for the presentation of data accumulated across the three corresponding spheres of evidence. On the whole, methods for data analysis corresponded with the suite of data collection methods across the three spheres of evidence, described in 2.4.

For the first sphere of evidence, academic literature was organised using techniques associated with a literature review. This included classification and storage using reference management software. This body of academic literature was then analysed to arrive at the conceptual framework elaborated in Chapter 3, which distils distinctive themes across the sustainability transitions, policy and governance literatures. With respect to the second sphere of evidence, similar organisational and analytical strategies were employed as in the first sphere of evidence. Reference management software enabled the classification and storage of an extensive body of grey literature. Thereafter, thematic and content analysis was used to compile the review of the REIPPPP in Chapter 5. And finally, within the third sphere of evidence, data collected according to the techniques detailed in 2.4.3, was assembled to present the case study in Chapter 6. Materials were systematically organised and then drawn upon in support of a narrative-based analysis of the Forum. In line with the nature of this qualitative inquiry, data analysis took the form of consolidation, as Saldaña (2015: 4) describes, "the mental process of joining things together".

Constructing each of these elements necessitated a level of discernment to ensure clarity and coherence – in line with how this thesis was described as a qualitative inquiry in 2.3. The importance of the inquiring sensibility was particularly relevant for chronicling the review of South Africa's political economy of energy in Chapter 5 and the situated account of the Forum in Chapter 6. The choice of a case study as the primary methodological instrument is thus a particular representation of an empirical reality and research context, where "the interpretive practice of making sense of one's findings is both artistic and political" (Denzin & Lincoln, 2018: 60). The analysis and interpretation culminate in the insights described in Chapter 7. The analysis and interpretation presented in this thesis are by no means a representation of the totality of my encounters or observations. The qualitative inquiry is instead a construction, endlessly creative and interpretive (Denzin, 2016; Mayan, 2016; Denzin & Lincoln, 2018). Denzin and Lincoln (2018: 60) reiterate that, "the researcher does not just leave the field with mountains of empirical materials and easily write up his or her findings. The writer creates narratives, braided compositions woven into and through field experiences". It is this notion of braided compositions that captures the quality of the analysis and interpretation presented in this thesis.

2.6 Positionality and ethical considerations

Denzin and Lincoln (2018: 51) remind researchers that "the politics of evidence cannot be separated from the ethics of evidence". Recognising that evidence is 'produced, constructed, represented', necessitates a reflection on positionality and the ethical considerations of a research inquiry. This is especially pertinent with respect to the 'engaged scholarship' following a transdisciplinary research approach and the ramifications of embedded research (Polk, 2015). By its very nature, transdisciplinary research makes a case for researchers to step into the world, to embed themselves in complex realities that have material impact. As such, the stakes are high, real people are involved and there are a number of risks involved. This stands in strong contrast to perhaps more conventional research approaches where researchers carefully curate interaction with a set of research subjects who become involved during the data collection phase of a structured research design (Cockburn & Cundill, 2016). This presents a challenge for transdisciplinary researchers to navigate the formal policies and procedures governing research ethics.

Problematising this dynamic is beyond the scope of this research, but Cockburn and Cundill (2016) reflect on the implications of 'science with society' making recommendations for an ethical research practice can be conducted in accordance with institutional procedures for obtaining and maintaining ethical clearance. Cockburn and Cundill (2016) make a useful distinction between procedural ethics as those codified in the institutional ethical clearance procedures, and everyday ethics, or ethics in practice, where researchers apply these principles in practice within the context of complex social realities. Again, the praxis of phronetic social science becomes relevant in the cultivation of an ethical research praxis.As a student of Stellenbosch University, I was guided by the institutions formal policies according to which research much be conducted. Therefore, cultivating my ethical research practice was done in accordance with the SU Ethics Policy Handbook. Formal ethical clearance was obtained in 2016 after an application to the Departmental Ethics Screening Committee (DESC). This provided the guiding framework for my research praxis, which importantly, involved obtaining free and informed consent from participants. Obtaining consent was relevant to two spheres of empirical research: the extensive review of in the REIPPPP, and of course the participation in the Forum.

As a transdisciplinary orientation elevates the significance of positionality – meaning it was 'top of mind' from the outset – I cultivated deliberate strategies to reveal and respond to my positionality in different contexts. My institutional framing, as a PhD researcher from Stellenbosch University, carried legitimacy and credibility. I found that, in positioning myself as a researcher interested in learning and contributing where possible, I was able to participate in a wide range of forums, and stakeholders did not perceive this as threatening or compromising. My institutional positionality was also enhanced through my affiliation with the CST and my supervisor, Prof Mark Swilling.

Denzin and Lincoln (2018: 45) emphasise that communicating research is both "the art and politics of interpretation, evaluation and presentation" but that, importantly, "research is an interactive process shaped

by one's personal history, biography, gender, social class, race, and ethnicity and those of the people in the setting". As a young, white, female, English-speaking individual, I occupied multiple powers and privileges as I undertook this inquiry. These concerns were not easily resolved or wholly 'mitigated' during the course of the inquiry. Instead, the commitment to reflexivity ensured that I cultivated an awareness to my own positionality and found feasible, sensitive and context-appropriate measures through which to address these. One example of how I attempted to ameliorate potential power-imbalances in research engagements in the ZF Mgcawu District Municipality, was a commitment to speaking Afrikaans as far as possible. Of course, this did not suddenly smoothen the potential communication or socio-cultural distinctions between us, but it did provide an avenue through which to foster genuine connection and mutual sharing. An awareness of the advantages and disadvantages of such powers and privileges is essentially vital and urgent in the context of research in a post-colonial society. While I tried to maintain reflectivity and reflexivity during the course of the research, there were undoubtedly blind-spots in my awareness and behaviour that might have had negative impacts on the research process. For example, by virtue of my own positionality and the manner in which I participated, I might have inadvertently closed down certain avenues of discussion or misread certain signals in the interactions between stakeholders. Another disadvantage stemming from my own positionality might have been to not fully comprehend and respond to nuances in my readings of the local context. A transdisciplinary research allowed me to build an awareness of these dynamics, and indeed also, maintain a commitment to operating ethically and with integrity in a post-colonial research environment going forward.

2.7 Conclusion

This chapter set out to elaborate the methodological strategy for this thesis. It began with an elaboration of my ambition to 'practise social science that matters' which was enabled specifically by the choice of a transdisciplinary research approach. Various constituting elements of the research design and associated methods were detailed, including the guiding principles of systematic combining, meshwork, co-production and process pragmatism. Following the elaboration of the methodological praxis, I detailed the techniques for data collection, management and analysis across three distinctive yet interconnected spheres of evidence. Finally, the chapter reflected on the ethical considerations of the inquiry. The intention of the chapter was to shed light on how the transdisciplinary inquiry was conceptualised and operationalised in line with the praxis of phronetic social science. With this established, it is possible to proceed with the presentation of the conceptual framework in Chapter 3, the description of the global energy transitions in Chapter 4, the critical review of the REIPPPP in Chapter 5 and the case study of the Forum in Chapter 6. Moreover, this methodological foundation is critical for positioning the integrative synthesis and analysis in Chapter 7 as a braided composition of insights culminating from this distinctive qualitative inquiry.

Part B
LITERATURE ANALYSIS AND CONCEPTUAL FRAMEWORK

Chapter 3
Towards energy democracy: strategic orientation and conceptual framework

3.1 Introduction

The global energy system is undergoing rapid and fundamental transformation. This is demonstrated by a number of key empirical trends: most significantly, that investment in new renewable energy (RE) capacity is exceeding investment in new fossil fuel and nuclear combined (Frankfurt School-UNEP Centre/BNEF, 2020); that the declining Energy Return on Energy Invested (EROI) of fossil fuels is reducing the economic viability of incumbent energy systems (Ahmed, 2017; Fischer-Kowalski, Rovenskaya, Krausmann, Pallua & McNeill, 2018); and that international climate commitments, most notably the Paris Accord, are driving decarbonisation agendas in both industrialised and developing economies (Roberts, Geels, Lockwood, Newell, Schmitz, Turnheim & Jordan, 2018; Vogler, 2020). In light of these developments, it is possible to observe a significant shift in the global energy system away from fossil fuels and towards RE infrastructure. Yet, as I will show in this chapter, the picture is in fact a lot more complicated than the word 'shift' is able to capture. And indeed, the idea that this energy transition will ultimately help reorient the overarching global development trajectory onto more just and sustainable development pathways, is not a foregone conclusion.

This chapter puts in place a normative orientation and conceptual framework for inquiring into broad dimensions of the global energy transition, as well as how they have informed South Africa's decarbonisation endeavours, and manifested in diverse locations across the country.

Grounded in a complexity orientation, a relational approach to sustainability transitions begins with the assumption that the status or direction of transition processes is fundamentally uncertain and unclear. This is an appropriate orientation to the energy transition in particular because it is "alive to imminent potential" and, as such, "is not an issue to be managed, but rather inquired into" (Labussière & Nadaï, 2018: 9). This means that the 'messy' and unprecedented interferences triggered by energy transition processes cannot be easily clarified or appreciated by the simple application of ready-made analytical tools.

Through the analysis of the energy transitions literature that follows, I concur with Labussière and Nadaï's (2018: 9) view that the energy transition "cannot be reduced to a 'passage' from a state A of energy production and consumption to a state B". As I will demonstrate through the review of various strands of the energy transitions literature, the unfolding global energy transition is far more than a simple passage, a simple shift, from a world powered by fossil fuels to one based on renewables. Labussière and Nadaï (2018) go further to frame the energy transition as a period of 'ontological trouble', that is, the type of trouble that is resistant to familiar strategies of problem-solving, necessarily because these unprecedented problems ask for a different way of being/seeing. Therefore, grappling with the 'ontological trouble' of the energy transition necessitates

having a conceptual orientation, and a corresponding theory of change, that are congruent with radical indeterminacy and imminent potential. Further, it requires an open and generative conceptual framework that deliberately pays attention to the multiplicity of consequences for diverse entities implicated in energy system changes. Therefore, I suggest that a theory of socio-technical change, such as the one I put forward in this chapter, is instructive for such an inquiry into the ontological trouble of the energy transition.

This chapter proceeds in two steps. Firstly, I build out my normative orientation, that is, a perspective on the strategic appeal of 'energy democracy' as a developmental approach to the energy transition (section 3.2) and, secondly, I put in place a conceptual framework to interrogate the multi-scalar dynamics of this global energy transition (section 3.3). Three literature themes, which follow the discussion of my perspective on energy democracy, are integrated in the conceptual framework. The first is the sustainability transitions literature which considers the dynamics of multi-scalar change within complex socio-technical systems (section 3.3.1); the second considers various threads of policy research as it pertains to sustainability transitions (section 3.3.2); and the third considers governance in relation to sustainability transitions (section 3.3.3).

The conceptual framework developed in this chapter is the guiding 'blueprint' for the major substantive chapters to come: the analytical description of the global energy transition (Chapter 4), the evolution of South Africa's energy policy landscape (Chapter 5), and the place-based challenges resulting from the design and implementation of the Renewable Energy Independent Power Producer Programme (REIPPPP) (Chapter 6). Developing the appropriate analytical building blocks is critical for seeing why experimentation with policy regimes frameworks and governance practices has the potential (as I argue) to inform the directionality of unfolding energy transitions (such as the one unfolding in South Africa), in support of the goals of energy democracy.

3.2 Energy democracy: a developmental perspective on the energy transition

In this section, I elaborate the claim made in Chapter 1 (and argued further in section 4.2) that decarbonisation alone will not deliver 'a transformed world'. A decarbonised unequal world is a distinct possibility. Coupling together decarbonisation and social and environmental justice is what leads to the energy democracy movement and the associated body of research. This elimination of carbon-intensive infrastructures alone will not instigate the restructuring of the global political economy that entrenches structural inequality. I legitimate this entry point based on two observable dynamics, namely: that a global energy transition is underway, and that this is taking place within the contextual reality of a highly unequal society faced with critical, and indeed existential, development challenges. Hence, it is necessary to connect 'energy transitions' with 'development' and I do so through a strategic perspective drawn from the literature on energy democracy. Put differently, I recognise 'energy democracy' as my normative vantage point and have explicitly chosen this orientation for

the merits it offers. Therefore, the elaboration of this energy democracy perspective is very deliberately included in the opening of this chapter since the forthcoming literature review that culminates in the conceptual framework must be read with the orientation of energy democracy in mind.

The energy democracy literature engages with the role of civil society, community organisations, labour unions, and grassroots social movements, and demonstrates that these diverse constellations of actors are vital in shaping transition processes (Walker & Devine-Wright, 2008; Hargreaves, Hielscher, Seyfang & Smith, 2013; Wirth, 2014; Hicks & Ison, 2018; Creamer, Taylor, Veelen, Walker & Devine-Wright, 2019). This has led to recent investigations into the democratic possibilities of RE infrastructures and the increasing diversity of stakeholder participation in contesting their formation and directionality (Becker & Naumann, 2017; Burke & Stephens, 2017; Hess, 2018).

As a movement, 'energy democracy' builds on the opportunities opened up by the divergent materiality of RE infrastructures and asserts that decentralised infrastructure might also enhance democratic outcomes (Judson, Fitch-Roy, Pownall, Bray, Poulter, Soutar, Lowes, Connor, Britton, Woodman & Mitchell, 2020). Put more modestly, energy decentralisation "introduce(s) disjunctures that may drive material and political change" (Pinker, 2018: 740). Brisbois (2020) describes how the system architecture of decentralised energy systems requires a re-scaling of governance activities and an increase in the number of actors to align with decentralised energy systems' complexity.

Energy democracy represents "a contemporary expression of ongoing struggles for social and environmental justice through engagement with technological systems" (Burke & Stephens, 2018: 90). Political claims on the energy transition, such as those by the energy democracy movement, therefore foreground the materiality of RE infrastructures. Coupling a democratic agenda to the shifting spatiality of the energy transition lies at the heart of the energy democracy movement. Energy democracy claims that the shift from centralised energy systems towards decentralised and dispersed configurations might amplify the devolution and democratisation of political power (van Veelen & van der Horst, 2018). As a movement, it has emerged predominantly in countries in the global North, used by grassroots activists and trade unions "to call for and justify integrations of policies linking social justice and economic equity with renewable energy transitions" (Burke & Stephens, 2017: 35).

Various authors have engaged with the concept of energy democracy to further elucidate the political dimensions of energy transitions. Rumpula (2018) introduces the concept of 'technological potentialism' to grapple with the reorganisation and reconfiguration of the various cultural, social, economic, and political characteristics of societal structures. Burke and Stephens (2018) articulate an energy-politics lens to theorise the relationships between RE and political power, and explore the political possibilities for an RE future. Thombs (2019: 159) offers a typology of envisaged potential energy futures, claiming that the "scale of the energy system will also play a pivotal role in reinforcing and reproducing democratic and just social relations".

Becker and Naumann (2017: 2) engage with energy democracy from two angles; firstly, the political calls for a more just society, and secondly, "in the diverse forms of organisation that accentuate principles of collective control, participative decision making, and a fair distribution of benefits". Delina (2018a) explores energy democracy as active civic participation in the production and use of energy, and how the energy transition is remaking public participation in Thailand. Szulecki's (2018) conceptualisation of energy democracy emphasises three main dimensions, namely, popular sovereignty, participatory governance, and civil ownership. Burke (2018: 2) elaborates how energy democracy provides "a socio-political counter narrative to mainstream political transition narratives that position renewable energy transitions with a broadly dominant neoliberal hegemony". Burke and Stephens (2017) argue that the energy democracy movement, particularly as it has evolved within the labour movement, provides "visionary organising principles" for the goals of 'resist, reclaim and restructure'. Specifically, these goals describe a shift to RE sources that resists the prevailing fossil fuel industry, reclaims social and public control over the energy sector, and restructures the sector to better support democratic processes, social justice and inclusion, and environmental sustainability (Burke & Stephens, 2017).

A more recent systematic review of the energy democracy literature by Szulecki and Overland (2020) analyse three broad understandings of the concept, namely: energy democracy as a process, an outcome of decarbonisation and a normative goal. As a process, energy democracy refers to the 'movement' described at the beginning of this section, whereby dispersed grassroots transitions and a transnational social movement challenge energy incumbents (Szulecki & Overland, 2020). As the outcome of decarbonisation Szulecki and Overland (2020) distil that this understanding of energy democracy calls for the move to a renewable, democratised and distributed energy system. Finally, as a normative goal, Szulecki and Overland (2020) describe this understanding of energy democracy as an ideal to aspire to in an unspecified decarbonised future. Their systematic review confirms the sustained fluidity and plurality of the energy democracy literature.

Seen together, these studies vehemently emphasise that politics, and indeed a democratic politics, needs to be at the centre of the debate on energy transitions. Any transformation of the energy sector towards an increasing integration of RE sources will emerge through ongoing and long-term political power dynamics that involve differences in visions, alliances, coalitions, and political consequences (Burke & Stephens, 2018). Crucially, though, many contributors to the energy democracy literature caution that the transition to a decarbonised society does not necessarily or automatically translate into the enhancement of democratic outcomes (Burke & Stephens, 2017; Van Veelen, 2018; Thombs, 2019; Szulecki & Overland, 2020). Put differently, achieving the goals of the energy democracy movement – to see the advancement of democratic outcomes together with the acceleration of an energy transition – is not a foregone conclusion. Even if this relationship is positive and reinforcing, van Veelen and van der Horst (2018: 19) call for a better understanding of "what type of democratic future is being sought" by energy democracy, and how this concept can be deepened through a stronger connection with political theory. Despite some variations in its understanding

and application, Burke and Stephens (2018: 90) conclude that "above all, energy democracy allows for a vision of renewable energy transitions as pathways for democratic development".

The core point is that, by taking into consideration the politics of energy transitions, it becomes clearer how transformations in the energy sector might reconfigure societal relations in ways more consistent with the vision of a just transition to energy democracy. Decarbonisation strategies are often approached or framed as simply mechanisms to substitute fossil fuel-intensive energy systems with RE alternatives. As such, these strategies run the risk of maintaining or amplifying existing patterns of exploitation and dispossession that characterise the current global political economy, even while seeking to overcome 'carbon lock-in' (Unruh, 2002; Goldthau, 2014). A just transition to energy democracy is thus recognised as an intensely political process of socio-technical reconfiguration that has the potential to shape the allocation of power, distribution of resources, and structure of the political economy.

Seen together, energy democracy, a strategic perspective on what 'a transformed world' will entail, is essentially a *developmental* perspective on the energy transition, where the dual goals of decarbonisation and development are achieved. I articulate these as a set of three propositions:

> The *energy transition* refers to the move from a global economy based on fossil fuel to one based on renewable energy. Achieving *decarbonisation* also entails providing affordable, renewable energy. As such, an energy transition cannot just be an increase in RE, but also the strategic dismantling of the fossil fuel industry.
>
> A developmental perspective on the energy transition is what distinguishes energy democracy from the narrower goals of decarbonisation. *Development* is understood as the self-defined social process that advances social-ecological wellbeing, while creating the structural conditions for the process of development itself (Castells & Himanen, 2014). Another dimension of development is about facilitating resourcefulness (Westoby & Kaplan, 2013) in the form of individual and collective capabilities (Evans, 2002).
>
> In light of the first two propositions, energy democracy can be conceptualised as a strategic and normative orientation towards a desirable future and a transformed world. Energy democracy aspires for a just and deep transition to a more just, equitable and sustainable world. A developmental and relational state must ensure the enabling conditions and 'rules of the game' within which these just transition processes will take place. As a result, a focus on local institution building amongst diverse coalitions will enhance the developmental potential of the energy transition. I view procurement design as a key mechanism through which energy democracy would be advanced, and how just transitions will be negotiated therein.

3.3 Overview of the conceptual framework: sustainability transitions, policy, and governance

Having defined what is meant by energy democracy, this section constructs a conceptual framework for analysing the global energy transition. At its core, this conceptual framework focuses on socio-technical transitions; that is, the combination of processes leading to the fundamental transformation of a socio-technical system. A socio-technical system is a heterogenous ensemble of technological artefacts, institutions, resources, and people (Edmondson, Kern & Rogge, 2019). Beginning with the sustainability transitions literature, the conceptual framework is then integrated with, and deepened by, literature on policy and governance. This culminates in a perspective through which to interrogate the multi-level dynamics of the global energy transition and, more than this, to understand how it might be directed towards the goals of energy democracy. Each of the three interconnected clusters of literature (sustainability transitions, policy, and governance) contributes a specific set of ideas to the overall integrated analysis.

Firstly, the sustainability transitions literature signifies the growing academic consensus around the need to reconfigure the socio-technical systems that support societal functions and bring them in line with more sustainable development pathways. In this way, it is useful for conceptualising change of a socio-technical nature and the way in which energy systems have a part to pay in shaping the global political economy. However, the sustainability transitions literature goes beyond just acknowledging the necessity to radically transform socio-technical systems, to providing useful theoretical frameworks for conceptualising the nature of change itself. And, importantly, it identifies leverage points, socio-spatial ramifications, and political contestation concerning the directionality of socio-technical transition processes. Reconfiguring socio-technical systems generally necessitates articulating normative directionality and the broader overarching normative goals of change processes, that, is asking not just 'where are we going', but '*why* are we going there, and in this way, elucidating an ethical stance on desirable futures. Doing so in energy systems, across multiple socio-economic and spatial contexts, therefore implies having to identify a set of normative goals and ambitions particularly for the unfolding global energy transition.

Secondly, various aspects of the policy research literature are significant for thinking about the potential of the global energy transition. This is because policy (as collectively agreed upon frameworks to coordinate action) enables a direct engagement with the directionality that sustainability transitions bring to the fore. Policy is a critical lever for setting the directionality of the global energy transition on a course towards fundamental and transformative sustainability-oriented change. Policies create, but also limit, the opportunity spaces within which socio-technical change can take place.

Lastly, literature regarding the governance (as strategies to facilitate interaction and collective action) of sustainability transitions emphasises the steering and coordinating of activities at multiple levels and across diverse institutional settings in line with articulated policy goals that support sustainability transitions.

The key building blocks for the conceptual framework informing my argument are as follows:

- Sustainability transitions call for the radical reconfiguration of socio-technical systems and emphasises their multi-scalar, spatial, and political nature.
- Policy encodes and institutionalises the normative goals of sustainability transitions into coherent frameworks, rules and regulations that enable socio-technical change.
- Governance refers to the institutional strategies and mechanisms that coalitions of actors employ to steer, contest and accelerate socio-technical change within the policy frameworks that articulate sustainability transition goals.

Figure 8 below (first introduced and explained in section 2.4.1.1) gives a visual overview of the conceptual framework's building blocks.

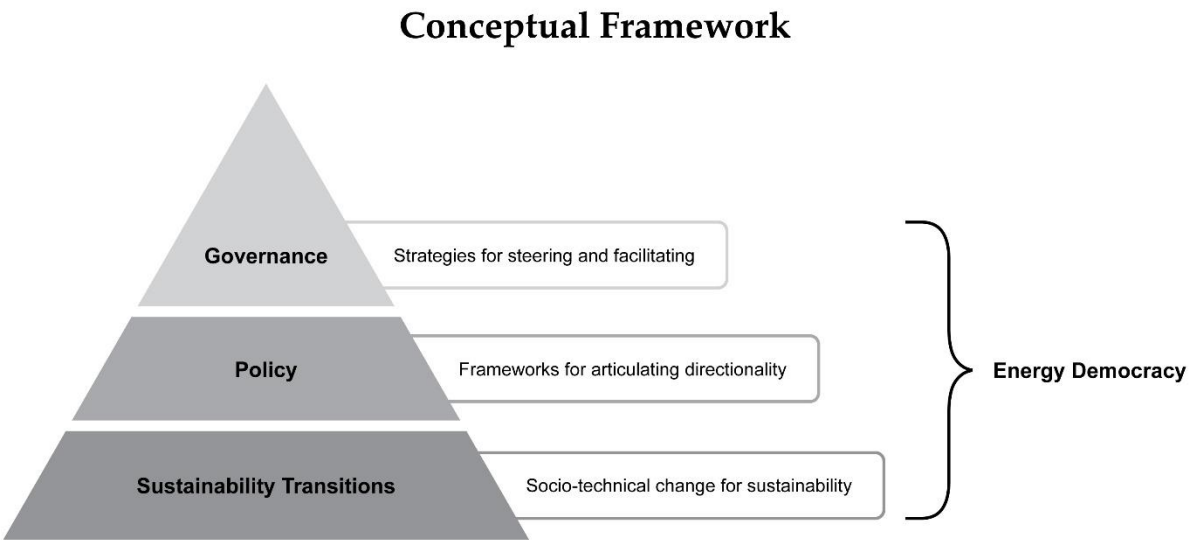


Figure 8 Conceptual Framework

In the more comprehensive literature review that follows, I substantiate how these conceptual building blocks were derived, synthesising key insights from each subset of literature (sustainability transitions, policy, and governance). Additionally, I demonstrate how experimentation (which I elaborate further in 3.3.1) is a crosscutting theme, one that comes up time and again as something important. I frame experimentation as the creativity required to assemble and contest institutional structures, policy rules and ways of working that support sustainability transitions. This clearly signals that, whatever the 'work' to be done – articulating transition goals, translating these into enabling frameworks and 'rules of the game', and finding strategies for steering, contesting and facilitating socio-technical change – it must involve experimental approaches.

The building blocks clarified above are depicted visually in such a way as to emphasise the relative weighting of the different bodies of literature to the overarching conceptual framework. As mentioned in section 1.2.3 and revisited in 2.4.1.1, the sustainability transitions literature provides the foundation for this conceptual framework. As such, it is depicted in Figure 8 as the base upon which the conceptual framework is developed,

with perspectives of policy and governance layering upon this foundation. Each of the key contributions from these bodies of literature follow on from each other. Thus, the schematic is constructed to demonstrate this hierarchy. As stated in section 3.2, this conceptual framework must be read from the energy democracy perspective, hence this emphasis in the schematic. Moreover, recalling the sub research question framing this chapter, each of the clusters of literature included here has been done so strategically, that is, for the purpose of analysing the global energy transition. In Chapter 4, I go on to deploy this conceptual framework to make sense of the global energy transition, before proceeding to the analysis of the South African energy transition in Chapters 5, 6 and 7.

3.3.1 Sustainability transitions

SYNTHESIS

The sustainability transitions literature represents growing academic consensus of the need to accelerate fundamental systemic change towards sustainability. Sustainability transitions aim to radically alter how societal functions are fulfilled through the reconfiguration of socio-technical systems. With the socio-technical system as its key unit of analysis, this literature has pioneered a range of theoretical frameworks to understand the dynamics of change. Socio-technical transitions are the outcome of dynamic interactions at multiple levels. Experimentation is a key strategy to foster such systemic socio-technical change.

The sustainability transitions literature has evolved as an attempt to grapple with the dynamics of transitioning towards a more sustainable society. While other academic communities and bodies of literature have also emerged in response to this growing consensus in the last few decades, the transitions community aims to address the big questions about radical and systemic change at the level of the socio-technical system, which organises society and fulfils critical societal functions. In other words, the key 'unit of analysis' for transitions research is the socio-technical system, and its main 'object' are the features of fundamental structural change (Zolfagharian *et al.*, 2019). This focus on the elements and processes comprising socio-technical systems distinguishes the sustainability transitions field and emphasises the co-constitutive nature of infrastructure, technology, resources, and institutions.

Critical responses to grand societal challenges "require radical shifts to new kinds of socio-technical systems, shifts which are called 'sustainability transitions'" (Köhler *et al.*, 2019: 2). The sustainability transitions community communicates its central aim as conceptualising and explaining how radical changes can occur in the way societal functions are fulfilled (Köhler *et al.*, 2019). The key focus therein is on *how* socio-technical systems fulfil these societal functions and, by extension, how their particular goals and configurations contribute to intersecting grand challenges such as climate change, economic inequality, biodiversity loss, and so on. As such, transforming socio-technical systems (such as energy, mobility, and food systems) has the potential to bring about more sustainable, resource-efficient, and equitable societies.

The transitions field has seen the emergence of a multiplicity of perspectives which are useful for understanding complex, large-scale societal transformations (Van den Bergh *et al.*, 2011; Loorbach *et al.*, 2017; Cherp, Vinichenko, Jewell, Brutschin & Sovacool, 2018). The core ambition of transition studies is to explore possibilities to advance and accelerate desired transitions (Roberts *et al.*, 2018; Hölscher, Frantzeskaki & Loorbach, 2019). A transition is understood as a "fundamental social, technological, institutional and economic change from one societal regime or dynamic equilibrium to another" (Hölscher, Wittmayer & Loorbach, 2018: 1). Transition processes can be protracted, involve disruptive shocks and shifts, be marred with contestation and conflict, and not unfold in a stepwise manner. Similarly, transitions are the outcome of nested processes, resulting from the interplay of dynamics at multiple levels (Loorbach *et al.*, 2017).

Loorbach *et al.* (2017) outline four central orientations within the transitions field that each inform diverse governance approaches and policy strategies. These include the socio-technical multi-level perspective (MLP) (Geels, 2002), the technological innovation systems (TIS) approach (Hekkert, Suurs, Negro, Kuhlmann & Smits, 2007), strategic niche management (SNM) (Kemp, Schot & Hoogma, 1998), and transition management (TM) (Loorbach, 2007).

Across these four perspectives, a number of common characteristics are identified, namely (Köhler *et al.*, 2019):

- Multi-dimensionality and co-evolution: Consisting of multiple interdependent elements, transitions are evolutionary and nested processes made up of changes in a range of elements and dimensions.
- Multi-actor process: Transitions are enacted by a range of stakeholders with varying levels of agency and power.
- Stability and change: Transitions research draws attention to the dialectic relationship between stability and change, recognising the potential of niche innovations alongside the path-dependency of incumbent actors and entrenched systems.
- Long-term process: Transition processes can be protracted, involving disruptive shocks and shifts that do not unfold in stepwise linear ways.
- Open-endedness and uncertainty: Transitions research recognises the potentiality of multiple innovations and initiatives, and as such, the various contested transition pathways that might unfold.
- Values, contestation, and disagreement: Transitions research recognises the varying interpretations of sustainability, the differing positionality of actors, and the way in which these play out as contested ambitions for transition processes.
- Normative directionality: While transitions might be the emergent result of particular interactions and actors, to achieve sustainability, normative statements about what transitions seek to achieve must be encoded in and enforced by public policy.

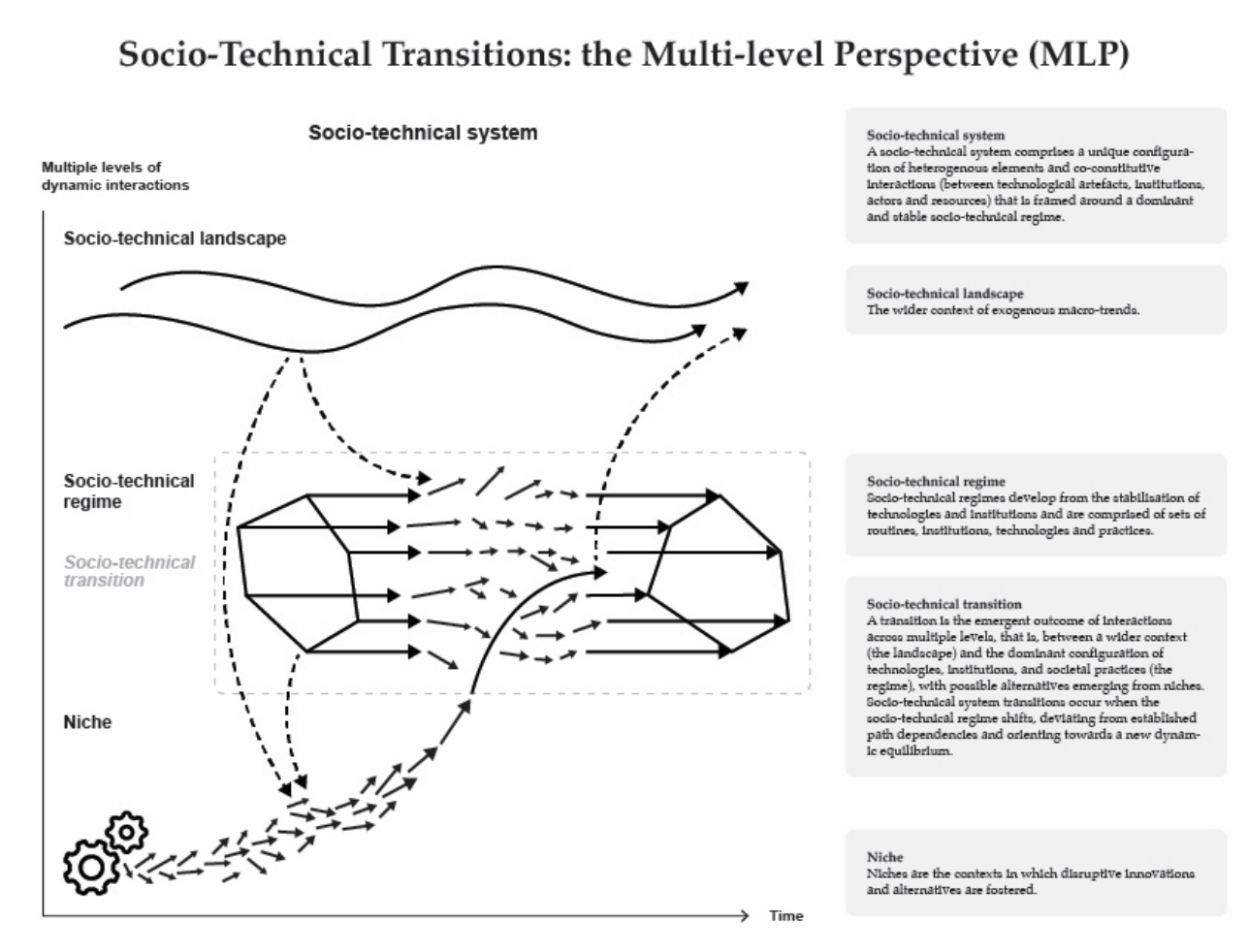


Figure 9 Sustainability transitions with reference to the Multi-Level Perspective (Geels, 2002)

Ultimately, the transitions field understands that change happens in a dynamic way when the characteristics of non-linearity, multi-level dynamics, co-evolution, emergence, variation, and selection are at play (Loorbach *et al.*, 2017; Pel, Raven & Est, 2020). Moreover, conceptualising these change processes can be done from various vantage points: technological, institutional, political, and/or ecological.

As mentioned, the central focus in transitions studies are the socio-technical systems that fulfil societal functions. This is because technology, infrastructure, and the implications of technological innovation, have been catalysts of major transition processes throughout history (Smil, 2010, 2017). A focus on socio-technical systems is common to all transitions perspectives, and most strongly in the MLP (the features of which are visualised and explained in Figure 9). This approach gives emphasises that transitions are the emergent outcome of dynamic interactions between a context, its dominant configurations, and emerging, often competing, alternatives (Loorbach *et al*., 2017). Although the MLP framework has been challenged for applying strict definitions to the distinctive 'levels' (regime, landscape, and niche), it is nevertheless a useful heuristic to identify forces playing out at different levels (Smith, Voß & Grin, 2010). The socio-technical 'regime' comprises sets of routines, institutions, technologies, and practices, and is shaped by the 'landscape', which refers to a wider context of exogenous macro-trends (Geels, 2011). Socio-technical regimes develop from the

stabilisation of technologies and institutions. These can build up momentum, become resistant to change, and lead to path dependency (Unruh, 2002; Jørgensen, 2012). The final component of the MLP is the 'niche', which signifies the contexts in which disruptive innovations and alternatives might be fostered. As such, a socio-technical system comprises a unique configuration of elements and interactions between features of all these levels, framed around a dominant and stable socio-technical regime. A transition is the emergent outcome of changes and interactions between a wider context (the landscape) and the dominant configuration of technologies, institutions, and societal practices (the regime), with possible alternatives emerging from niches (Loorbach *et al*., 2017). Socio-technical system transitions occur when the regime shifts, deviating from established path dependencies and orienting towards a new dynamic equilibrium.

The transitions field has witnessed considerable "intellectual expansions" and, according to Loorbach *et al*., the most significant of these was moving from a socio-technical focus to "a recognition of socio-ecological, socio-economic and socio-political systems as equally relevant objects of transition" (Loorbach *et al*., 2017: 603). The results of this are useful—socio-institutional and socio-ecological perspectives can be integrated with the predominant socio-technical orientation, given their naturally occurring interdependencies (Loorbach *et al*., 2017).

The sustainability transitions literature has also triggered increased interest in experimentation as a strategy to foster socio-technical change (Sengers, Wieczorek & Raven, 2019). Experimentation has been widely interrogated and conceptualised, and now constitutes a burgeoning sub-set of the transitions research community. A 'sustainability experiment' is defined as "an inclusive, practice-based, and challenge led-initiative, designed to promote system innovation through social learning under conditions of uncertainty and ambiguity" (Sengers *et al.*, 2019: 9). Distinct from research on *what* constitutes a sustainability experiment, other authors interrogate the sites *where* experiments take place (Voytenko, McCormick, Evans & Schliwa, 2016; Torrens, Johnstone & Schot, 2018). Much of this literature identifies cities as conducive sites for experimentation: living-labs or testbeds for urban experiments to pilot innovations for sustainability (Voytenko *et al.*, 2016; Kronsell & Mukhtar-Landgren, 2018; Raven, Sengers, Spaeth, Xie, Cheshmehzangi & de Jong, 2019; von Wirth, Fuenfschilling, Frantzeskaki & Coenen, 2019). This conception of experimentation is congruent with one of sustainability transitions' key theoretical frameworks, namely, strategic niche management (SNM), which conceptualises how alternatives emerge out of protected niches to subvert or redirect socio-technical regimes (Schot & Geels, 2008). In line with SNM's theory of change, urban experiments have the potential to contribute to systemic socio-technical change. Urban experimentation has also expanded as an important approach to urban governance (Bulkeley & Castán Broto, 2013; Wolfram & Frantzeskaki, 2016; Bulkeley, Marvin, Voytenko, Mccormick, Breitfuss-Loidl, Mai, von Wirth & Frantzeskaki, 2018; Huang, Castán Broto & Liu, 2018; Voß & Simons, 2018). Foregoing unnecessary further detail here, experimentation in the sustainability transitions literature resonates with other dimensions of sustainability science as well. It is

therefore fair to say that the widespread uptake of experimentation demonstrates the necessity of *being* experimental in the face of increasingly complex sustainability challenges.

Another area of 'intellectual expansion' is the exploration of deep transitions developed by Schot and Kanger (2018) and advanced by Swilling (2020). The transitions field has contributed various frameworks for understanding and intervening in societal change processes. The deep transitions perspective offers a stronger take on the directionality of transitions by taking into account a multiplicity of socio-technical transitions, beyond singular socio-technical systems such as food, mobility, or energy. Schot and Kanger (2018: 1045) formally define a deep transition as "a series of connected and sustained fundamental transformations of a wide range of socio-technical systems in a similar direction". Essentially, a deep transition goes beyond just shifts of a socio-technical system that in fact remains aligned with the fundamental organising principles of the dominant regime. A deep transition would entail the multiplying effect of radical changes across a range of socio-technical systems.

The deep transitions framework presents "a story about the unfolding of industrial modernisation, told from the perspective of socio-technical systems change" (Kanger & Schot, 2019: 8). Kanger and Schot's (2018) theorisation of deep transitions argues that the sustainability conundrums faced by contemporary society are fundamentally linked to the First Deep Transition. This First Deep Transition "refers to the creation and expansion of a wide range of socio-technical systems for the provision of transport, energy, food, housing, healthcare, communications, etc., in a similar direction over the past 200–250 years" (Kanger & Schot, 2019: 7). In essence, the First Deep Transition denotes the features and contradictions of the modern fossil economy. Kanger and Schot's (2018) provocation is to say that the coalescing of socio-technical transitions, across a number of domains, might lead to a fundamental overhaul, a Second Deep Transition, or (what has been referred to thus far) 'a transformed world'.

Drawing on the work of Swilling (2012; 2020), the directionality of the deep transition will be profoundly influenced by the politics of sustainability-oriented coalitions and the identification of binding visions and corresponding policy programmes. Swilling's (2020) more specific claim is that the directionality of the energy transition will be a key determinant of whether the Second Deep Transition in fact materialises. In other words, the shift from fossil fuels to renewables as the primary resource base of society is the fulcrum upon which the Second Deep Transition does (or does not) turn. If it unfolds in such a way that maintains the operating logic of the global fossil economy, the disruptive potential of RE will be diminished. On the other hand, if the shift to a global political economy powered by RE is fully embraced and anchored in the goals for energy democracy, the Second Deep Transition is more likely.

The following additional strands of the sustainability transitions literature are considered in this review. Again, it is important to note that each of these strands have been purposefully included given their explicit focus on energy and further justified by their usefulness in analysing the dynamics of the global energy transition. To

elucidate their explanatory value, I have included a framing question that speaks to the contribution of that particular strand of literature to the overarching conceptual framework.

- *Energy transitions* (3.3.1.1): energy as a socio-technical system is a key focus within the transitions literature and emphasises, often through historical and national-level investigations, how energy and societal systems are co-constitutive of one another.
    - *What is the place of energy in processes of sustainability-oriented societal change?*
- *Political economy of energy* (3.3.1.2): throughout history, particular energy resources and their associated infrastructure configurations have provided the material basis for distinctive political and economic agendas.
    - *Does the (re)configuration of energy infrastructure have political and economic implications?*
- *Energy geography* (3.3.1.3): within energy transitions research, there is an increasing focus on the spatiality and materiality of socio-technical energy systems which open up new avenues for analysis of, and engagement with, the shift from fossil fuels to RE.
    - *How does the literature make sense of the socio-spatial implications of renewable energy infrastructure?*
- *Just transitions literature* (3.3.1.4): justice constitutes an evolving focus within the energy transitions literature with respect to the implications of transition for workers and, vulnerable and marginalised sectors of society, as well as to wider social-ecological implications.
    - *How does the energy transition interface with social and ecological justice?*

3.3.1.1 Socio-technical transitions and energy

SYNTHESIS

A socio-technical perspective on sustainability transitions reveals how energy infrastructure and societal institutions are co-constitutive of one another. Radically transforming the nature of energy systems necessarily implies a corresponding transformation of societal systems. Energy transitions are observable throughout history; most recently, in the centrality of fossil fuels in advancing industrial modernisation.

Closely connected to the broader sustainability transitions literature, a burgeoning literature on energy transitions demonstrates the centrality of energy in the structural (trans)formation of society (Kemp, 2011; Mitchell, 2011; Fouquet & Pearson, 2012; Goldthau & Sovacool, 2012; Araújo, 2014). The notion of an 'energy transition' is without a universal definition; however, it denotes a shift in the nature or pattern of how energy is used within a system (Araújo, 2014). Put differently, an energy transition refers to the change in the state of an energy system, as opposed to a change in an individual energy technology or fuel source (Grubler, Wilson & Nemet, 2016; Cherp *et al.*, 2018). The reconfiguration of the energy sector comprises changes in interconnected components: energy flows and markets, energy technologies, and energy-related policies

(Cherp *et al.*, 2018). To make sense of such changes in energy systems, transition thinking has been widely applied to their various constituting elements, including the electricity, transport, and heating sectors (Markard, 2018). These analyses have, on the whole, been oriented towards energy transitions at the level of the nation state. However, there is an increasing focus on regional and local energy transitions, and the interplay between shifts across these various scales (Späth & Rohracher, 2010; Balta-ozkan, Watson & Mocca, 2015; Mattes, Huber & Koehrsen, 2015; Van Der Schoor, Van Lente, Scholtens & Peine, 2016; Hess, Mai, Skaggs & Sudibjo, 2018; Sareen & Kale, 2018). A socio-technical systems perspective is useful in seeing the interconnectedness of the actors, technologies, and institutions implicated in fulfilling the societal demands on the energy sector and its decarbonisation.

It is eminently clear, when looking at transitions through history, that a 'change in the state of an energy system' is by no means trivial, with far-reaching implications for social-ecological systems. Energy transitions research, for its part, is widely accepted as multidisciplinary and crosscutting in nature, and core to the evolution and progression of societies (Solomon & Krishna, 2011; Goldthau & Sovacool, 2012; Araújo, 2014; Hirsh & Jones, 2014; Beltran, 2018; Gismondi, 2018). The manipulation of carbon-intensive energy resources has enabled the industrialisation and advancement of modern economies (Bradshaw, 2010; Foxon, 2017; Smil, 2017; Davidson & Gross, 2018). As addressed in section 1.2.1, these carbon-intensive systems of production and consumption have turned out to be fundamentally unsustainable. To address this, the decarbonisation of the energy sector is an integral component of transitions towards sustainability (Foxon, 2017; Geels, Sovacool, Schwanen & Sorrell, 2017; Bernstein & Hoffmann, 2018b; Markard, 2018).

Energy transitions research has strengthened this understanding that energy systems, technologies, and networked infrastructure all play a central role in shaping economic systems and, in turn, broader societal structures (Clark & Yusoff, 2014; Hirsh & Jones, 2014; Urry, 2014; Malm, 2016; Foxon, 2017). Historical analyses of energy transitions, skewed towards those of industrialised economies and developed countries, have elucidated this complex and co-constitutive nature of energy, the economy, and societal systems (Fouquet, 2010; Fouquet & Pearson, 2012; Miller, Iles & Jones, 2013; Labanca, 2017). Increasingly, attention is being paid to emerging and developing economies of the global South, which highlights the importance of grappling with energy transitions in contexts where developmental priorities are vastly different. Some of these include studies in India (Yenneti & Day, 2016; Yenneti, Day & Golubchikov, 2016; Sareen, 2018; Shidore & Busby, 2019), Tunisia (Rocher & Verdeil, 2019) Thailand (Rennkamp, Haunss, Wongsa, Ortega & Casamadrid, 2017; Delina, 2018b), South Africa (Baker, 2015a; Swilling, Musango & Wakeford, 2016; McEwan, 2017), Kenya (Newell & Phillips, 2016; Achiba, 2019), Indonesia (Kennedy, 2018a), Mozambique (Broto, Baptista, Kirshner, Smith & Alves, 2018; Power, 2018; Kirshner, Baker, Smith & Bulkeley, 2019), Mexico (Howe & Boyer, 2016; Avila-Calero, 2017), Chile (Furnaro, 2019), and Turkey (Erensü, 2018).

The discourse used to describe the place of energy in transition processes is diverse and expanding. Within the energy transitions literature, there is agreement that all facets of the energy sector are unsustainable and

need to be transformed; yet, different terms within this discourse imply different normative goals and outcomes. While an analysis of the entire spectrum of the energy transitions discourse is beyond the scope of this review, it is pertinent to emphasise that the various terms deployed in advocating for energy transitions each come with their own connotations and implications.

For example, the term 'low-carbon transition' implies increased efficiency and the need to increase the use of RE technologies to both reduce emissions and meet economic development targets, within the ranges of national emission reductions commitments (Geels, 2018). 'Decarbonisation', as another prominent example, implies the radical reduction of carbon from the economy, thus going beyond the reduction of emissions or the increased efficiency of existing energy systems (Sovacool, Martiskainen, Hook & Baker, 2019). However, a socio-technical framing of energy transitions surfaces the fact that radically transforming the nature of energy systems, whether reducing or eliminating carbon intensive energy systems, also implies a transformation and reconfiguration of social, institutional, political, and economic structures (Geels *et al.*, 2017). Contrasting these two terms highlights the necessity of making explicit the normative goals and directionality for energy transitions. Energy transitions that aim merely to reduce the carbon emissions and increase efficiency of current economic systems differ radically from those that aim to eliminate fossil fuel energy systems and substitute these with RE alternatives. Other energy transition goals might go beyond decarbonisation entirely, to restructuring the global political economy around fundamentally different (sustainability) principles.

3.3.1.2 The political economy of energy transitions

SYNTHESIS

A political economy perspective reveals that the significance of energy infrastructures transcends their ability to resource societal activities. Throughout history, particular energy resources and their associated infrastructure configurations have provided the material basis for distinctive political and economic agendas.

The transitions literature has been criticised for not sufficiently considering politics, power, and agency in transition processes (Shove & Walker, 2007; Meadowcroft, 2009, 2011; Avelino, 2017), and has subsequently expanded to integrate wider socio-political and environmental considerations, beyond low-carbon or decarbonisation priorities. As Baker and Burton (2018: 2) state, "the argument of the need to understand the role that power and political economy play in energy transitions is now well rehearsed".

Several authors, both within and beyond the transitions field, emphasise that the energy transition is an intensely political process, much more than simply a technological or socio-technical matter to be attended to by technical experts (Healy & Barry, 2017). An increasing number of studies have investigated these aspects, both across the global North and South (Baker, Newell & Phillips, 2014; Kern & Markard, 2016; Power *et al.*, 2016; Rennkamp *et al.*, 2017). This geographical and conceptual expansion of the focus of energy transition

studies is necessary, since, as Bradshaw (2010: 281) states, "the global energy system is experiencing a dramatic shift in its centre of gravity, as the emerging economies of the global South are increasingly becoming the locus of both future energy production and new energy demand".

These interlinkages, between the political and economic possibilities of energy infrastructures for nation-states as components of the global economy, are captured by researchers applying a political economy analytical lens (Johnstone & Newell, 2017; Bridge, Özkaynak & Turhan, 2018). In the context of the global South, this has been done with reference to the emergence of developmental states in Africa (Baker *et al.*, 2014; Andrews & Nwapi, 2018) and the energy sovereignty movement in countries across South America (Cotarelo, Llistar, Pérez, Guillamon, Campuzano & Berdié, 2014).

As mentioned, energy infrastructures' impact transcends their role of resourcing societal activities. "Energy infrastructures do political and economic work", given how they are "bound up with a highly diverse array of social and political phenomena" (Miller & Richter, 2014: 74). Loorbach *et al.* (2017: 601) state that "the energy transition is thus much more than merely a technological shift; it is a power struggle and a socio-cultural change having a deep effect on incumbent institutions, routines, and beliefs". Energy infrastructures have, in various contexts and periods, provided the material basis for distinctive political and economic agendas (Jungk, 1979; Mitchell, 2011; Di Muzio, 2015; Burke & Stephens, 2017). According to Bridge *et al.* (2018: 13), "infrastructures for energy have been a key frontier in the evolution of economic organisation forms—around markets, finance, labour organisations and techno-scientific expertise—that transcend the energy sector, such that they can be considered integral to the reproduction of economic power".

As such, the interrogation of the political implications of energy transitions is being increasingly taken up within the context of thinking about the state (Johnstone & Newell, 2017; Andrews & Nwapi, 2018; Bridge *et al.*, 2018). Bridge *et al.* (2018: 13) unpack the intersection between energy infrastructure and the political economies of national development, demonstrating that the "social importance of energy infrastructure lies in the political and economic effects to which it can give rise". Following the same logic, much has been written about the critical role that fossil fuels have historically played in the expansion of capitalist, globalised, and financialised modes of production and consumption, as well as the associated political institutions, rooted in a conception of the nation state, that embolden this market-based economic paradigm (Huber, 2009; Malm, 2016).

Understanding that particular energy resources (and their associated infrastructure configurations) give rise to distinctive political and economic modalities is important for engaging intelligently with the unfolding energy transition. And further: displacing fossil fuel infrastructure and its accompanying socio-economic and political realities therefore requires interrogating the alternative realities that might accompany RE infrastructure.

3.3.1.3 Energy geography and the spatiality of energy transitions

SYNTHESIS

Energy resources, and the infrastructures that conduct them, have distinctive socio-spatial properties which shape energy transition processes. RE infrastructures, fundamentally dispersed and decentralised, imply a divergence from the energy geography of a centralised fossil fuel-based global political economy. Energy infrastructures are the material basis of political and economic systems and these are spatially manifested.

A 'geographic turn' within the transitions literature emphasises the role of place and the socio-spatial aspects of sustainability transition processes (Raven, Schot & Berkhout, 2012; Hansen & Coenen, 2015; Murphy, 2015; Binz, Coenen, Murphy & Truffer, 2020). A closer interrogation of the spatial manifestations of the energy transition has resulted in the recent 'energy geography' literature. The energy geography literature explicates the connection between energy infrastructure and the spatiality of socio-technical transitions (Bridge, Bouzarovski, Bradshaw & Eyre, 2013; Huber, 2015; Calvert, 2016; Baptista, 2018). The emergence of a multiplicity of configurations of multi-scalar dispersed and decentralised RE infrastructures has become the object and subject of this 'geographic turn' (Bridge *et al.*, 2013; Huber, 2015). These infrastructures stand in stark contrast to the centralised and large-scale nature of fossil fuel infrastructure (Hirsh & Jones, 2014; Rutherford & Coutard, 2014; Harrison & Popke, 2018).

From a wide reading of the energy research field, particularly in terms of the geography, spatiality, and materiality of energy, it is evident that a new dynamic is emerging with the uptake of RE *because* of its different spatial organisation to that of fossil fuels (Nadaï & Horst, 2010; Mitchell, 2011; Stoeglehner, Niemetz & Kettl, 2011; Goldthau & Sovacool, 2012; Bridge *et al.*, 2013; Balta-ozkan *et al.*, 2015; Mattes *et al.*, 2015). For Huber (2015: 2), "any planning or concern for an energy transition to renewable or alternative energy must put space at the centre of the conversation". It is easy to see, when we are reminded that energy is the material basis of economic and political systems, that the spatial transformation in the structuring of energy infrastructure has far-reaching impacts.

For Calvert (2016), the various prevailing geographic imaginaries, spatial identities, and connections to place are co-productive with particular systems of energy provision; this is energy geography. As the physical depiction of an emerging energy regime, RE infrastructures contrast strongly with fossil fuel infrastructures; thus, their geographic imaginaries, spatial identities, and connections to place are constituted differently. In some ways, RE infrastructures "provide us with new visual reminders that our energy comes from somewhere" (Nadaï & Horst, 2010: 144); more profoundly, they challenge the unnoticed, often inconspicuous, and centralised character of fossil fuel infrastructure (Hirsh & Jones, 2014; Rutherford & Coutard, 2014). This 'unmasking' of conventionally unseen energy infrastructure demonstrates the "stark contrast between carbon-intensive energy sources that have largely unnoticed supply systems, and renewable alternatives… that

remain eminently obvious" (Hirsh & Jones, 2014: 109). Hirsh and Jones (2014) highlight the changes in visual and cognitive engagement that people experience with RE infrastructures, and how these differ strongly from the largely unperceived – other than in times of disruption, breakdown, crisis, or failure (Graham, 2010) – carbon-intensive energy infrastructures that still dominate the global energy system. For example, South Africa's coal-fired mines and power stations are all located within a geographically-concentrated area of Mpumalanga. The average South African has never visited a mine to encounter the processes of coal extraction or witness the complex processes of combustion that take place inside the closely-guarded confines of Eskom's power stations. Similarly, residents of the Western and Eastern Cape, for example, are accustomed to pristine air condition and reliable electricity that travels long distances, evacuated via thousands of kilometres of transmission and distribution lines. On the other hand, though, for those living in the shadow of these megaprojects, the negative health and socio-economic side effects of the coal industry are eminently clear. Nonetheless, these differing experiences are united when the entire country is reminded of its dependence on a failing coal-based electricity sector when faced with nationwide rolling blackouts. These blackouts continue as South Africans become more accustomed to seeing solar panels mounted on industrial and domestic roofs or large-scale wind and solar plants peppered across the landscape while also becoming cognisant of the country's abundant renewable energy resources.

As well as being geographically dispersed, RE infrastructures are also connected to complex financial flows and regulatory frameworks. This means that energy infrastructures and various components of the energy system are embedded in distinctive ways within diverse environments, and that the "networked natures of the system itself produces geographies of connection, dependency and control" (Bridge *et al.*, 2013: 333). According to Nadaï and Horst (2010: 145), "the transformation from fossil fuels to (more) renewable sources of energy, just by the mere fact that they are more decentralised, brings new patterns into the picture: new powers, new connections and new relations". Referring to RE projects, Mitchell (2011: 283) argues that "[t]hese projects and the arguments that support them indicate not that forms of energy determine modes of politics, but that energy is a field of technical uncertainty rather than determinism, and that the building of solutions to future energy needs is also the building of new forms of collective life" In sum, thinking about space in socio-technical energy transitions involves being sensitive to the divergent geographies of RE infrastructures and the potentially transformative nature of the socio-spatial processes that accompany their expansion (Kennedy, 2018a).

3.3.1.4 Energy justice and just transitions

SYNTHESIS

Energy transition processes must reckon with the injustices of the fossil economy. The concept of energy justice points to various dimensions of energy system transformation that must be accounted for from a distributional, recognition, and procedural justice perspective. The just transitions movement, in its most narrow articulation, calls for a shift from fossil fuels to RE that mitigates losses for workers and vulnerable

communities. In a more expansive view, a just transition explicitly connects energy system transformations with environmental, political, and socio-economic goals.

As should be clear, a socio-technical framing of energy transitions highlights that radically transforming the nature of energy systems also implies reconfiguring social, institutional, political, and economic structures. The extensive energy justice literature attempts to conceptualise these wider ramifications (Sovacool & Dworkin, 2015; McCauley, Ramasar, Heffron, Sovacool, Mebratu & Mundaca, 2019; Williams & Doyon, 2019). Rooted in environmental justice, this burgeoning field highlights issues of justice and equity arising from decarbonisation, climate change, and the emergence of a green economy (Jenkins, McCauley & Forman, 2016; Healy & Barry, 2017; Heffron & McCauley, 2017; Jenkins, 2018; Galvin, 2020).

Operationalised as a conceptual, analytical, or decision-making tool, 'energy justice' calls for a global energy system that fairly disseminates the benefits and costs of energy services (Sovacool, Burke, Baker, Kotikalapudi & Wlokas, 2017). Distributional, recognition, and procedural justice are its three core tenets (Walker, 2009; Jenkins, Mccauley, Heffron, Stephan & Rehner, 2016; Jenkins, 2018). Increasingly, a fourth tenet of energy justice is included, namely, restorative justice, to account for the necessity of remediation processes in response to energy-related injustices (Lacey-Barnacle, Robison & Foulds, 2020). The concept is being expanded and deepened with reference to emergent transformations in the energy sector (Pellegrini-Masini, Pirni & Maran, 2020). For Sovacool *et al.* (2018), there is a necessity for a justice-aware energy policy and research agenda, one that considers an expanded scope of the principles of justice. They offer the following ten principles to contribute towards the strengthening of energy justice theory: availability, affordability, due process, transparency and accountability, sustainability, intergeneration equity, intragenerational equity, responsibility, resistance, and intersectionality (Sovacool *et al*., 2018).

In recent decades, contestation in the energy sector has triggered the just transitions movement (Farrell, 2012; Evans & Phelan, 2016; Heffron & McCauley, 2018; Jasanoff, 2018; Snell, 2018; Pellegrini-Masini, Pirni, Maran & Klöckner, 2020). Emerging out of the global North labour movement, the notion of a 'just' transition has gained traction as a set of strategies to support vulnerable stakeholders (both workers and mining communities) in dismantling the fossil economy (Stevis & Felli, 2014; Routledge, Cumbers & Derickson, 2018; Cock, 2019; Piggot, Boyland, Down & Torre, 2019). This is a narrow understanding of the concept of a just transition. It can also be deployed in support of a far-reaching transformation of the energy sector that connects with environmental, political, and socio-economic goals. The concept brings with it the challenge of coupling the decarbonisation agenda with the equity and justice agendas of socio-economic and socio-ecological transformation (Newell & Mulvaney, 2013). It makes sense to explicitly refer to the role that energy plays in the realisation of just transitions, given that "energy is the current upon which cultures, economies,

polities, technology and relations of social power have ridden throughout human history" (Davidson & Gross, 2018: 2).

The discourse of just transitions calls for a consideration of "where and how policies aimed at decarbonising the economy can address the range of injustices and impacts of a socio-energy transition" (Healy & Barry, 2017: 451). For this, a stronger consideration of the politics, power dynamics, and political economy of socio-technical energy transitions is required (Meadowcroft, 2009, 2011; Goldthau & Sovacool, 2012; Healy & Barry, 2017).

3.3.2 Sustainability transitions and policy research

SYNTHESIS

Policy has a critical role to play in influencing the speed and direction of socio-technical transitions towards sustainability.

The interconnected strands of the transitions literature reviewed thus far recognise that transitions (such as experiments in reconfiguring socio-technical energy systems) are deeply political, contested, multi-scalar, and place-based processes, and that visions of desirable futures and strategies for change are divergent and contested. This section adds to the growing picture by picking out and examining one of the most crucial dimensions of sustainability transitions mentioned above: policy.

Policy represents a powerful instrument through which priorities and collective aspirations are articulated and realised (Hajer, 2003). Policy can be seen as a lever for translating and concretising ideas about the configuration of societal systems into strategies for practical action (Edmondson *et al.*, 2019). Policy functions as a key organising principle for society, a way of symbolising and structuring social relations (Shore & Wright, 2013). As such, policies are powerful vehicles for social change: they "can serve as instruments for consolidating the legitimacy of an existing social order or they can provide the rationale for 'regime change' and the subversion of an established order" (Shore & Wright, 2013: 3).

Public policy is key for determining the speed and direction of sustainability transitions (Kern & Rogge, 2017; Bhamidipati, Haselip & Hansen, 2019). The sustainability transitions literature recognises the role of policy, and particularly public policy, in articulating the directionality and accelerating the pace of transitions (Lauber & Jacobsson, 2016; Rogge & Reichardt, 2016; Edmondson *et al.*, 2019). For Bhamidipati *et al.*, (2019: 1321), "policies in the context of sustainability transitions are unique, as they are geared towards speeding up the deployment of low-carbon technologies and mitigating climate change". While this is now widely recognised, according to Edmondson *et al*. (2019: 1) "understanding how policymaking processes can influence the rate and direction of socio-technical change towards sustainability is an important, yet underexplored research agenda in the field of sustainability transitions". Therefore, it is necessary to build stronger interlinkages

between sustainability transitions and policy research, particularly in the context of the global South and developing countries (Bhamidipati, Haselip, *et al.*, 2019).

Policy research literature is well established and wide ranging. Recently, transitions scholars have been interrogating the usefulness of various policy frameworks for sustainability transitions research (Bhamidipati, Haselip, *et al.*, 2019; Loorbach, Wittmayer, Avelino, von Wirth & Frantzeskaki, 2020). Policy is integral to facilitating "the restructuring of socio-technical systems towards more sustainable ways of fulfilling societal needs" (Edmondson *et al.*, 2019: 1). Further, transitions scholars have good reason to draw on more well-established policy theories, given their recognition of the need to investigate the political dynamics of transitions (Avelino, Grin, Pel & Jhagroe, 2016; Kern & Rogge, 2017; Roberts *et al.*, 2018). Shore and Wright (2013: 11) frame policy "as a lens through which to study processes of political transformation", which elevates the significance of policy research, in recognition of its power to shape socio-technical systems. Moreover, emphasising policy's political nature, Shore and Wright (2013: 11) argue that "it is precisely the way that policy creates links between agents, institutions, technologies and discourses and brings all these diverse elements into alignment that makes it analytically productive".

Changes in a multiplicity of realms, be they technological, economic, institutional, political, or socio-cultural, and the interconnections (often highly contested and conflictual) between these nested components, have the potential to produce systemic effects for socio-technical systems. However, critically, such reconfigurations do not take place autonomously and require the intervention of strategic actors (Svensson & Nikoleris, 2018; Bhamidipati, Elmer Hansen & Haselip, 2019). Thus, they can take time. Indeed, the transitions literature has astutely demonstrated the often-protracted and arduous nature of historical transitions, and set this against the increasingly urgent need to accelerate transitions towards more sustainable outcomes. This is where the role of policy comes in. For Edmondson *et al.* (2019: 2) "this is indeed the ambitious foundational claim of much thinking in the sustainability transitions literature, that it is possible to influence the speed and direction of socio-technical transitions towards sustainability and that public policy can play a role in this regard". This claim is the key linkage between the sustainability transitions and policy research literature in this conceptual framework (Kern & Rogge, 2017).

In the context of energy, and specifically the electricity sector, on-paper policy physically manifests as the institutions, infrastructures, and technologies that are co-constitutive of socio-technical systems. Policy research has a significant bearing on energy transitions as it concerns the alignment of explicit, normative transitions goals (such as emissions reductions or demand-side management) with concrete strategies to bring them about (such as a carbon tax).

The conceptual framework at work in this thesis integrates policy research with sustainability transitions via the 'policy assemblage' literature. More specifically, I harness 'assemblage thinking' to make sense of policy processes in the context of energy transitions. Reasons for doing so are explained below.

3.3.2.1 An assemblage perspective on policy

SYNTHESIS

In practice, policy development and enactment are dynamic, emergent, and uncertain processes. In light of this complexity, an assemblage perspective is instructive for substantiating how policy might direct and accelerate sustainability transitions.

Assemblage thinking is fruitful for conceptualising the development, enactment, and impact of policies in service of sustainability transitions. This is because an assemblage perspective "dispel(s) any notion that 'policy' is simply made in particular bureaucratic sites and projected across neat jurisdictional space" (Baker & McGuirk, 2017: 11). An assemblage perspective emphasises the relational, experimental and political nature of policy in transition processes. It provides an alternative way to understand public policies and thus challenges the dominant instrumental rationality paradigm in policy research (Ureta, 2014a). As Uteta (2014a; 304) explains:

> Although it has become common currency among practitioners to talk about policies as 'multifaceted', 'messy', or 'undetermined' in practice the analyses tend to easily return to instrumental rationality's analytic sensibility that claims that even the most complex phenomena 'are best understood through intelligent disaggregation into their components parts. These parts should then be apprehended – and any problematic aspects of them resolved instrumentally – in piecemeal fashion' (Dryzek 1994,6).

Importantly, assemblage thinking shares a similar foundation with the sustainability transition literature, namely, a complexity ontology (Latour, 2005; Li, 2007; Müller, 2015; MGuirk, Mee & Ruming, 2016; Müller & Schurr, 2016; Savage, 2018). It is well established and applied in a variety of fields; for example, education (Gorur, 2011), geology and archaeology (Hamilakis & Jones, 2017), critical policy studies (Baker & McGuirk, 2017), natural resource management (Li, 2007; Köhne, 2014), energy transitions (Bouzarovski, Bradshaw & Wochnik, 2015; Debizet, Tabourdeau, Gauthier & Menanteau, 2016; Kumar, Ferdous, Luque-Ayala, McEwan, Power, Turner & Bulkeley, 2019), and human geography and urban transitions (Brenner, Madden & Wachsmuth, 2011; Farías, 2011; McCann, 2011; McFarlane, 2011a,b; Pow, 2014; Ureta, 2014b; Haarstad, 2016; MGuirk *et al.*, 2016). Its rootedness in a complexity-based ontology can be made clear thus: 'assemblage' is used "to understand complex human and non-human systems, made up of multi-faceted interactions between component parts, which interact to produce broader traits or characteristics that are of relevance to thinking about contemporary social problems" (Savage, 2018: 1).

With reference to policy research, policy assemblage thinking builds specifically on the policy mobility and policy transfer literatures in the field of comparative policy studies (Prince, 2010, 2017; Peck, 2011; McCann & Ward, 2012; Pow, 2014). Taking the concepts of policy mobility and policy transfer further, the policy

assemblage perspective, (much like the policy translation approach (Stone, 2012)), considers "how policies move, mutate and manifest in particular spaces and time, in a context of intense transnational flow of policy ideas and practices" (Savage, 2019: 2). For Savage (2018: 1), the "rapidly evolving transnational flows of policy ideas, practices, actors, and organisations pose new and difficult questions for how we understand power, knowledge, and influence, as well as the making and doing of policies". In light of this, policy assemblage signifies a shift in the discourse and practice of policy research towards seeing policy development and enactment as dynamic, emergent, and uncertain (Prince, 2010; Gorur, 2011; Ureta, 2014a; Baker & McGuirk, 2017). Policy assemblage is likely therefore better equipped to capture the nature of 'policy-doing' and 'policy-making' in a world marked by complexity, non-linearity, and emergence (Savage, 2018).

With reference to urban governance, Haarstad (2016) grapples with *where* urban energy transitions are governed. For this, assemblage thinking proves useful for capturing the vertical, horizontal, and infrastructural processes that combine to shape urban low-carbon governance. According to Haarstad (2016), a policy assemblage is the co-articulation of policy instruments, policy ideas, networks, actors, and institutions that come together in particular locales. This assemblage perspective makes it possible to tease out the global trajectories, regional cultures, and local cultures that inform urban governance processes. In this way, urban governance is 'assembled' by "a variety of trans-urban processes that are brought to bear on the built environment and existing infrastructures in those cities" (Haarstad, 2016: 9).

Framing policy through assemblage thinking was first introduced by Shore and Wright (1997). Their anthropological perspective is instructive for grappling with the reality of policy-making and policy-doing (Ureta, 2014a; Mellaard & Van Meijl, 2017). It is worthwhile to present Shore and Wright's (2013: 1) perspective on policy, such that:

> Policies belong to—and are embedded within—particular social and cultural worlds or 'domains of meaning'. But they create as well as reflect those worlds. From our perspective, policies are not simply external, generalised or constraining forces, nor are they confined to texts. Rather, they are productive, performative and continually contested. A policy finds expression through sequences of events; it creates new social and semantic spaces, new sets of relations, new political subjects and new webs of meaning… In stating this we are adamant that the term 'policy worlds' does not imply essentialised or bounded entities; rather, we see policies as windows onto political processes in which actors, agents, concepts and technologies interact in different sites, creating or consolidating new rationalities of governance and regimes of knowledge and power.

Given this highly abstracted framing, the challenge is to engage with policy studies in terms of how policies develop and are contested and enacted in everyday practice. For this, thinking about policies as assemblages, rather than as discrete things, is generative (Shore & Wright, 2013). For Savage (2019: 2), assemblages are understood as "relational constructs, comprised of heterogenous and emergent component parts that are arranged together towards certain strategic ends". Moreover, "through strategically harnessing the relational

capacities of multiple component parts, assemblages represent a *gathering together* of political imaginations, rationalities, technologies, infrastructures and agents towards steering individuals and groups in particular directions" (Savage, 2019: 13).

Thinking in terms of assemblages is a productive way to engage with power, politics, conflict, and agency in the 'gathering together' and continual contestation of policy-making (and unmaking). Further, it embraces the diverse processes of arranging, cohering, and fitting together, rather than settling for static 'explanatory' components aligned with underlying logics (McCann & Ward, 2012). As such, a policy assemblage is constituted by networks of heterogeneous elements that are "at once, constituting, multiplying and transforming it" (Mellaard & Van Meijl, 2017: 332). Clearly, then, assemblages "are never fully stable and well-bounded entities; they don't have an *essence*, but exist in a state of continual transformation and emergence" (Ureta, 2014b: 232). From this perspective, policy assemblages are never solid or stable; instead, as Greenhalgh (2008), quoted in Utreta (2014a: 305) explains, policy assemblages are

> The collection of heterogeneous, often incommensurate elements that come together for a period of time, sometimes quite fleeting, to produce a policy construct that, through micropolitical processes … may become the core of an official policy.

Policy-making is conceptualised as "a global-relational, social and spatial process which interconnects and constitutes actions, institutions and territories" (McCann & Ward, 2012: 328). An assemblage perspective to policy provides an umbrella concept under which various elements from different strands of policy research can be integrated. The policy assemblage literature emphasises four aspects that have a particular bearing on policy's role in socio-technical change and are therefore key to the development of this study's conceptual framework (Ureta, 2014a; Savage, 2019). These are summarised here, and described in detail in sub-sections (i) to (iv) that follow:

- *Aliveness to context:* Policy components are arranged in particular contexts and "undergo forms of mutation, translation and re-assemblage as they travel between different policy contexts" (Savage, 2019: 6).
- *Multiplicity, emergence, and dynamic interactions:* Dynamic interactions within policy assemblages reveal the emergent and processual nature of policy arrangements in context.
- *Coherence and stability*: Policy arrangements are made to cohere but this can take place without the existence of an overarching guiding or essential logic.
- *Provisional policy assemblages*: Policy-making is provisional and continually contested, rather than a static and discrete arrangement of tools, instruments, rules, and actors.

Together, these comprise the rationale for leaning on the interconnection between policy and sustainability transitions in this conceptual framework.

i. Aliveness to context

SYNTHESIS

Varying conditions across contexts prove amenable to certain policy ideas and practice, but not others.

The features and components of policy assemblages are arranged uniquely in particular contexts, regardless of any apparent universality across the types of instruments or tools employed. While the components of policy arrangements are inspired by other contexts, they land and become grounded in specific contexts as they are re-interpreted across cultural, political, and economic boundaries. In this way, "policy ideas, practices and forms of influence might be strongly informed by transnational flows, but the conditions of possibility for such policies depends largely on local conditions of possibility" (Savage, 2019: 5). Reflecting their contexts, policy assemblages are imbued with the rationale and guiding assumptions prevalent at the time of their creation (Shore & Wright, 2013). However, Shore and Wright (2013) caution that this does not suggest that the ideologies and ambitions that create and sustain policy agendas are static or monolithic. On the contrary, a key quality of policies is that, once they are conceived and enacted, they migrate to new settings and acquire 'a life of their own', with consequences beyond their initial intentions (Shore & Wright, 2013).

Policies, and the territories they co-constitute, "are not entirely local constructions but neither are they entire extra-local impositions. They are assemblages of parts of the near and far, of fixes and mobile pieces of expertise, regulation, institutional capacities, etc, that are brought together in particular ways for particular interests and purposes" (McCann & Ward, 2012: 328). The particular way in which elements of a policy instrument or policy programme become situated and enduring is similar to how policy regimes are understood. A policy regime is a governing arrangement consisting of roles and codes for addressing policy problems, and is executed in a particular set of practices (Foster, 2012; May & Jochim, 2013). Literature on policy regimes emphasises the stability created by the feedback between policy tools and the context in which they are applied. While policy assemblages come to be defined by constituting elements (which are assembled in particular ways, in particular places, and for particular purposes), they demonstrate a tension between provenance and situatedness. For policy knowledge to have effects in the world, seemingly generic policy ideas or instruments are 'rendered place-specific' and are contoured by the conditions of possibility that characterise distinctive socio-ecological milieu (McCann, 2011; Briassoulis, 2019; Savage, 2019). In a word, they are 'alive' to context.

Aliveness to context in policy assemblages implies a consideration of their 'materiality', or (as the actor network theory literature emphasises) the continual processes of territorialisation and de-territorialisation (Müller, 2015; Baker & McGuirk, 2017). According to Wise (2005: 77), an assemblage 'claims a territory'; or, as Baker and McGuirk (2017) state, assemblages consist of and create 'spatialities'. These territories, however, are more than just spaces, since they "have a stake, a claim, they express" (Wise, 2005: 78), and are continually made and un-made, stabilised and de-stabilised. Mellaard and Van Meijl (2017: 335) explain how the

materiality of policies "is considered by accounting for practically every-*thing*, the humans and nonhumans, bound together in an assemblage or a socio-technical system".

Knowing this, observing the minutiae of incremental or radical social change in distinctive locations, the challenge becomes connecting these to wider processes of social, economic, and political transformation. Indeed, the task is "finding ways of studying *through* the specificities of particular sites and their relationships to events in other sites to grasp large-scale processes of change and track the emergence of new systems of governing and formations of power" (Wright, 2013: 27).

ii. Multiplicity, emergence, and dynamic interactions within policy arrangements

SYNTHESIS

Dynamic interactions within policy arrangements result in emergence and their co-evolution with socio-technical change.

Following from this sensitivity or 'aliveness' to context and materiality, the policy assemblage approach emphasises the emergent nature of policy development and opposes a deterministic or linear approach. Socio-technical changes are not induced through single policy instruments, but rather through appropriate 'mixes' of policy instruments aimed at reconfiguring socio-technical systems. The literature on policy mixes also emphasises the co-evolution of policy mixes and socio-technical change (Rogge & Reichardt, 2016).

Moving from a systems perspective, a policy assemblage, or policy regime, cannot be simply or coherently captured as the sum of its constitutive parts. Why? Because a policy regime is not a static structure, but a process of arrangements and power relations. This relational approach explores the nature of interactions between components and the ways in which these interactions shift depending on the particular arrangement of tools and elements within the policy regime. Elements of a policy assemblage function as an ensemble, where policies exhibit agency and shift action in the policy worlds they constitute (Shore & Wright, 2013). Being sensitive to emergence and multiplicity involves a commitment to illuminating the continual process of arranging and cohering, since "it is through process that the effect of an assemblage is established" (Baker & McGuirk, 2017: 7).

iii. Coherence and stability in policy arrangements

SYNTHESIS

Policy regimes are strategic arrangements that are made to hold together and cohere without necessarily having an essential rationale.

Further developing this relational approach, focusing on the nature of interaction within policy arrangements also requires understanding how these arrangements sit together, cohere, and endure. Importantly, this

coherence, and the extent to which a policy regime holds together at all, can be without a central guiding logic (Savage, 2019). This aspect of the policy assemblage literature appears subtle, but is in fact critical. This is because it recognises the *strategic* arrangement of policy components, where connections and synergies are forged and sustained such that they *hold together* and cohere without necessarily having a single guiding rationale or essence (Savage, 2019). This leaves space for points of tension and contradiction, as well as integration and alignment, between the elements constituting policy regimes. Ong (2007: 5) evocatively points to the potential imbued in assemblages, describing how "promiscuous entanglements of global and local logics crystallise different conditions of possibility".

Thinking about policy from an assemblage perspective requires considering how constitutive goals, tools, instruments, and strategies are 'made to cohere', while simultaneously letting go of the necessity to uncover some singular guiding goal or essence. Savage (2019: 10) states that "to focus on policy assemblage is to examine how multiple heterogenous components are arranged to create governable forms". This does not imply the absence of forethought or directionality; rather, "assemblages are the result of heterogenous elements that are brought together into particular *strategic relations* with particular desired impacts" (Savage, 2019: 7). Furthermore, this conception of policy assemblages (as ensembles that hang together in spite of the absence of a defining essence) perturbs the conventional idea that policies are internally coherent or stable things, and that they emerge fully-formed in a particular space and time (Mellaard & Van Meijl, 2017).

From an assemblage perspective, policies are not concrete objects. They are tools of politics and administration that "make up the glue that hold together, or aim at holding together, a patchwork of humans and nonhumans in a certain problem space" (Mellaard & Van Meijl, 2017: 331). The ability of these elements to hold together, to be made to cohere, often presents as policy stability. In the literature on punctuated equilibrium theory, Baumgather and Jones (1993) use the concept of a 'policy monopoly' to capture a form of stability in which a specific manner of framing and regulating becomes hegemonic. A policy monopoly presents as two defining features: a definable institutional structure responsible for policy-making, and a framing of this 'responsibility' in terms that reflect the political values, images, and ideas of the establishment (Kern & Rogge, 2017). In other words, a policy monopoly generates stable policy outcomes that are buttressed by the visions and values of incumbent policy elites (Baumgartner & Jones, 1993).

As the policy monopoly concept implies, this apparently favourable stability (created by coherent and durable institutional arrangements, interest alignments, and shared ideas) also lock in certain *un*favourable outcomes (May & Jochim, 2013). In this vein, policy monopolies, dominated by limited interests, control the decision-making processes and political understanding of policy issues. 'Lock-in', or path dependency, is a pertinent concept for grappling with energy transitions specifically: it describes the 'stuck-ness' of socio-technical regimes and the policy arrangements that underpin them (Unruh, 2002; Urry, 2014). Essentially, lock-in denotes the incumbent actors' resistance to change, thus thwarting, redirecting, or co-opting transition processes. Contemporary energy systems are characterised by strong path dependencies and lock-in; "these

obstacles mean that low carbon transitions require strategic policy efforts to be overcome" and "without such policies, these problems enforce the stability of existing unsustainable, high carbon energy systems" (Rogge, Kern & Howlett, 2017: 1). This justifies my description of fossil fuel incumbents (such as those in the minerals energy complex) as 'obdurate', given that this term captures the *unreasonableness* of resistance to change.

An assemblage perspective looks past the apparent coherence and stability of policy monopolies and adjusts the focus to be able to see possibilities for redirection and reconfiguration sitting within the tensions and contradictions that exist between constituting elements.

iv. Provisional policy assemblages

SYNTHESIS

Policy arrangements can demonstrate stability and lock-in but are equally rich spaces of potentiality and change.

Though it may at first sound counter-intuitive, a fourth quality of systemic policy arrangements is that they are provisional and open-ended in nature. Policy assemblages are always provisional, that is, they are arranged in such a way that they exist in the present, but remain open to being changed or re-arranged in future. Certainly, policy regimes, and indeed socio-technical regimes, might be mired in incumbency and path-dependency which produce negative outcomes; yet, when seen from an assemblage perspective, these arrangements become rich spaces of potentiality and change (Savage, 2019). This is possible because assemblage thinking emphasises that a multiplicity of opportunities for contestation exist, and that policy assemblages are always in the process of becoming (Mellaard & Van Meijl, 2017). Unsurprisingly, given this framing, experimentation is critical. Experimentation surfaces opportunities to contest and reconfigure policy arrangements, opening up "windows and lines of flight towards imagining and assembling something better in line with some normative preferred vision of the world" (Savage, 2019: 14). This means "relations may change, new elements may enter, alliances may be broken, new conjunctions may be fostered" (Anderson & McFarlane, 2011: 126).

Following Li (2005), this vantage point on the development, enactment, and transformation of policy *as assemblage* recognises policy as the outcome of agency and struggle, rather than as a master plan advanced by clearly demarcated policy leaders or institutions. This pluralistic, experimental orientation means that policy assemblages are always subject to contestation and reformulation, and new arrangements with different possibilities have the potential to be cultivated in the midst of constraining conditions.

3.3.3 Sustainability transitions and governance

SYNTHESIS

Governance refers to the steering of collective action. As such, it is the manner in which the policies that articulate sustainability transitions goals are enacted and facilitated.

The third and final component of this conceptual framework is the governance literature and its interconnection with sustainability transitions. Governance, or 'steering' for collective action, concerns how society collectively manages its development, arranges institutions, resolves conflict, and structures interactions between its constituting elements. For my purposes, I intentionally frame 'governance' as the manner in which policies (which, as established in the preceding section, are an assemblage of the espoused goals of sustainability transition strategies) are enacted and facilitated by diverse coalitions of societal actors. Thus, it is clear how these three components (transitions, policy, governance) become integrated – or so I argue in this chapter.

Building on the assemblage thinking described above, approaching policy-making as "a multiple scaled, relational and emergent social process" (McCann & Ward, 2012: 382) implies a close interconnection between policy-making and governance. The assemblage approach to policy implies agency, and a focus on governance points to agents, or actors: how they marshal resources, expertise, and relationships to enable action (Baker & McGuirk, 2017). By this way of thinking (Baker & McGuirk, 2017: 8):

> Policy requires labour: the continued effort of human actors and the enrolment and often unforeseen effects of various materials and techniques through activities that range from everyday toil to executive decree.

It is this agency and labour that is required to arrange policy elements in support of sustainability transitions that necessitates a critical consideration of the concept of governance.

The concept and study of governance emerged out of the political science and public administration domains, with efforts to comprehend changing patterns of interaction between state and society. Traditionally, the institution responsible for advancing the developmental agenda of societal systems was the state (Scoones, 2016). Conventional approaches to development, public policy, and public administration require institutions of the state – 'the government' – to facilitate the delivery of services in the public interest. Following this, a historical perspective of governance understands it as the manner in which *the state* implemented policies serving the public interest. Put slightly differently, governance has historically signified the interactive processes that lead to the production and implementation of state-determined public policy. In the last few decades, however, the word's meaning has shifted to encompass a broadening of the share of responsible actors in the service and advancement of societal goals. In essence, a shift from government to governance has taken place (Jessop, 2016a).

Complex and intertwined social, ecological, and economic challenges make renewed approaches to governance necessary (Borgstrom, 2019). As such, governance is the shift from a focus on state-led government planning, to the recognition of interactions between multiple actors beyond the state. The concept now broadly denotes the coordination of stakeholders around sustainability issues, which can then

be formalised or institutionalised in various modes (Smith, Stirling & Berkhout, 2005). The concept captures the growing complexity of the institutional structures, political processes, and social relations involved in broadening the ways in which collective goals and societal interests are advanced by diverse coalitions (Moss, 2009). It has been the focus of a diverse range of scientific disciplines, and following Briassoulis (2019), a voluminous and variegated literature offers various accounts of governance. Across these diverse disciplines and literatures, "a deeper reason for the popularity of governance may be its inclusive and encompassing nature that makes it ideal for portraying the practice of steering for collective action in a world that has always been complex and uncertainty-ridden" (Briassoulis, 2019: 420).

3.3.3.1 Partnerships and collaboration in sustainability governance

SYNTHESIS

Sustainability governance is the explicit steering of coalitions of diverse actors towards socially just and environmentally sustainable pathways. This normative framing of governance is operationalised in a number of ways, from partnerships to place-based collaborations.

The notion of governance is increasingly pertinent in the context of sustainable development and sustainability science (Meadowcroft, 2010; Taylor & McAllister, 2015). The literature on sustainability governance is broad and multifaceted (Smith *et al.*, 2005; Lange, Driessen, Sauer, Bornemann & Burger, 2013). As described by Meadowcroft (2009), sustainability governance concerns the processes of socio-political governance oriented towards the attainment of sustainable development goals. With this explicit orientation towards sustainable development – notice, importantly, that is a normative directionality – sustainability governance is explicitly goal-oriented and seeks to achieve certain desirable (sustainable) societal outcomes. Practically, sustainability governance requires alliances to be formed between increasingly diverse stakeholder networks working to shift societal systems along alternative, socially just, and environmentally sustainable trajectories. This framing is shaped in particular by Jessop's (Jessop, 2016b,a) view that governance is the complex art of steering multiple agencies, institutions, and systems which are operationally autonomous from one another, though structurally coupled, through various forms of reciprocal interdependence.

A relevant strand of the sustainability governance literature refers to the role of partnerships (Bäckstrand, 2006; Gray & Stites, 2013; Lubell, 2015; Margerum & Robinson, 2015; McAllister & Taylor, 2015; IRENA, 2016). Partnership arrangements are seen as tools for deliberate societal change, as they enable stakeholders to connect their own self-interest or mandates with common goals developed as part of the partnership initiative. Partnerships can be initiated by government, led by public-sector stakeholders. This is often an attempt to reinforce power by forming alliances with business or civil society. In these cases, partnerships become an extension of public policy and lean heavily on the authority of the initiating partner. Yet this does not come close to exhausting the range of possible partnerships.

McAllister and Taylor (2015) review the diverse applications of partnerships as a vehicle for sustainability governance. Beyond the traditional form of public-private partnerships, other forms include learning and policy networks or partnerships in the forms of place-based collaboration and collective action. Glasbergen (2008) describes the emergence of a 'partnership paradigm' as a new era of governance, one that is characterised by consultation, collaboration, mutual accommodation, shared decision-making, and an orientation to the market. Glasbergen (2008: 2) describes how partnerships are self-organising and coordinating alliances; more specifically, they are

> Collaborative arrangements in which actors from two or more spheres of society (state, market and civil society) are involved in a non-hierarchical process through which these actors strive for a sustainability goal.

The partnership literature is useful for synthesising the way in which alliance-building should aim to create mutual, reinforcing, shared, and overlapping goals amongst stakeholders. Further, alliances should be underpinned by mutual trust and an orientation towards coherent sustainability goals.

Similar to the partnership literature, the collaborative governance literature emerges predominantly from research and practice across fields within public administration (Emerson, Nabatchi & Balogh, 2012). 'Collaborative governance' is framed by Ansell and Gash (2007) as a strategy or mode of governance to bring multiple stakeholders together, in common forums, with public agencies, to engage in consensus-building decision-making. Collective action is a mode of achieving a public purpose. It refers broadly to the processes and structures of public policy decision-making and management that engage people constructively across the boundaries of public agencies, levels of government, and private and civic spheres.

A collaborative governance initiative is described as (Ansell & Gash, 2007: 544):

> A governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets.

Ansell and Gash (2018: 1) describe collaboration as a "high intensity mode of interaction that nurtures mutual interdependence and joint action while preserving the autonomy of collaborating parties". This joint action implies that participants co-produce goals and strategies and share responsibilities and resources. Naturally, this kind of high-intensity interaction is risky, time consuming, and can be fragile.

Collaborative governance efforts are often oriented towards addressing the cumulative impacts of the stakeholders' activities (Porter, Franks & Everingham, 2013). Collaboration refers to the joint efforts and sharing of views and resources by multiple parties to solve problems in a way that extends beyond individual capacities and uni-linear visions, and aims to realise mutually desirable outcomes (Wood & Gray, 1991; Porter *et al.*, 2013). 'Cumulative impact' is understood as resulting from the "aggregation and interaction of impacts

in a receiving environment, social group or economic unit" (Porter *et al.*, 2013: 657). Thinking in terms of cumulative impacts or cumulative effects helpfully embodies a systemic view and involves understanding that the activities of stakeholders are interconnected. The interrelatedness of their resource investments means that uncertainty and complexity abound in terms of the emergent (unintended) outcomes.

Porter *et al.* (2013) describe how collaboration may be motivated by numerous factors: crisis, complex and large-scale problems, necessity (for coordinating activities or planning), desire for efficiency and reduced transaction costs, awareness that a problem requires collective action, mobilising and focusing resources, and/or commitment to involving stakeholders. The collaborative governance literature also emphasises the spatiality or place-based nature of collaborations involving multiple stakeholders (Ayala-Orozco, Rosell, Merçon, Bueno, Alatorre-Frenk, Langle-Flores & Lobato, 2018). Place-based initiatives are explicit about addressing socio-spatial issues, where context is central in terms of how problems are framed.

3.3.3.2 Experimentation and transition governance

SYNTHESIS

Thinking about governance in experimental terms resonates with sustainability transitions. In the context of governance, '*experimentation*' is the creativity required to craft institutional structures and ways of working that support sustainability transitions.

While governance has become a vague umbrella term encompassing a diversity of strategies for organising and steering societal development towards more sustainable futures, a refined version emerges in the context of the sustainability transitions literature: 'transition governance'. Transition governance is deployed specifically in the context of the frameworks of sustainability transitions (Frantzeskaki, Loorbach & Meadowcroft, 2012; Loorbach *et al.*, 2017). Transition governance takes the notion of sustainability governance further by detailing explicit governance modalities that align with the various theoretical frameworks comprising the field of sustainability transitions.

A prominent framing of transition governance is 'transition management' (TM), which seeks to mediate transition processes through the creation of transition arenas, TM represents a focus on the institutional arrangements that are responsible for addressing complex sustainability challenges and accelerating progressive change (Voß, Smith & Grin, 2009; Smith *et al.*, 2010; Markard, Raven & Truffer, 2012). It provides guidelines for how transition processes can be established within facilitated transition arenas comprising relatively formal stakeholders across the science-policy interface.

Looking beyond the MLP (detailed in section 3.3.1 above) and TM, and across the various governance approaches in the transitions field, the following elements are recognised:

- the involvement of *constellations and coalitions of actors* with varying power and agency (Hoffman, 2013; Fischer & Newig, 2016; Avelino, 2017; de Haan & Rotmans, 2018),
- in the development of *shared understandings* of systemic change (Schuttenberg & Guth, 2015; Moezzi, Janda & Rotmann, 2017; Burke, 2018; Rosenbloom, 2018),
- which are galvanised around *visions or imaginaries* of alternative futures (Jasanoff & Kim, 2013; Ballo, 2015; Wilson, 2017; Simmet, 2018; Tozer & Klenk, 2018; Longhurst & Chilvers, 2019),
- cultivated through *experimentation* (Caniglia, Schäpke, Lang, Abson, Luederitz, Wiek, Laubichler, Gralla & von Wehrden, 2017; Weiland, Bleicher, Polzin, Rauschmayer & Rode, 2017; Voß & Simons, 2018),
- shaped through *iterative learning and evaluation* (Mierlo & Beers, 2018; Pellicer-Sifres, Belda-Miquel, Cuesta-Fernandez & Boni, 2018), and
- contested by a multiplicity of actors engaged in *struggles over the terms of sustainability transition processes* (Paul, 2018; Lakhanpal, 2019).

Transition governance is about organising collective responses to complex sustainability challenges; for this, experimentation, novelty, and innovation are crucial (Hildén, Jordan & Huitema, 2017; Kivimaa, Hildén, Huitema, Jordan & Newig, 2017; Torrens *et al.*, 2018). Transition experiments seek radically new ways of meeting societal needs and are geared towards transforming regime structures. Thinking about governance in experimental terms creates space for diversity strategies and modalities of organising collective responses amongst a multitude of actors (Bulkeley *et al.*, 2018). Approaching governance as experimentation can take a number of potential avenues, including institutional arrangements, ways of working, and practical activities. Considering this wide range of possibilities, governance experiments have the potential to embody alternative imaginaries that inform radical socio-technical configurations. For example, institutional experiments that trial novel arrangements with and between institutions, stakeholders, and contexts, have the potential to establish new ways of relating and thus to reconfigure how interactions are governed.

3.3.3.3 Governance as multiplicity

SYNTHESIS

An assemblage perspective brings together various orientations and frames governance as multiplicity. Governance as multiplicity captures approaches that are experimental, pragmatic, and responsive to contextual socio-technical realties.

These various orientations, from partnerships to collaborative and experimental governance, can be integrated, following Barissoulis (2019), by thinking about *governance as multiplicity*. Underpinned by assemblage thinking, this framing of governance emphasises the situated, negotiated, provisional, and emergent nature of governance (Barissoulis, 2019). Assemblage thinking is itself underpinned by an ontology

of becoming, and thus implies agency in the ongoing negotiation of governance assemblages (Brassoulis, 2019). Governance assemblages are the unique compositions that continuously emerge from the multiplicity of (often-contradictory) interactions within alliances attempting to steer action towards shared goals (Brassoulis, 2019). Governance as multiplicity is thus the practice of assemblage—an ongoing effort to bring disparate elements together and forge generative connections between them (Li, 2005). Recognising governance as multiplicity ensures an openness to risk, failure, contradiction and ambivalence in transition processes, as a necessary part of the multifaceted nature thereof.

3.4 Conclusion

The conceptual framework established in this chapter brings together three interrelated bodies of literature pertaining to sustainability transitions and the role that policy and governance play in fostering socio-technical change, with energy democracy serving as the normative orientation for this socio-technical change to be directed. To recall, a complexity-based ontology provides the paradigmatic foundation for this conceptual framework. I have attempted to substantiate a framing of socio-technical transitions, an approach to grappling with the dynamics of change, that is commensurate with this conceptual orientation and its epistemological and ontological implications. As such, it emphasises relationality, materiality, conflict, agency, and emergence. The resulting conceptual framework integrates various 'clusters' of literature related to socio-technical transitions that are instructive for recounting and intervening in transformation processes.

As outlined in the introduction to the chapter, each of the bodies of literature on sustainability transitions, policy, and governance, signify distinctive elements of a dynamic theory of socio-technical change. The sustainability transitions literature calls for the reconfiguration of socio-technical systems in line with explicit normative sustainability goals. Premised on the relationality of infrastructure, the transitions literature views socio-technical systems as ensembles of institutions, infrastructures, practices, and processes, that together constitute and conduct nested socio-economic, political, and social-ecological systems. Efforts to encode and institutionalise normative sustainability goals into cohering frameworks that facilitate and accelerate socio-technical change is what policy represents. Policies are constituted by assemblages of objectives, knowledges, and techniques; they are practices of diverse provenance that are reconstituted across diverse contexts (Li, 2005). Governance is the active labour required to contest and reconfigure policies that steer and accelerate sustainability transitions.

In reviewing this literature, summarised above, I deliberately harness the idea of 'assemblage thinking'. This approach stems from the underlying complexity perspective and reinforces the *relational character* of sustainability-oriented socio-technical transitions. This relational ontology underpins how infrastructures, policies, and governance become the focus of multiple experiments instigated by those who share a desire for radical socio-technical change in response to the global challenges the world faces. Socio-technical systems operate within a given set of policy and governance assemblages that, in turn, manifest within specific sets of

socio-spatial realities. From this vantage point, apparent stability might be present in those assemblages where there is sufficient relational resonance or coherence between the component parts. At the same time, opportunities for change might surface in the form of ruptures, tensions, or contradictions within the policy and governance assemblages that co-constitute socio-technical systems.

This culminates in a theory of socio-technical change which can be summarised as the experimental practices whereby actors marshal resources and expertise to steer collective action within the policy frameworks, rules and regulations that support normative sustainability goals. I submit that this conceptual framework is appropriate and helpful, considering the global development challenges introduced in Chapter 1 and elaborated upon in the analytical description of the global energy transition in Chapter 4. This theory of socio-technical change is invoked in the analytical description of the global energy transition in Chapter 4, and further deployed in the exploration of South Africa's energy transition in Chapters 5 and 6.

Chapter 4
Dimensions of the global energy transition

4.1 Introduction

This chapter describes the evolution of the global energy transition using the building blocks distilled in Chapter 3. In it, I explore various intersecting dynamics driving the global energy transition, in order to (in proceeding chapters) explore how these have come to bear on South Africa's nascent energy transition. This is necessary to substantiate the 'conditions of possibility' (Baker & McGuirk, 2017) that shaped the design and implementation of the Renewable Energy Independent Power Producer Programme (REIPPPP) (described in Chapter 5) and materialised in governance responses like the ZF Mgcawu District Development Coordinating Forum (described in Chapter 6). Grasping these 'conditions of possibility' requires tracing the policy frameworks and governance practices within the context of the global energy transition, that set a precedent for the how enabling frameworks for renewable energy (RE) became situated and enduring in South Africa. In the case of the REIPPPP as a driver of South Africa's energy transition, these conditions comprise the historical structuring of the global political economy of energy, the various dynamics that unleashed the renewable energy (RE) transition, and the distinctive driving 'logics' that have shaped its evolution.

The starting point for this analytical description of the global energy transition is accepting that an energy transition is more than just a passage from one state to another, and that energy resources are never neutral inputs merely in service of stable, enduring societal functions. With this in hand, a historical account of the global political economy of energy unequivocally presents fossil fuels as inextricably entangled with the formation of contemporary global society, or, as shorthand, what some have called the 'Anthropocene' (Malm & Hornborg, 2014; Steffen, Broadgate, Deutsch, Gaffney & Ludwig, 2015). In teasing out this connection, the fact becomes clear that there is nothing inevitable or teleological about the way that society is structured, cultures are practiced, or how economies and political systems operate. That said, the materiality of these resources, together with the policy frameworks and governance practices that shape their configuration, have a bearing on the conditions of possibility for *re*forming the defining features of society. As the following historical perspective illustrates, fossil fuels have co-evolved within a global political economy that is highly financialised, structurally unequal, resource-intensive, and characterised by the concentration of political and economic power in the hands of elites (Sovacool & Brisbois, 2019). So, as the biophysical foundation of society shifts increasingly towards RE, it remains an open question what forms of collective life they may accompany or co-evolve. To emphasise the point: it matters deeply how these infrastructures are configured.

The chapter begins with a description of the features of the global political economy of energy and the historic foundations of the dominant fossil-fuel based socio-technical energy regime (section 4.2). This historical perspective illuminates how particular forms of energy resources have enabled the evolution of modern

civilisation, the socio-economic structures of society, political institutions, and cultural practices; how, in short, the fossil economy is material and cultural foundation of contemporary collective life. Thereafter, I trace the foundations of RE, with special reference to the rise of RE technologies in frontrunner countries such as Germany and Denmark (section 4.3). The context which gave rise to the proliferation of RE cooperatives is explored in order to identify the distinctive features of those contexts that made rapid innovation and investment possible. This is followed by a review of the policy conditions that fostered this initial innovation and investment: how these evolved, in particular, from feed-in tariffs to competitive auctions, and how they became the dominant policy instrument spurring investment in RE capacities across both developed and developing countries (section 4.4).

Moving towards the present moment, I provide an overview of current investment and finance trends that demonstrate the scale and nature of the nascent energy transition (section 4.5) This is set against a brief comparison of the shifting finance and investment dynamics within fossil fuel industries, with a reference to falling Energy Return on Energy Invested (EROI) as one driver of the decline in the economic and financial viability of fossil fuels (section 4.6). All of these dynamics are then located within an overview of global climate commitments, signified by the Paris Agreement, and the broader Sustainable Development Goals, which provide international policy impetus to advance decarbonisation and development agendas (section 4.7).

The exploration of the global energy transition in this Chapter is done for the purpose of distilling what precedent it set for the South African energy transition, signalled by the initiation of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP). To this end, I argue that two overarching logics of RE development are evident in a critical review of the global energy transition, each of which I substantiate in the course of this chapter and refer to in shorthand, namely, a 'social logic' and a 'corporate logic'. On the one hand, I refer to the broadly 'social logic' of RE development that emerged in frontrunner countries, and the broadly 'corporate logic' that has overtaken as the prevailing logic according to which RE development now takes place. With reference to the RE boom that was sparked in frontrunner countries, I articulate the specific socio-technical configuration, and its particular policy frameworks and governance practices, as the 'social logic' of RE development. This 'social logic' with its foundations in the frontrunner countries of the RE sector (with the FIT at its core) is contrasted with a 'corporate logic' of RE development (with competitive auctions at its core). Exploring the emergence of and interaction between these distinctive logics is instructive for understanding the precedent for how specific policy frameworks and governance practices for RE came to bear in South Africa's nascent energy transition.

4.2 Facing deep incumbency: energopolitics and the fossil economy

Through the elaboration of the energy transitions literature in section 3.2.2., I demonstrated that energy transitions entail more than merely the substitution of one form of energy with another. Instead, the shift

from the dominance of a particular energy resource to another involves fundamental co-constitutive changes in societal structures.

The socio-technical transitions approach attempts to capture the complex emergent outcomes of shifts in the way that society manipulates energy resources and, conversely, in the way that different forms of energy make possible distinctive political, economic, and social forms. As the contemporary field of energy research proliferates, a number of authors have developed concepts that address the interwovenness of human civilisations and energy resources (Mitchell, 2011; Di Muzio, 2015; Smil, 2017). An exhaustive review of this body of literature is beyond my scope here. However, it is worthwhile to note the work of Andreas Malm (2013, 2016) and Timothy Mitchell (2011), two prominent thinkers in the energy transitions literature whose ideas have influenced the understanding the dynamics of the global political economy of energy in this chapter. Making reference to these inquiries is especially appropriate in the sense that they frame a wide range of contemporary energy transitions research and, in particular, foreground the socio-spatial relations that are made possible by energy resources, as well as the political opportunities opened up by these shifts.

Malm (2013), through his analysis of the cotton industry in nineteenth century Britain, conceives of the origins of the 'fossil economy': "an economy characterised by the self-sustaining growth predicated on growing consumption of fossil fuels, and therefore generating a sustained growth in emissions of carbon dioxide" (Malm, 2013: 17). The fossil economy entails a mode of capital accumulation that spurred what has become known as the 'Great Acceleration' and the impetus for tipping civilisation into a new geological era, the so-called Anthropocene (Steffen, Richardson, *et al.*, 2015).

Malm (2016: 6) spells out the 'union' of economic expansion and fossil energy consumption and the prominence of the fossil economy as "an altogether historical substance". The notion of the fossil economy has become a prominent explanatory term for the evolution of the global political economy of energy, and in particular the connection between a distinct form of capitalist economic development and the extraction of fossil fuels. Malm's (2016) analysis is important for grappling with the origins of the Industrial Revolution and a political economy of energy that is now the essence of the 'business-as-usual' conditions that are the object of resistance in contemporary climate politics (Malm, 2013). For Bellamy and Diamanti (2018: 1), "the very fabric of today's climate crisis is knit from the exhaust of intensive and extensive waves of capital accumulation". Nonetheless, the expansion of this mode of capital accumulation has not been linear or stepwise, and instead is distinguished by multiple phases, in the form of long waves and socio-technical transitions (Swilling, 2013; Malm, 2016).

Following Malm (2016), interrogating the foundation and features of the fossil economy reveals the drivers of the worsening polycrisis that typifies Anthropocene conditions. The Anthropocene is now widely understood as a product of capitalist economic relations based on fossil-driven industrialisation (Di Muzio, 2015; Wright, Nyberg, Rickards & Freund, 2018). Being deliberately explicit about the logic of the fossil economy allows one

to causally link the continued undermining of the biophysical foundations of society with the appropriation of fossil fuel in support of growth-oriented capital accumulation. A number of other authors reiterate this perspective; for example, Mathew Huber (2009) highlights the importance of fossil fuel to capitalist industrial development and the production and circulation of capital. Huber (2009: 113) explains that

> as the current political economy attests, energy issues are at the epicentre of not only the geopolitics of empire and the global climate crisis, but also the more banal, everyday reproduction of capitalist social life.

Also relevant is Jason Moore (2015, 2019), who critiques the notion of the Anthropocene for underemphasising the significance of capital; instead, Moore argues for the 'Capitalocene' as an explicit recognition of the capitalist era as a world-ecology of power, capital, and nature.

While Malm (2013) interrogates the foundations of the industrial era, and Moore points to the distinctive power of capital in the formation of this global political economy, Mitchell's (2011) analysis focuses on political dynamics within the last century in the shifting dominance of steam, coal, and most recently oil. Furthermore, Mitchell demonstrates how the materiality of energy resources, and their socio-technical configuration, creates the conditions for distinctive modes of socio-political organisation and mobilisation (Mitchell, 2011). He writes (Mitchell, 2011: 12):

> Understanding the question of oil and democracy starts with the question of democracy and coal. Modern mass politics was made possible by the development of ways of living that used energy on a new scale. The exploitation of coal provided a thermodynamic force whose supply in the nineteenth century began to increase exponentially. Democracy is sometimes described as a consequence of this change, emerging as the rapid growth of industrial life destroyed older forms of authority and power. The ability to make democratic political claims, however, was not just a by-product of the rise of coal. People forged successful political demands by acquiring a power of action from within the new energy system. They assembled themselves into a political machine using its processes of operation. This assembling of political power was later weakened by the transition from a collective life powered with coal to a social and technical world increasingly built upon oil.

The ability of coalitions to "acquire a power of action from within the new energy system" (Mitchell, 2011: 12) is at the heart of Mitchell's assessment. His exploration of 'carbon democracy' foregrounds the materiality of fossil fuels, in particular coal and oil, to lay bare the way in which these resources enabled the formation of distinctive eras of socio-political democratic orders. Put simply, Mitchell (2011) demonstrates how coal provided the material basis for the rise of social democracy, while oil enabled globalisation, financialisation, and neoliberalism. As Swilling (2020: 259) states, "the mode of combustion affects the nature of politics". Keen to avoid technological determinism, Mitchell's analysis of the materiality of modern democracy is presented here in concert with the explication of the fossil economy as a logic of capital accumulation. Seen together, these cornerstone ideas give impetus to energy transitions research. And, stronger: they frame the challenge

of reconfiguring energy infrastructure as one of overhauling "forms of collective life" (Mitchell, 2011: 238) as opposed to merely reducing emissions or increasing efficiencies.

In essence, carbon-dominated politics is exemplified by the concentration of political and economic power and the way in which fossil fuels have provided the material basis for the structural inequality that defines modern life (Hickel, 2017). Equally, the defining experiential features of modernity are directly connected to fossil fuels. In this vein, Boyer's (2011, 2014) concepts of 'energopower' and 'energopolitics' are binding and integrative, "putting into words the increasing recognition that conditions of life today are increasingly and unstably intertwined with particular infrastructures, magnitudes, and habits of using electricity and fuel" (Boyer, 2014: 7). These concepts are helpful for rethinking political power through the analysis of electricity and fuel, however, "the point here is not to promote naïve materialism but rather to argue that power over energy has been the companion and collaborator of modern power over life and population from the beginning" (Boyer, 2011: 5).

Thus far, this section has sketched a picture of the extent to which a global fossil economy evolved over the last century; it is largely within this same picture's parameters that RE infrastructures are being introduced. In other words, they are treated (merely) as technological innovations in a long-established and deeply entrenched global political economy that structures geopolitical, economic, cultural, and social-ecological relations. When RE alternatives are conceived of in this narrow sense (as *technological* innovations), ramping up investments in them can in fact obfuscate the problematic levels of sustained obduracy within the prevailing socio-technical regime. But, as historical energy transitions make clear, the transition from a global political economy built around fossil fuels will, necessarily, *not* be limited to the mere substitution of old technology (carbon-intensive infrastructures) with new technology (low-carbon alternatives) (IRENA, 2019). However, that this shift from one socio-technical regime to another will be supportive of a just transition to energy democracy is not a foregone conclusion (Swilling, 2020). The challenge for sustainability transitions strategies is to achieve decarbonisation in a way that aligns with wider development imperatives, so as to avoid RE technologies simply being co-opted into a global political economy that amplifies pressures on the biophysical foundations of society, further undermining social-ecological wellbeing.

4.3 Revisiting niche conditions: foundations of the RE sector in frontrunner countries

Human civilisations have been entanglement with fossil fuels for nearly 250 years. This is the distinctive characteristic of contemporary geopolitical, economic, technical, cultural, and social-ecological realities. Fossil fuels are enfolded into every aspect of contemporary human existence. From a geopolitical and socio-economic perspective, fossil fuels remain the dominant source of energy powering economic expansion and political hegemony (Bellamy & Diamanti, 2018). However, during the second half of the twentieth century, a number of intersecting dynamics ushered in RE technologies as niche innovations within the dominant socio-

technical energy regime. Since then, innovation in those RE technologies has led to the expansion of the RE sector, such that it is now no longer considered a niche (Swilling, 2020), and is indeed the impetus of the global energy transition.

The extent of the growth and expansion of the sector is reflected in how RE is now more affordable than fossil fuels across all world regions (REN21, 2019; Frankfurt School-UNEP Centre/BNEF, 2020). RE technologies are competing alongside their carbon-intensive counterparts and are increasingly outperforming incumbent technologies on a number of financial and environmental measures. These simplistic comparisons are underpinned by a (worryingly widely-held) view that the full extent of RE technologies' potential is to simply substitute carbon-intensive infrastructures, without disrupting the political economy that serves the interests of a tightly-knit set of incumbent socio-political actors. This denudes the historical significance (pointed out by Malm (2013), Mitchell (2011), and others) of the opportunities opened up by dispersed and decentralised RE infrastructures.

However, a closer look at the socio-spatial dynamics of the evolution of RE technologies in frontrunner countries provides evidence of their transformative and path-breaking potential, in line with claims made by the energy democracy movement (Becker, Beveridge & Naumann, 2015; Bauwens, Gotchev & Holstenkamp, 2016). Following Mitchell's (2011) argument that the materiality of energy resources has a constitutive role to play in shaping the forms of collective life, and Boyer's (2011: 5) point that "power over energy has been the companion and collaborator of modern power", RE's distributed and decentralised material nature clearly has far-reaching implications. To explore what some of those implications might be, it is instructive to look to the foundations of the RE sector (in the frontrunner countries of Germany and Denmark) for signs of the nascent energy transition's potential to cultivate new forms of collective life (Mitchell, 2011).

Germany and Denmark are recognised in the energy transitions literature as 'frontrunner' countries that have driven the energy transition (Markard, 2018). More specifically, the community alliances, social movements, and energy cooperatives in these two countries played a significant role in kickstarting national energy transitions and driving shifts elsewhere across Europe (Becker, Blanchet & Kunze, 2016; Van Der Schoor *et al.*, 2016; Debor, 2018; Törnberg, 2018; Galvin, 2020). The broad spectrum of community activities in frontrunner countries, and their contribution to the transition to sustainable energy systems, is captured in the 'community energy' literature (Creamer *et al.*, 2019). This literature is well established in the European context and accounts for the multiplicity of institutional forms, financial arrangements, and policy environments that have been shaped by, and in turn enabled, diverse alliances between the state, communities, and the private sector (Rydin, Guy, Goodier, Chmutina, Devine-Wright & Wiersma, 2015; Creamer, Eadson, Pinker, Tingey, Markantoni, Foden, Speight & Barnacle, 2018). These diverse alliances serve as the basis for what I refer to as the 'social logic' of RE development that accounts for the emergence of RE within these niche conditions in frontrunner conditions.

Denmark is considered a pioneer, with the development of energy cooperatives from the 1970s (Hoffman, 2013; Sovacool & Blyth, 2015), and Germany experienced a boom in the early 2000s (Kunze & Becker, 2015; Yildiz, Rommel, Debor, Holstenkamp, Mey, Müller, Radtke & Rognli, 2015; Debor, 2018). "Energy cooperatives are innovative social structures that find collective solutions to problems occurring during transition processes or provide testbeds for adapting low-carbon energy technologies to local conditions and needs" (Wierling, Schwanitz, Zeiß, Bout, Candelise, Gilcrease & Gregg, 2018: 2). Both countries had long-standing traditions of cooperatives stretching back into the nineteenth century, and anti-nuclear activist movements gaining a foothold towards the end of the twentieth century (Bauwens, 2016; Bauwens & Devine-Wright, 2018). The dovetailing of these and other dynamics, including the 1970s' oil crisis, led to a wellspring of participants in a diversity of locations seeking to cultivate viable alternative energy innovations. This boom in RE was spurred by a number of features, including the existence of enabling policy and regulatory frameworks (which prioritised the participation of community-based entities), standardised infrastructure frameworks, and close collaboration in open-learning environments between communities and the wind turbine industry, particularly (Swilling, 2020).

In Germany, these innovations also emerged out of the country's long tradition of the municipal economy, a tradition that had been destabilised with the privatisation projects of the 1980s and 1990s (Becker *et al.*, 2015). This liberalisation of the energy market had resulted in the sector being dominated by regional and largely privately-owned energy companies; to correct this, the objective became *Rekommunalisierung* ('re-municipalisation'). The German experience of *Rekommunalisierung,* successfully reclaiming public services and advancing the energy transition, was made possible by a diversity of political strategies and institutional arrangements. As Cumber (2016: 282) describes, "the country's remunicipalisation efforts range from big-city campaigns, to small town and rural district initiatives, to the takeover of large regional concerns". The wave of *Rekommunalisierung* swept through towards the end of the 2000s when a number of concession contracts came to an end, opening a window of opportunity in the energy sector. A number of factors contributed to this return to public ownership of various elements of the energy sector, including the ambitions of many public authorities to strengthen their participation in the energy sector. These ambitions were, in turn, strengthened by an upsurge in citizen-driven campaigns opposing privatisation and supporting public and democratic control of public services. Other crucial factors included shifts in policy (notably, the introduction of a feed-in tariff enabling wider participation in electricity generation), the availability of public finance for RE, and disappointment with the private sector players' response to the energy transition.

Re-municipalisation took two main forms—returning privatised utilities to public ownership and forming new utilities where a regional (often private) supplier was previously active (Becker *et al.*, 2015). The strong place of local utilities in Germany, or '*stadtwerke'*, meant that following privatisation, the notion of a *stadtwerk* remained important as a political option. "As impressive as the scale of new enterprises is the diversity and innovation in forms of collective ownership" (Cumbers, 2016: 242). This new generation of local, collectively

owned energy companies ranged from new local state-run entities to smaller rural cooperatives. They demonstrate that grassroots mobilisations and state-led action need not be in opposition.

From a socio-spatial perspective, the financial investment and technological innovation was made possible by a vast array of geographically dispersed community-based entities across Germany and Denmark. Open-learning environments, so important in innovation, were created in community-based institutional structures, such as cooperatives. These structures were in turn enabled by state regulation and public-private partnerships, and supported by financial investments in research and development by development finance institutions (DFIs) (Swilling, 2020). This meant that energy cooperatives were able to invest in RE technologies, together with renewable energy developers (such as Vestas) to accelerate the development and deployment of increasingly efficient and affordable wind turbine technology. At the same time, energy cooperatives were supported by the state, which purchased the electricity generated by their infrastructures. Seen together, these arrangements cultivated a rich environment for innovation and learning that protected against the commodification of technological developments, and invited households and community structures to become invested in the configuration of transformative socio-technical systems. In short, these arrangements are usefully described as a 'social logic' of RE development.

The key insight from this brief overview of the emergence of the RE sectors in Germany and Denmark between the 1970s and early 2000s is this: the materiality of dispersed and decentralised RE technology is what made the predominance of collective and public ownership possible. In other words, the social logic of RE development was made possible largely by the dispersed and decentralised nature of RE technologies. Despite these (distinctly social) foundations of the RE sector, where community and municipal energy structures emerged from community movements, this is no longer true for the majority of RE projects. There has been a shift from this social logic of RE development, to a predominantly corporate logic of RE development. While in the formative decades of the expansion of the RE sector, alternative, low-carbon technologies were fostered through small-scale, democratic, community-based initiatives (that is, a social logic of RE development), today they are delivered through large-scale, commercial mechanisms and driven by an increasingly consolidated set of private actors operating at a global scale (or in short, a corporate logic for RE development) (Baker, 2015b; Kennedy, 2018b). The last two decades have witnessed what can largely be described as the 'co-option' of RE technologies, by incumbent forces. Put differently, a market-driven, finance-led enclosure of the socially-owned community energy sector has taken place. The corporate logic of RE development has overtaken the social logic in driving the energy transition in other parts of the world. The result of this is that the features of the RE boom that were poised to fundamentally disrupt the global political economy of energy in the early 2000s have been tempered and undermined. As Swilling (2020: 250) notes,

> The material configurations of RE became the basis for the emergence of a significant energy cooperative movement in Denmark and Germany, aided and abetted by an enabling governance and regulatory environment supportive of collaboration and cooperation. During the 1980s and

> 1990s communities, cooperatives, cooperative banks and state institutions were the most important collaborators during the innovation phase of the RE industry. However, as the costs of RE came down and new technologies emerged, a wide range of public and private investors moved into the RE sector. The governance framework that supported the flourishing of a community energy sector was dismantled, and public sector investments helped to de-risk private sector investments which have, as a consequence, grown rapidly.

Fortunately, the window of opportunity to recover these progressive, democratic, and community-based foundations of the RE sector, that is its social logic, is arguably still open. Moreover, in line with Mitchell (2011) and Malm's (2013) perspectives, the distinctive materiality of different energy resources means that socio-spatial relations will *necessarily* change in some way; in other words, there is no getting away from the fact that the decentralised and dispersed nature of RE infrastructures breaks from the prevailing organisation of socio-spatial relations in the fossil economy.

It is worth dwelling for a moment here (and in further detail in section 4.4) on the role played by policy in the frontrunner countries, as policy is a major part of the reason for claiming that the 'window of opportunity' has not yet closed. The evolution of energy policy regimes in Germany and Denmark led to wide-ranging changes in the investment and ownership dynamics of those countries (Leiren & Reimer, 2018; Ohlhorst, 2020). In simple terms, energy policy moved from the use of feed-in tariffs (which was amenable to the social logic of RE development) to a preference for competitive auction schemes, the latter of which operates according to a distinctively market-driven logic. This shift is what underpinned the resultant financialisation of energy policy in these countries; furthermore, it echoes experiences in other countries that moulded their energy policy decisions on those of the frontrunners (Newell & Phillips, 2016; Erensü, 2018; Kennedy, 2018b). With some exceptions, competitive auction programmes now lead the way in the procurement of RE, that is, the corporate logic for RE development is now the most prominent one. Competitive auctions have been executed in more than 67 countries across the world, most of which are developing countries whose investment in RE capacity now exceeds that of developed countries (IRENA, 2013, 2018a).

4.4 Problematising policy evolution: from feed-in tariffs to competitive auction programmes

The shift away from feed-in tariffs (FiTs) to competitive auction programmes in Germany, Denmark, and elsewhere across the region, was by no means simplistic or uniform. It is here that the interaction between the social logic and the corporate logic is described and problematised. As Leiren and Reimer (2018) spell out, feed-in tariffs successfully crowded in widespread participation (making possible a social logic for RE development), as seen especially in the rise of energy cooperatives which were increasingly threatening to the incumbent actors in the sector. Naturally, putting pressure on the socio-technical regime in this way meant that RE niches became caught up in broader political contestation; this was particularly pronounced in

Germany and has been widely documented in the evolution of the country's '*Energiewende*' (Quitzow, Canzler, Grundmann, Leibenath, Moss & Rave, 2016; Ohlhorst, 2020)

A RE feed-in tariff (REFIT) is an economic instrument designed to incentivise the uptake of an emergent RE industry which is not yet economically competitive with conventional energy generation, but which is desirable for other reasons, such as environmental reasons (Winkler, 2005). REFITs guarantee a fixed price paid to RE generators for a specified time period. In Europe, feed-in tariffs have proven to be an effective policy option for stimulating investment in, and increasing the capacity of, renewables (Winkler, 2005; Power Africa, 2017). REFITs are thus a central policy element of the social logic of RE development. From a market-oriented perspective, the use of feed-in tariffs is appropriate when kickstarting an industry, and the subsequent move towards auctions (to increase competition and thereby drive down prices) is a positive indication that an industry is maturing. There are, of course, other perspectives. From a different point of view, the evolution from REFITs to auctions can be seen as driving out smaller actors (and undermining the social logic) and preferencing major market players (in support of a corporate logic) that have access to the finance, capital, and resources necessary to secure their participation and pursuit of market share (Baker, 2015b; Ohlhorst, 2020).

There is strong evidence to support this perspective and the ascension of the corporate logic of RE development in the context of the energy transition beyond frontrunner countries. During the early 2000s, feed-in tariffs became highly politicised in Germany and a series of incremental policy shifts eventually resulted in their removal, partly in response from pressure from the European Union prescribing a competitive approach (Leiren & Reimer, 2018). The removal of these schemes triggered a notable downturn in the number of new energy cooperatives being established. "Statistical evidence shows how drastic these developments are. Having over 900 energy cooperatives in its peak time, Denmark has meanwhile lost 88% of the energy cooperatives. In Germany, these developments are less pronounced but the yearly number of newly founded energy cooperatives is continuing to drop" (Wierling *et al.*, 2018: 20). While feed-in tariffs were responsible for boosting vibrant and diverse community energy participation, and in turn for spurring on the cultivation of the RE sector in these frontrunner countries, the policy instrument became a victim of its own success (partly due to its threat to incumbents and the cost implications of its widespread adoption and given that they became unnecessary the technology no longer required subsidisation) and lost favour with policy-makers as the preferred mechanism for RE procurement (Swilling, 2020).

Germany has solidified its role as a pioneer and leader in the global energy transition. It now operates as one of the prominent reference points for the development of RE industries across the world (Fitch-Roy, Benson & Woodman, 2019). In the wake of the elimination of feed-in tariffs and thus the undermining of a social logic of RE development, competitive auction programmes emerged triumphant as the policy mechanism of choice, thus advancing a corporate logic of RE development. Indeed, auctions are largely credited with having driven down technology prices, stimulating innovation and investment, and boosting the capacity of installed RE

technologies (Fitch-Roy *et al.*, 2019; Polzin, Egli, Steffen & Schmidt, 2019). Yet there is reason to be more cautious in commending this arrangement and the corporate logic underpinning its proliferation. Ritch-Roy *et al.* (2019) emphasise the importance of problematising the way in which auctions are now presented as uncontroversial policy choices for the deployment of RE infrastructure. Their research, which is focussed on RE governance in the European Union, outlines how competitive auction programmes are largely responsible for displacing feed-in tariffs and other RE instruments (Fitch-Roy *et al.*, 2019).

With respect to the propagation of competitive auctions (and thus too a corporate logic of RE development) in developing countries, Fitch-Roy *et al.* (2019) spell out the two major factors that explain why auctions have become so prevalent as an RE procurement tool (recall that, as of 2019, they have been initiated in 67 countries, predominantly developing countries (Kruger & Eberhard, 2018)). The first contributing factor to the rapid uptake of auctions is that this modality is well aligned with the established logic of state procurement in many developing nations (Fitch-Roy *et al.*, 2019). So, the widespread use of auctions in a range of already-existing state-procured service delivery systems in developing countries makes it easy to apply them to RE procurement (Fitch-Roy *et al.*, 2019). The second factor, as Fitch-Roy *et al.* (2019) explain, is the compatibility of auctions with multilateral organisations and DFIs' guidelines for procurement supported with donor capital. From a foreign policy perspective, this means that DFIs and other donor organisations' rules have an influence on domestic energy policy frameworks. The supply of financial aid and technical expertise, driven primarily by these policy and development agendas, has been instrumental in establishing RE sectors in many developing countries (and in turn, sectors that are characterised by the corporate logic of RE development). As competitive procurement tools, auctions ensure competition, transparency and the compliance of the recipients of donor aid. Attesting to the political nature of policy translation, Bhamidipati *et al.* (2019) explore the development of a feed-in tariff in Uganda. Their investigation captures a similar dynamic to that which Fitch-Roy *et al.* (2019) present. However, by contrast, the interplay between local and international policy actors resulted in the application of a different policy instrument attesting to how policy instruments move, mutate and manifest different across distinctive contexts.

IRENA (2018a) claim that the growing use of auctions is mainly motivated by their ability to apply a competitive mechanism for price determination, a key component of the corporate logic of RE development. Indeed, the global surge in RE investment has resulted in unpresented innovation and technological advancement, resulting in the rapid reduction of RE costs, evident in the record-low procurement prices of recent auction schemes in Mexico, South Africa, and India (Frankfurt School-UNEP Centre/BNEF, 2020). However, this is not the only justification employed for their deployment. Another compelling rationale for the use of competitive auction schemes is their apparent suitedness to address severe shortages of installed power generation, especially in developing countries with intersecting development imperatives (Eberhard, Gratwick, Morella & Antmann, 2017). To fulfil decarbonisation commitments of the 2015 Paris Agreement, and indeed, to meet electrification demands generally, it is projected that up to USD 61 trillion of global investment in RE is required

(Hall, Roelich, Davis & Holstenkamp, 2018). In Sub-Saharan Africa, it is estimated that more than USD 490 billion will need to be invested in additional power generation capacity to meet the projected doubling of demand by 2030, and tripling by 2040 (Eberhard *et al.*, 2017). This investment is also justified in response to the number of people in Sub-Saharan Africa without access to affordable, reliable, and clean electricity (Blimpo & Cosgrove-Davies, 2019). According to the International Energy Agency (IEA) the region's electrification rate sits around 45% as of 2018 (IEA, 2019). In reality, this amounts to just under 600 million people without access to electricity (IEA, 2019). Clearly, the rationale for a corporate logic for RE development is comprehensive and compelling.

Within this economic logic, it follows that investment and finance by both the private and public sector are key drivers of the transformation of the fossil-fuel based global energy system, to the extent that these can be mobilised for the expansion of low-carbon alternatives. Because the extraordinary costs of global investment far surpass state funding capabilities, the role of the private sector is instrumental (Hall *et al.*, 2018). Labussière and Nadaï (2018: 2) capture the totalising effect of these dynamics, saying, "as increasing climate change casts its shadow of urgency over the negotiations, it steers our attention to 'scalable' (big) solutions. Large-scale technologies such as carbon capture and storage, nuclear or even (on- and off-shore) wind power, driven by market actors, are presented as the main, if not the sole, road to success". Hence, this implies the predominant role of private sector involvement.

For Sub-Saharan Africa, the inadequacy of current public sector investment levels in RE provides even further impetus for the participation of the private sector, in the form of Independent Power Producers (IPPs), who are currently playing a leading role in driving energy transformation (Eberhard *et al.*, 2017). Investments in the power sector by IPPs across Africa (so, power projects developed, constructed, operated, and owned by private entities) still represent a minority of total generation capacity. However, according to Eberhard *et al.* (2017), this is clearly where the potential lies. Kruger and Eberhard (2018: 3) state that the "precipitous drop in RE prices, coupled with the region's massive growth in energy demand, presents a formidable investment opportunity". Their analysis shares the view that "competitive tenders for these long-term contracts – also called competition for the market – more often than not result in better investment and price outcomes than feed-in-tariffs or directly negotiated projects" (Kruger & Eberhard, 2018: 3). The ability of effectively designed auction schemes to attract high levels of investment and deliver timely, cost-effective RE generation capacity makes a compelling case for competitive auction programmes and the involvement of the private sector.

While auction schemes have clearly succeeded in attracting substantial investment in RE, it is necessary to point out that this cannot be construed to be a fully positive outcome. That is, the corporate logic of RE development, is not without critique. This procurement strategy (and its underlying corporate logic) has enabled the 'financialisation' of the unfolding energy transition (Pathania & Bose, 2014; Kennedy, 2018b). Unpacking in detail the role of finance in the energy transition, and in particular the significance of project finance, is beyond the scope of this thesis. However, the financialisation of the energy transition has been well

documented (Pathania & Bose, 2014; Polzin, 2017; Steffen, 2018; Hafner, Jones, Anger-Kraavi & Pohl, 2020) and critically analysed (Baker, 2016; Hall *et al.*, 2018; Kennedy, 2018b,a) by a number of authors.

What is pertinent for this thesis is the acknowledgement that finance has become the key driver in the renewable energy transition since the cost of capital, as opposed to the cost of fuels (as in the case for oil, gas or coal technologies), is the determining factor in the financial, and thus operational, feasibility of RE infrastructures. In short, the corporate logic of RE development is largely to do with financing the energy transition to achieve decarbonisation. To make this point, the sunshine is readily and freely available to be harnessed, and so investment is directed primarily into the development and construction of the physical structures of the solar PV plant. Operational costs are minimal. By contrast, the operational costs of a coal-fired power station include large volumes of coal. It follows that there will inevitably be an array of financial intermediaries who participate in – and therefore shape – the nature of the energy transition (Hall *et al.,* 2018). To recall, the social logic of RE development evident in frontrunner countries was animated largely by alliances of what can be termed social actors, and in contrast, the corporate logic of RE development is dominated by vastly different sets of actors, most prominently financial intermediaries and RE market players.

As Fitch-Roy *et al.* (2019) explain, and supported by Bhamidipati *et al.* (2019), the propagation of competitive auction programmes across the world has not been the mere outcome of emergent policy 'diffusion'. Instead, it the outcome of a far more strategic and active process of policy 'transfer' and 'translation' on the part of an increasingly well-equipped and astute network, or 'policy constituency'. Investigating the making of policy for New Zealand's creative industry, Prince (2010) describes the consultants and experts (acting as policy advisors) as a 'cabal', a deliberate vocabulary chosen to refer to the extent to which policy translation constitutes a political project. In the context of the global energy transition, "a community of auction experts has accompanied the RES [renewable electricity support] auction on its journey" (Fitch-Roy *et al.*, 2019: 86), and there is a market for their knowledge. Thus, the corporate logic of RE development was promulgated more widely. This 'market' has a great deal to do with the huge investment by donor organisations and DFIs into financial support and technical expertise, resulting in numerous national policy contexts that are well positioned for learning, innovation and fine-tuning (Bhamidipati, Elmer Hansen, *et al.*, 2019; Fitch-Roy *et al.*, 2019). This has been especially true in Sub-Saharan Africa, where experiences "have now led to the enumeration of RES [renewable electricity support] action 'best practices'" and the "lessons learned becoming the impetus for further expansion" (Fitch-Roy *et al.*, 2019: 85). Positive feedback loops have "created mutual reinforcement between policymakers and analysts making the most of the competitive advantage afforded by their auction expertise" (Fitch-Roy *et al.*, 2019: 87).

The key insight from this reflection on the evolution of RE policy frameworks, which is by no means an exhaustive analysis, is this: a particular set of policy instruments, regulatory frameworks and governance practices supported the emergence of the RE sector in the frontrunner countries, driven by the participation of community energy institutions. I have referred to this consistently as the social logic of RE development.

The governance and policy conditions that characterised the founding years of the energy transition in the frontrunner countries were vastly different to what exists today, what I have referred to as the prevailing corporate logic of RE development. The application of policy tools, derived from a global policy consensus actively promoted by a particular set of DFIs, resulted in a competitive sector that had little place for the social goals of the community energy movement. This shift in the rules of the game (towards to corporate logic of RE development) effectively constrained the divergent possibilities of the social logic crystallised in niche conditions in two frontrunner counties. This resulted in the effective demise of the social logic of RE development, and the ascension of the corporate logic of RE. While the initial policy conditions in the early years enabled the vibrant participation of community energy institutions, local governments and energy cooperatives, today the RE sector is about technological efficiencies, investment strategies and financial returns. As a result, RE technologies can now stand their ground against their carbon-intensive counterparts with respect to all of these criteria. Indeed, one can only speculate whether this achievement would have been possible if the sector had remained dominated by community energy institutions and cooperatives, or in short, is the social logic of RE development had continued

The corporate logic, operationalised through the current policy and financial architecture of the RE sector has one clear focus, namely decarbonisation. A more transformative just transition to energy democracy (encapsulated in the potential of the social logic of RE development) is not an explicit part of this agenda. Competitive auction schemes are an integral mechanism of the corporate logic of RE development, delivering on this commitment to decarbonisation and demonstrating their efficacy in deploying extensive private investment in the energy transition, that has, importantly, been enabled by state support and public investment. Moreover, competitive auction schemes are a policy mechanism that have functioned effectively within a political economy of energy that is extractive, carbon-intensive and highly centralised in nature. Should the ambitions of the energy transition should go beyond decarbonisation, then the suitability of such policy instruments might be called into question.

As incumbent actors in the fossil economy innovate to maintain their positionality within the global political economy of energy (one that is highly centralised and carbon-intensive in nature), the distinctive materiality of RE heightens tensions in the transition. RE is spatially distributed and construction activities are geographically decentralised. Despite the mismatch between a centralised financial system that extracts rents from a vast array of plants built in specific localities and a decentralised and distributed material reality, there are policy instruments and regulatory practices that could result in a more appropriate alignment between this material reality and a set of more democratic accountable socio-institutional configurations. This is what is signalled by a social logic of RE development. Moreover, as the long-term viability of oil and coal companies come into question because of their negative impacts on the environment, some are changing their business models and moving into the RE sector. This will further undermine the democratic potential of RE. Just like coal underpinned the rise of social democracy, and oil underpinned financialised globalisation and

neoliberalism, so too will RE provide the basis for a specific set of political configurations. They can potentially provide the material base for new forms of collective life driven by a social logic of RE development, including a new generation of political institutions, socio-spatial relations, and economic paradigms based on vastly different imaginaries to those that were appropriate for coal- and oil-based economies. This is where the window of opportunity lies for assembling policy frameworks and governance practices that advance decarbonisation *and* development, in line with the goals of energy democracy.

4.5 Levelling the playing field: dimensions of the global energy transition

Any overview of the dimensions of the global energy transition must be understood in terms of the above framing, where the fossil economy is the prevailing global socio-technical regime, and the early RE technologies were fostered in a 'niche' in the frontrunner countries, Germany and Denmark. Largely due to the extension of a corporate logic of RE development significant investments have since been directed to the RE sector. This has resulted in a levelling of the playing field, so to speak, between the performance and viability between carbon-intensive infrastructures and their renewable counterparts. Global evidence, most notably that comprising REN21's *Renewables 2019 Global Status Report*, shows that RE is now a fully mainstreamed element in the global electricity mix (REN21, 2019). Despite impressive gains experienced by the RE sector since the early 2000s, and the fact that renewables are now the lowest-cost source of new power generation, the global energy system is still dominated by fossil fuels (Bellamy & Diamanti, 2018). Exploring why that might be is the topic of this section. The dimensions of the global energy transition are described according to the rise in levels of investment in RE, the scale of RE capacity development, the drop in prices for RE electricity, and the scope of policies supporting RE development.

Authoritative reports, such as those by IRENA (IRENA, 2019) and REN21 (REN21, 2019), reveal the far-reaching diffusion of RE technologies across the power (i.e. electricity), transport, and heating and cooling sectors in all world regions. Progress in the transformation of the power sector outstrips the decarbonisation of the transport and heating and cooling sectors, despite the fact that electricity only accounts for around 17% of worldwide energy demand (REN21, 2019). REN21 (2019) reports that 51% of energy is consumed within the heating and cooling sector, where the integration of RE technologies is stagnating. This is also the case for the transport sector, which consumes 32% of energy globally (REN21, 2019). The prevalence of RE targets and supportive policies is skewed towards the electricity sector, despite the fact that there is a need for more ambitious targets and comprehensive policy frameworks to advance decarbonisation right across the energy sector (IRENA, 2017).

The expansion of RE capacities has been a truly global phenomenon, and one made possible by a corporate logic of RE development. Not including hydro, which still contributes the majority of RE, electricity generation from renewables grew more than tenfold since 2000. In 2018, renewables made up for as much as two-thirds of global investment in power generation, and two-thirds of net new electricity generation capacity (REN21,

2019). 2018 was the fourth consecutive year in which installation of RE capacity outstripped net additions to fossil fuel capacity (REN21, 2019). Since 2012, renewables have contributed more to new power generation than conventional sources of energy (IRENA, 2019). This growth has been led by wind and solar photovoltaic (PV) power; in 2018 alone, 100 GW of new solar PV capacity was installed (REN21, 2019). The additional solar PV capacity in the previous year outstripped new capacity of coal, gas, and nuclear plants combined (IRENA, 2019). In 2018, a total of 181 MW of RE was installed (REN21, 2019).

Despite the picture of rapid growth painted by these figures, the power sector indicated the sustained dominance of fossil fuels in the form of coal, oil, and gas. In terms of electricity generation, wind and solar now provide 6% of electricity generation worldwide (IRENA, 2019). On aggregate, and including all forms, RE now accounts for around a quarter of global electricity generation.

The preceding discussion presents a non-exhaustive overview of the global energy system with respect to electricity and investments in generation capacity for the power sector. As of 2017, the RE sector operates as a USD 280 billion global industry that delivers cost competitive, affordable energy solutions (REN21, 2019). It bears repeating that, on the whole, RE technologies are now cheaper than fossil fuels. Following the frontrunners of Germany and Denmark, other prominent developed countries initially took the lead in terms of investments in RE generation capacity; this took place though, in the form of a corporate logic of RE development. However, since 2015, this has shifted, with developing countries taking the lion's share of investment in RE. This is mostly because of the dominating role of China, which took the lead in RE investments since 2012. A corporate logic of RE development is now evident across all world regions. As stated earlier, developing countries are confronted with the imperative of meeting basic electrification and other socio-economic development targets, which means that they have the opportunity to address these unmet needs *through* innovative low-carbon alternatives, as opposed to having to retrofit and replace existing carbon-intensive infrastructures. As RE investments in developed countries have declined from 2014, investments have steadily risen in developing countries (except for one year, 2015-2016). China alone accounted for 45% of total investments in RE in 2017 (REN21, 2018: 140). Whereas virtually no incentives favouring RE existed in developing countries in the early 2000s, by the second decade of the 21st century, governments across all major regions in the developing world had adopted policies that incentivise RE investments (IRENA, 2017).

As investment in RE generation capacity has proliferated dramatically, equally impressive drops in costs have been witnessed. Renewables are becoming increasingly attractive for investment as they experience rapidly declining costs across all world regions. In more than 100 countries, they have become cheaper than carbon-intensive alternatives (IRENA, 2018b). A number of factors have contributed towards this impressive drop in costs and prices in RE technologies and the rapid uptake of low-carbon investment. It is important to note, however, that successes in the private sector are not exclusively responsible for driving the innovation cycle (Swilling, 2020). As Mazzucato and Semieniuk (2018) have demonstrated, private investment has tracked the investment by the public sector, largely in the form of DFIs. In this way, the public sector has played a strong

role in de-risking investment opportunities in RE (Steffen, 2018; Kruger, Stritzke & Trotter, 2019; Polzin *et al.*, 2019). What most of these narratives describing the public and private sector financial drivers of RE usually do not take into account are the investments by social actors, such as the individuals, households, and community energy structures that played a critical role during the initial formation of the sector in frontrunner countries (Swilling, 2020). This is unfortunate because, as developing countries become the primary regions for increased investment in RE (as per a corporate logic), this (social logic) dimension of the energy transition is lost. The consequence of the prevalence of a corporate logic of RE development are significant since developing countries might miss the opportunity for deploying RE systems in ways that can address the challenges of inequality, poverty, and unemployment.

4.6 Revealing cracks in the system: flailing performance of the fossil economy

The viability of renewable energy has not taken place on its own terms, but also in relation to the decline of the fossil economy. As the viability of renewables (deployed via a corporate logic and in particular through the use of competitive auction schemes) becomes more apparent across a number of indicators, low-carbon technologies have begun to attract investment away from fossil fuel industries. While the cost of finance and the technologies for renewables have been driven down, the opposite has been taking place for coal, oil, gas and to some extent nuclear energy. Globally, the long-term financial viability of the coal sector is in question, oil and gas prices have dropped but remain volatile, and the costs of nuclear energy remain much higher than renewables. While the expansion of renewable energy generation capacity is positive and necessary, this needs to be matched with the dismantling of fossil fuel industries. This requires greater transparency around subsidisation and punitive measures that curb the expansion of fossil fuel industries, and accelerate their dismantling.

A major outcome of the dynamics described above that is, the shift from a social logic to a corporate logic of RE development, is that incumbent actors are participating in, and advocating for, the restructuring of the energy system in ways that do not fundamentally subvert their positionality as market leaders. A case in point are the strategies by energy incumbents and corporate actors such as BP, Total, Shell and Enel, pivoting from being predominantly oil and gas companies, to broadly energy companies with strong RE development capabilities (WEF, 2020). Academic literature makes sense of this dynamic to maintain dominance and manage the terrain the energy transition by framing the incumbent socio-technical regime formed around fossil fuels, as an expression of hegemony (Newell, 2018). This phenomenon is revealed through analyses of the institutional work of incumbents (Geels, 2014; Smink, 2015) that creates distinctive institutional changes and transition pathways (Geels, Kern, Fuchs, Hinderer, Kungl, Mylan, Neukirch & Wassermann, 2016). Newell (2018: 5) describes the strategies of deep incumbency are “to create modest re-arrangements that don’t fundamentally alter the structures of hegemony”. By striving to secure market leadership reinforced by

demonstrating clear compliance with international policy commitments and shifting public sentiment, established incumbents in the socio-technical regime are now competing for market share in the RE sector.

Capitalising on incumbents' existing market share and deploying renewables through policy instruments and financial arrangements that are consistent with the corporate logic of RE development has the effect of crowding out smaller (social) players (Baker, 2015b; Kennedy, 2018b). These strategies by incumbents to advance a corporate logic of RE development (for example, entailed by oil and gas multinational companies 'jumping on the RE bandwagon' and pivoting to broadly energy companies) thus diminish the potential for alternative political imaginaries (such as those opened up by the social logic) to take hold and subvert a highly unequal, resource-intensive political economy. As I argue, amenable policy frameworks and governance practices as part of this corporate logic RE development have played a significant role in making these arrangements and strategic manoeuvrings possible.

4.7 Conclusion

There is growing scientific consensus that the pace of the current energy transition "must somehow differ from historical precedent" (Roberts *et al.*, 2018: 304). Looking back (Roberts *et al.*, 2018: 304).,

> Past transitions have been triggered by a largely emergent combination of policy efforts, economic shifts, technological developments, and other factors. While currently ongoing low-carbon transitions also benefit from emergent technical, economic and cultural development, however, they are also being actively pushed by policymakers on an international level, in a way unlike any other energy transition on historical record.

To do so, will require an acceleration of the pace and direction of change within the energy transition. The international agreements shaping and informing national energy policies are significant as they themselves are historically unprecedented drivers of the decarbonisation and development agenda. Never before have there been such high levels of global impetus and support for the formation of national energy policies. Seen together with the Sustainable Development Goals (SDGs), the Paris Agreement has a unifying effect, galvanising national efforts to reach climate targets around collectively determined goals. While there are some views that these targets are not ambitious enough, they do serve as a powerful reference point for all aspects of society, not only for national governments constructing public policies.

It remains an open question whether espoused commitments to the energy transition ultimately materialise as modest rearrangements or radical transformations. It is here that the reflection on the emergence and evolution of the energy transition is instructive, and the reason why I traced back the RE boom to its roots in two frontrunner countries. The backstory of those socially-driven and -owned RE movements, which kickstarted technological innovation and diverse investments in formative RE technologies, is a reminder of the *materiality* of the dispersed and decentralised infrastructures that accompanied their socio-political agendas.

During the early phases of the global energy transition in these two frontrunner countries, the combination of enabling policies and a history of cooperative organisation made it possible for a community-based energy movement to emerge. I referred to this modality as a social logic of RE development. Central to the emergence of this social logic of RE development was the dispersed and decentralised nature of RE. This suggests that the materiality of the decentralised and distributed nature of RE technologies are such that they create the necessary but not sufficient conditions for cooperative-type social organisation for the purposes of ownership, innovation and value creation, indeed this is reflected in the energy democracy literature reviewed earlier in section 3.2. Because funding was provided by members, the financial flows aligned with the decentralised and distributed nature of the emergent RE infrastructures. However, as the RE infrastructures were de-risked by this combination of an enabling policy and social environment, the private sector and corporate actors, became far more interested in the potential profits from this sector. This resulted in changes in the policy environment that favoured a completely different set of financial flows. Instead of thousands of investments by participating members, traditional funding mechanisms became the central dynamic. Corporates and their investment partners (banks, DFIs, shareholders) required an enabling framework that enabled rent extraction for these decentralised and distributed infrastructures. The most important shift was from FIT to competitive auctions. As a result, cooperatives declined, and corporates emerged as the dominant players. Remunicipalisation emerged as a counter-reaction. In short, a corporate logic of RE became dominant, eclipsing the prospects of the social logic that was cultivated in these frontrunner niche conditions. However, this trajectory does not subvert the argument that decentralised and distributed RE infrastructures create the necessary but not the sufficient conditions for a social logic of RE development where a wider alliance of actors might participate in, and benefit from, the deployment of RE infrastructures. All that it confirms is that traditional corporate modes of financing and operation can accommodate the materiality of RE infrastructures, importantly though, with the assistance of approach policy mechanisms. However, contradictions remain, including actions by citizens, communities, and local authorities who want to resist this corporate approach because of the potential of RE infrastructures. Energy democracy is an ideal orientation that aims to reinforce this trend towards the cultivation of a social logic of RE development that might unlock the potential for RE infrastructure for democratic development. From this perspective, and for the social logic of RE development to be reinforced in diverse contexts, enabling policy frameworks and supportive governance practices are required to reinforce the alternative that is clearly possible because there is an historic precedent.

In conclusion, insights from the global energy transition can enrich our understanding of how South Africa negotiates its transition. More specifically, studying the world-level dynamics, as I have done in this chapter, illuminates how developments elsewhere shape the ‘conditions of possibility’ for the design and enactment of country-level policies. To this end, I described how RE moved from its origins in community energy initiatives, to being a competitive player on the global energy stage. A critical driver of this was of an evolution

in the policy frameworks and governance practices that propelled their ascendance. To capture this dynamic, I made use of the reference to a social logic and a corporate logic of RE development. The co-existence of these two logics sets an important precedent for interrogating *how* RE came to bear in the South African energy transition in service of decarbonisation and energy security, as will spelled out in Chapter 5. With this framing of the global energy transition, and more specifically, the identification of two distinctive logics that have shaped different phases of the RE boom, it is possible to locate and interrogate the evolution of the South African energy transition; to this I turn in Chapters 5 and 6.

Part C
EMPIRICAL FINDINGS

Chapter 5
Kickstarting South Africa's energy transition: a review of the REIPPPP

5.1 Introduction

Many of the defining features of South Africa's unfolding energy transition can be traced to the dimensions of the global energy transition spelled out in the previous chapter. In this chapter I build on this global context to investigate the conditions of South Africa's political economy of energy. In so doing, I capture the socio-economic and political milieu in which the ZF Mgcawu District Development Coordinating Forum emerged, which will be important context for the case study thereof in Chapter 6. The purpose of this chapter is to present a critical review of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), South Africa's flagship renewable energy (RE) programme, using the conceptual framework developed in Chapter 3 and the narrative of the global energy transition elaborated in Chapter 4. It was proposed in chapter 3 that energy transitions can best be theorised in terms of a theory of socio-technical change which elucidates how socio-technical change is the outcome of the experimental practices of particular societal actors to encode normative goals of positive and desirable futures into the policy assemblages and governance practices deployed by diverse coalitions of actors to marshal the requisite resources and expertise to shaped and steer collective action

Chapter 4 applied this conceptual framework to the global energy transition. The key conclusion is that the transition to RE has resulted in two seemingly contradictory logics: the corporate and the social logic, which have co-existed, each privileged during different phases of the RE boom. During the early years the social logic was dominant in the frontrunner countries (Denmark and Germany). However, as I described in the previous chapter, after 2000 in Denmark and 2014 in Germany, new policies (in particular, the competitive auction scheme) were introduced that favoured the rapid entry of corporates into the market. This resulted in the advancement of a corporate logic of RE development.

In this chapter I build on this understanding of the social logic, rooted in niche conditions of renewable energy's emergence in two frontrunner countries, and the corporate logic which is evident in how RE has been scaled up and deployed and across all world regions. Framing these two logics is instructive for interrogating how policy ideas about the design of enabling policy frameworks and governance principles for renewable energy became situated in South Africa, and in turn, were shaped by the conditions of possibility in the country at the time of the initiation of the REIPPPP. As this chapter will show, both logics were operative in the South African context. The REIPPPP emerged as a relational construct, a policy framework comprising heterogenous elements that were strategically arranged together towards particular strategic ends most pressing at the time of its design and implementation. As such, the REIPPPP blended together an auction-centred procurement process to mobilise private sector investment (pointing to the corporate logic of RE development) with an

elaborate developmental mechanism (reminisce of the social logic), all tightly accountable to the IPP Office. This could be characterised as a state-regulated, private sector delivered model with significant developmental impacts. Unsurprisingly, implementation has been contradictory and contested. To better understand this gathering together of diverse element and the manner in which such broader policy ideas moved, mutated and manifested in South Africa, this chapter will tease out the emergence and evolution of South Africa's flagship RE programme.

Before doing so, it is important to note that the mechanisms of accountability and strategic planning that direct the electricity sector are situated within the set of tightly knit institutions responsible for executing central government's political agendas. Following Jessop (2016b: 16),

> The state is a complex ensemble of institutions, organisations and interactions involved in the exercise of political leadership and in the implementation of decisions that are, in principle, collectively binding on its political subjects. These institutions, organisations, and interactions have varying spatiotemporal extensions and horizons of actions and mobilise a range of state capacities and other resources in pursuit of state objectives.

In the case of South Africa's energy transition, this complex ensemble of institutions, organisations, and interactions is by no means coherently organised to achieve a shared strategic goal. On the contrary, as the following review of the REIPPPP demonstrates, the complex ensemble that constitutes South Africa's RE policy response is fraught with tension, misalignment, and contradiction. The launch of the REIPPPP, though largely successful, was the outcome of a highly contested policy development process. And it shows. On closer interrogation, the distinctive arrangement of policy frameworks and governance practices that constitute the REIPPPP ultimately results in a number of development challenges.

I begin by presenting a historical perspective of the minerals energy complex (MEC) that shapes South Africa's contemporary political economy of energy (section 5.2). Thereafter, I explore South Africa's energy policy landscape by focussing on the Integrated Resource Plan 2019-2030, which is the keystone energy policy influencing the country's energy future (section 5.3). With this background in place, I elaborate the fraught governance context within which the REIPPPP has been implemented in section 5.4, and describe the evolution of South Africa's RE policy together with key dimensions of the REIPPPP in section 5.5. The final section (5.6) delves into the developmental implications of the REIPPPP, describing challenges in three broad areas: alignment, implementation, and evaluation.

5.2 Historical relations of incumbency in the minerals energy complex

South Africa has witnessed profound transitions in the decades since the historic democratic elections in 1994 (Parr *et al.*, 2018). While the democratic dispensation has brought about vital (though not sufficient) changes in the structure of the national economy (Bhorat, Cassim & Hirsch, 2014), what has *not* been displaced is the Apartheid legacy of a deeply entrenched system of capital accumulation, in particular the MEC (Fine &

Rustomjee, 1996). This complex and intractable legacy is most evident in the electricity sector, which lies at the heart of South Africa's political economy. The MEC evolved over many decades and is inextricably connected with, and co-constitutive of, a particular form of economic and political power. "At the heart of the MEC is an evolving relationship and set of linkages between highly concentrated ownership structures between the state, corporate capital and a powerful financial system" (Baker, 2015b: 148). The MEC is reflective of a "mutually reinforcing assemblage of actors, institutions, infrastructures and webs of finance" (Newell & Johnstone, 2018: 67) that work together to prop up the country's carbon-intensive economy.

Understood as a socio-technical regime, the electricity sector is comprised of a set of resources, institutions, market practices, and regulatory frameworks that sustains the dominance of its carbon-intensive and coal-dependent features. The policy and governance tools in the electricity sector evolved to buttress a particular form of political and economic power that is based on the extraction and manipulation of fossil fuels. More directly, the structuring of the electricity sector was a mechanism used by the Apartheid government to *centralise* governance and thereby *concentrate* political and economic power. The country's industrial development and economic growth experienced during Apartheid was powered by an abundance of cheap coal and cheap labour, as well as by the strategic leveraging of a set of complex interdependencies between industries, state-owned enterprises, and the state (Fine & Rustomjee, 1996). However, while this capital accumulation strategy that made possible racist political and economic policies was concretised by the Apartheid government, it is worth noting that the foundations of the MEC date back further, to the gold mining boom of the early 1900s (Fine & Rustomjee, 1996).

Apartheid was dismantled as a result of a number of intersecting and multi-scalar dynamics, including international sanctions and domestic opposition which disrupted the dominant socio-political regime, and the construction of a democratic alternative (Parr *et al.*, 2018). The transition from Apartheid to a multiracial democracy also involved the internationalisation and liberalisation of South Africa's economy, which had implications for the country's electricity sector. As it turned out, these 'landscape' pressures, far from 'dismantling' the MEC along with Apartheid, actually bolstered many of South Africa's existing energy-intensive industries and perpetuated the interdependence between private capital, the financial sector, and public utilities (van der Merwe, 2017). This legacy of Apartheid's capital accumulation strategy is pervasive and has significantly hindered the restructuring of the economy, despite efforts to drive broad-based economic transformation. This is evident in the continued central role played by Eskom (the country's vertically integrated and monopolistic state-owned utility), the sustained dependence on a coal-based electricity system, and the exacerbated levels of structural socio-economic inequality, poverty, and unemployment (Baker, 2015b). However, financialisation is a distinctive feature of the post-Apartheid MEC (Mohamed, 2016), specifically the proliferation of liberalised financial markets (to enable debt-financed consumption) that resulted in the financial sector becoming the primary contributor to GDP growth during the post-1994 period.

Because financialisation reinforced the MEC relative to the declining non-MEC manufacturing sector, the MEC remains an important notion when grappling with the structural dynamics inhibiting a low-carbon transition.

The viability of the current structure of the electricity sector is now seriously challenged as a result of a number of coalescing dynamics (Dubresson & Jaglin, 2016; Bischof-Niemz & Creamer, 2019). More bluntly, it is increasingly apparent that this is a 'regime in crisis' (Baker & Burton, 2018). These dynamics include international trends towards electricity sector reform, the expansion and competitiveness of RE technologies, and changes in the national and international coal market. On the domestic front, South Africa has witnessed a decline in economic growth and subsequent electricity demand over the last decade – this has only been accentuated by the COVID-19 pandemic (Winkler, Keen & Marquard, 2020a). For its part, Eskom has experienced mounting financial and technical supply-side crises (including periods of rolling blackouts) exacerbated by corruption, mismanagement, and 'state capture' (Dubresson & Jaglin, 2016; Bhorat, Buthelezi, Chipkin, Duma, Mondi, Peter, Qobo, Swilling & Friedenstein, 2017).

5.3 Contestation and uncertainty in South Africa's energy policy landscape

South Africa's energy sector is shaped by a number of nested and interconnected policy frameworks. The National Development Plan (NDP) is the country's overarching strategic framework, spelling out a roadmap for development to 2030 to address the triple crisis of poverty, inequality, and unemployment. The energy sector as a whole is guided by the Integrated Energy Plan (IEP) 2030. The IEP describes a roadmap of the future energy landscape of the country, whereas the Integrated Resource Plan (IRP) 2010 regulates the electricity sector specifically. The IRP does so by prescribing how electricity needs will be met through specific resource and technology allocations.

The intersecting trends mentioned in the preceding section have far-reaching socio-economic and political implications, which are reflected in ideological and political contestations around the future of electricity policy in South Africa. Bischof-Niemz and Creamer (2018) go as far as to refer to the 'political contamination' of electricity planning processes. There is no starker evidence of this than the period of widespread 'policy uncertainty' from 2011 to 2019, which euphemistically describes the eight years when a much-needed update to the IRP was suspended in a fractious stalemate between pro- and anti-renewables lobbies (Naidoo, 2019). The IRP functions as the country's primary electricity policy and regulatory framework. The previous version was approved in 2011 but was soon in need of revision. Various revised versions were released in 2013, 2016, and 2018 respectively, each outlining vastly different growth projections, electricity scenarios, and technology allocations (WWF, 2017; Baker & Burton, 2018). The current revised version was not formally adopted until late 2019.

These differing 'in-progress' versions of the IRP are emblematic of the degree to which the energy futures for South Africa's electricity sector are intensely contested, particularly with reference to the role that nuclear and RE might play in the energy mix (Bischof-Niemz & Creamer, 2018). The significance of the tensions around

the future of coal, and the disputed role of nuclear and RE technologies, must not be understated. They signify differing ideological positions within the policy-making landscape in South Africa which pertain "as much to a struggle over which technology is selected as the model that determines who should procure, own and manage it" (Baker & Burton, 2018: 5). This struggle goes to the heart of the 'politics of procurement' in South Africa's energy transition, and exposes the various competing (even incommensurate) perspectives on the questions of how the electricity sector should be governed and how energy infrastructure might be configured through policy to enable or sustain particular forms of political economy (Baker & Burton, 2018).

To properly understand the contemporaneous dynamics within the REIPPPP it is necessary to trace certain political and economic conditions back in time. During the lead-up to the 2019 national and provincial elections, political struggles over national development priorities (such as land, energy, housing, and jobs) were naturally intensified. The preceding two years had witnessed a broad-based mobilisation around issues of state capture and the dismantling of Jacob Zuma's presidency (Bhorat *et al.*, 2017). At the centre of the state capture crisis under the Zuma regime was an energy choice in favour of nuclear, driven directly by President Zuma (Fig, 2018). Rapid growth in the RE sector (made possible by the REIPPPP) was happening in parallel, so it consequently became politically expedient for a succession of Ministers of Energy to attempt to terminate that growth. Indeed, for some time, South Africa faced the very real possibility of a nuclear energy procurement programme which was shrouded in controversy and implicated in wider state capture struggles (Lovins & Eberhard, 2018). Concurrently, the obstruction of the roll-out and expansion of the REIPPPP was enabled at the highest levels, obstruction that is aptly described by Ting and Bryne (2020) as 'regime resistance'.

Analysing these dynamics through a political economic perspective helps to highlight the "capacity of different energy technologies and infrastructural assemblages to reproduce social power and shape political and economic outcomes" (Bridge *et al.*, 2018: 2). The significance of South Africa's IRP in this picture must not be underestimated: it *determines* the policy framework within which the transformation of the electricity sector will take place. The IRP is the policy instrument in the 'driver's seat' of South Africa's energy transition, informing its speed, directionality, and destination. Setting out how much of a role the different energy sources (coal, nuclear, RE) will play in the country's future is the prerogative of the IRP. I touch on these in turn.

Firstly, while coal remains integral to South Africa's electricity sector for at least the next two decades, the management of coal mine closures and the socio-economic implications thereof is a subject of considerable research (Steyn, Burton & Steenkamp, 2017; Burton, Caetano & McCall, 2018; Ireland & Burton, 2018). The IRP 2019 stipulates a clear decommissioning timeframe and a significantly reduced place for coal in the future energy mix (CSIR, 2019). Secondly, the future of nuclear remains highly contentious. It has been criticised from various corners for the substantial downside socio-economic risks (Caetano & Burton, 2015), the connection with issues of state capture (Bhorat *et al.*, 2017; Swilling, 2020) and the socio-ecological threats it might pose to the country (Watts, 2018). The IRP 2019 does not include any further nuclear procurement other than

necessary upgrades to the existing nuclear energy fleet. Finally, the IRP 2019 spells out a significant role for RE technologies. In total, an allocation of 20 000 MW for RE paints a future of rapid expansion for the sector (Department of Mineral Resources and Energy, 2019).

The realisation of the IRP 2019 will be shaped largely by reforms at Eskom (Bischof-Niemz & Creamer, 2019). To this effect, the *Eskom Roadmap* paper (released by the Minister of Public Enterprises, Pravin Gordhan, in 2019) spells out how the electricity sector will be unbundled, and how a new business model for Eskom will be pioneered by the incoming chief executive officer (CEO). The Roadmap stipulates that Eskom will be separated out into three entities, with an independent, state-owned Transmission System Market Operator (TSMO) bridging the generation and distribution sectors of the electricity industry (Department of Public Enterprices, 2019). Adding to the enormity of the challenge is the fact that Eskom's debt has, as of May 2020, surged to around R 450 billion (Eskom, 2020b). The extent of the undertaking to reform Eskom must not be underestimated.

In the midst of these uncertainties, an interrogation of the existing RE programme will help to reveal whether the REIPPPP has the potential to provide the socio-technical and material basis for a departure from a century-old carbon-intensive political economy. Such an interrogation might shed light on whether the REIPPPP

SNAPSHOT OF THE UPDATED ENERGY MIX

	Coal	Coal (Decommis-sioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1 860	2,100	2 912	1 474	1 980	300	3 830	499
2019	2,155	-2,373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1,433	-557				114	300			
2021	1,433	-1403				300	818			
2022	711	-844			513	400 1,000	1,600			
2023	750	-555				1000	1,600			500
2024			1,860				1,600		1000	500
2025						1000	1,600			500
2026		-1,219					1,600			500
2027	750	-847					1,600		2000	500
2028		-475				1000	1,600			500
2029		-1,694			1575	1000	1,600			500
2030		-1,050		2,500		1000	1,600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

Installed Capacity
Committed/Already Contracted Capacity
Capacity Decommissioned
New Additional Capacity
Extension of Koeberg Plant Design Life
Includes Distributed Generation Capacity for own use

- 2030 Coal Installed Capacity is less capacity decommissioned between years 2020 and 2030.
- Koeberg power station rated/installed capacity will revert to 1,926MW (original design capacity) following design life extension work.
- Other/ Distributed generation includes all generation facilities in circumstances in which the facility is operated solely to supply electricity to an end-use customer within the same property with the facility.
- Short term capacity gap is estimated at 2,000MW.

Figure 10 IRP 2019 Allocations (Govender & Dempster, 2019)

bolsters a development trajectory that responds to a multiplicity of socio-economic, political, and environmental imperatives and, further, whether it might trigger more fundamental structural transformations, beyond decarbonisation of the prevailing capital accumulation strategy.

Tracing the existence of the corporate and social logic of RE development in the composition of the REIPPPP is helpful in this regard. There REIPPPP's unique configuration, that is, the inclusion of explicit economic development requirements within a competitive auction programme, is evidence of how both the corporate and social logic of RE development manifested in the design and implementation of the programme. These logics, and the associated policy frameworks and governance practices they resulted in, were blended together in response to distinctive conditions of possibility, which are the focus of this chapter. I continue to elaborate these conditions of possibility below, and the emergent, dynamic interactions that were triggered by the REIPPPP's constituting elements.

5.4 Energy governance and development planning in democratic South Africa

Energy planning, and the governance of the energy system (the power sector in particular), remains a strongly centralised function. It is led by the Department of Energy (DoE) (which became the Department of Mineral Resources and Energy (DMRE) in June 2019), with support and involvement from various other government departments, public institutions, and private organisations. The governance of electricity in South Africa has been dominated by national government for over a century (Mosdell, 2016). Centralised governance has been an expression of hegemonic state control, rooted in the Apartheid state, locked in through the MEC, and now reoriented in service of a democratic developmental state (Dubresson & Jaglin, 2016). Eskom, through the single-buyer model, also plays a key role in the sustained centralised governance of the electricity sector. Yelland (2020) describes how South Africa's electricity sector has an "archaic and painfully slow, central planning, command-and-control approach to generation capacity procurement".

Centralised governance of the socio-technical energy regime is congruent with a highly centralised electricity production system. In South Africa, the norm of centralised energy governance evolved over decades through the management of 29 coal-fired power stations, owned and operated by Eskom (Eskom, 2013). These are all concentrated in Mpumalanga Province, where the majority of the country's coal mines are located (Dubresson & Jaglin, 2016).

Dominated by mega-projects under the control of national government and in service of evolving national development imperatives, South Africa's electricity sector is an example of strong centralisation. Brisbois (2020: 16) clarifies centralisation as those systems that "involve a limited number of generation assets that produce power that flows to consumers through a centrally controlled grid". With reference to the REIPPPP, accountability mechanisms are located within the Independent Power Producer Office (IPP Office) within the

Department of Energy, an arrangement which also stems from the historical precedent of centralised energy governance.

Looking beyond the electricity sector, it is important to recognise the formal, state-led development planning and governance context into which this RE programme was introduced. South Africa has a history of highly centralised governance, with the Apartheid government concentrating power and resources in institutions that safeguarded and entrenched segregatory development policies. Since the country's democratic transition, the institutions and objectives of government have been reoriented around the vision of a developmental state (Edijechi, 2010). This reorientation, which involved some devolution of power, is thus an important component of the evolution of development planning in the country. Specifically, local government, as one of the three spheres of government alongside provincial and national government, now has an explicit developmental mandate. A role for local government (which is comprised of three tiers, metropolitan, local, and district municipalities) within the developmental state is encapsulated in the Constitution. The intention for local government to be a democratic, inclusive, delivery-oriented sphere of government is also captured in the 1998 White Paper on Local Government, and enacted through various policy frameworks, including the 2001 Local Government Systems Act (Dlamini & Reddy, 2018). This is a distinct break from the past with the White Paper on Local Government (1998) signifying a landmark policy approach that aimed at rectifying the Apartheid municipal functions that focused on creating and perpetuating separation and inequity at the local level.

The 2001 Local Government Systems Act requires that municipalities engage in integrated development planning, key components of which are service delivery and local economic development (LED). A local municipality's purpose in engaging in LED planning is to facilitate functioning local economies through the coherent coordination of planning and implementation, and to support local communities' access to economic opportunities. Within the comprehensive set of local government legislative frameworks, integrated development planning concerns the coordination of legal instruments and planning mechanisms for municipal planning. This concept has been a core strategy for the evolution of development planning within the post-1994 local government dispensation (Dlamini & Reddy, 2018). The vision of local government as a developmental partner, a vision which the integrated development planning and LED functions operationalise, means (in theory) that collaboration and multi-stakeholder engagement are at its core (Rogerson, 2012; Nel & Rogerson, 2015; Marais, 2016).

With their role as drivers of local economic development, local municipalities in South Africa have a responsibility to deliver affordable and equitable services (van Rooyen, 2013; Houghton, 2016). At the same time, according to the Constitution, municipalities have a relatively high degree of autonomy regarding service delivery (Tait & Euston-Brown, 2017; SALGA, 2018a). Electricity reticulation is one of the service delivery competences afforded to municipalities (Gaunt, 2008). The reticulation of electricity (or, more specifically, the distribution of electricity to customers within their jurisdictions) is central to the financial model of

municipalities (Korsten, Brent, Sebitos & Kritzinger, 2017; Shumba, Radebe, Dippenaar & Euston-Brown, 2019). Municipalities buy wholesale electricity from Eskom which they then sell on to customers according to tailored tariffs regulated by the National Energy Regulator of South Africa (NERSA). As such, the income from the re-sale of electricity cross-subsidises the provision of a wide range of other municipal services. However, in reality, municipalities in South Africa are in crisis. Many are faced with the 'utility death spiral' where the very viability of their business model is under threat. The impact of small-scale embedded generation (SSEG) on municipal revenue is widely researched (Korsten *et al.*, 2017; SALGA, 2018b; Shumba *et al.*, 2019) and is a long-standing area of engagement with municipalities (Montmasson-Clair, Kritzinger, Scholtz & Gulati, 2017).

While a coherent framework for a developmental local government exists in principle in South Africa, in reality, the failures and ineptitudes of the country's local governments are widely documented (Statistics South Africa, 2019). Local governments are not sufficiently equipped and appropriately capacitated to attend to the multiplicity of South Africa's local developmental challenges. These failures are evident in the systemic dysfunctionality of local governments and their widespread inability to deliver services, let alone LED. South Africa's developmental challenges manifest in deeply ingrained and enduring spatial and socio-economic inequalities. While an assessment of the function of local government as a whole is beyond the scope of this chapter, it should be obvious that dysfunctionality within this sphere of government will severely constrain its ability to work synergistically with other agencies and levels of government, and that this inhibits the realisation of inclusive and transformative LED. The support for more participatory governance approaches in South Africa, as demonstrated in the opportunities for public-private partnerships, is an indication that the necessity of reconfiguring the current approach to developmental governance has been recognised (Rogerson, 2010).

5.5 Assembling South Africa's renewable energy policy response

The REIPPPP is South Africa's first formally adopted policy instrument facilitating the participation of the private sector in the generation of electricity (Montmasson-Clair & Ryan, 2014). That being said, a number of policy frameworks provided legitimation for the inclusion of the private sector in the generation of electricity, most notably the 1998 White Paper on Energy Policy and the 2003 White Paper on Renewable Energy. While both referenced the role of Independent Power Producers (IPPs) in the electricity sector, a commitment to large-scale procurement for RE was only made some years later with the formalisation of the IRP 2011 (Montmasson-Clair & Ryan, 2014). Even though both of these White Papers noted the integration of IPPs into the electricity generation market, there was a lack of clarity about who would buy the power from IPPs and no appropriate institutional framework to facilitate any private-sector investment (Power *et al.*, 2016). An additional challenge to this early vision for the role of the private sector was that IPPs would have been unable to compete with the price of electricity produced by Eskom which, at the time, was offering extremely low tariffs to consumers and industry.

The selection of a competitive auction scheme for the REIPPPP in 2011, as opposed to a feed-in tariff, was the outcome of a lengthy and politically contested policy development process (Montmasson-Clair & Ryan, 2014; Baker, 2015b; Eberhard & Naude, 2016; Schmidt *et al.*, 2017). Before then, NERSA was first responsible for the formation of a policy instrument for the introduction of electricity generated from renewable energy, which took the form of a Renewable Energy Feed-In Tariff (REFIT). In 2007, NERSA announced the intention to investigate and develop a REFIT. Guidelines were approved in 2009 and, in 2010, NERSA released a draft REFIT document (Tait, 2012). Despite interest from the market in light of attractive tariffs, there was considerable uncertainty during this period due to delays in the further development of the policy (Tait, 2012). It later came to light that National Treasury had legal objections to the REFIT, refuting NERSA's mandate to run a procurement programme. The REFIT also faced objections on a constitutional basis in terms of the country's preferential procurement policies (Tait, 2012). As Tait (2012) explains, this policy development process was mired in political and legal challenges, as well as obvious misalignment and misunderstanding of the roles of various stakeholders, most critically, the DoE, the Treasury and NERSA. While NERSA was unsuccessful in its attempt to take the lead of a RE procurement programme, the DoE was able to launch an alternative (this time competitive) procurement programme, the REIPPPP.

Institutionally, the REIPPPP was made possible by a partnership between the Department of Energy (DoE), National Treasury, and the Development Bank of Southern Africa (DBSA), which mandated the IPP Office, as a semi-autonomous institutional entity within the DoE, to oversee ministerial determinations for the procurement of utility-scale RE. Participation by the National Treasury, and specifically its Public-Private Partnership Unit, was instrumental in configuring the programme. The Treasury's provision of state guarantees for 20-year Power Purchase Agreements (PPAs) is widely recognised as a feature that increased the REIPPPP's investment attractiveness and sustained its viability (Montmasson-Clair & Ryan, 2014; Eberhard & Naude, 2016). Much of the success of the procurement framework has been attributed to its stringent and comprehensive design, together with ongoing adjustments and improvements, the particularities of which have been detailed in various recent studies (Montmasson-Clair & Ryan, 2014; Kruger & Eberhard, 2016, 2018; Bayer, Schäuble & Ferrari, 2018). The regulatory novelty involved in constituting the IPP Office was also another strong contributing factor to the successful launch of the REIPPPP (Morris & Martin, 2015; Bayer *et al.*, 2018; Winkler, Keen & Marquard, 2020b). Morris and Martin (2015: 8) state that:

> The institutional nature of the IPP Unit was crucial. It comprised a small group of individuals that did not bureaucratically fall under the watch of any single department. This contributed to its success in building a coalition of influence within government. Essentially operating as a proxy for the DoE but, with the tacit backing of the Treasury, not having to work within the DoE's internal procedures, it was able to operate unknown to any other stakeholders long enough to gain the momentum necessary to ensure that the process would not be stopped. This unit managed to

> create the joined-up government that was necessary to move beyond the normal state silos that act to constipate and stifle innovation.

According to the IPP Office, the motivations for the REIPPPP are to demonstrate South Africa's progress on climate change commitments as part of the Paris Agreement, as well as to respond to the need for adequate, reliable, flexible, and affordable electricity generation capacity (IPP Office, 2019). Montmasson-Clair and Ryan (2014) signal that another motivation for the introduction of the REIPPPP was a recognition, by the South African government, that Eskom was ill-equipped to meet the country's electricity demand and thus not capable of ensuring the energy security to underpin broad-based socio-economic development. The lack of financial and technical capacity within Eskom gave clear impetus for the inclusion of the private sector in meeting electricity (and thus also broader socio-economic development) targets (Montmasson-Clair & Ryan, 2014). This account of the REIPPPP's motivation mirrors Eberhard *et al.*'s (2017) analysis of the rise of IPPs across Sub-Saharan Africa and the consequent development potential unlocked by the deployment of private-sector investment in the energy transition.

A statement by Karén Breytenbach, the head of the IPP Office on 13 March 2018 (IPP Office, 2018: 1), amplifies this argument:

> Through the REIPPPP we have proved that we can quickly help reduce the country's reliance on fossil fuels, that we can stimulate an indigenous renewable energy industry and that we can contribute to socio-economic development and environmentally sustainable growth. Today, our REIPPPP approach has become an export product in itself, with an increasing number of countries in Africa and elsewhere in the world, adopting and adapting the South African model to suit their particular conditions.

The procurement framework signifies a departure from South Africa's statutory procurement standards, which are guided by the Preferential Procurement Policy Framework Act 2000, with an increase in the consideration of non-price factors in bid evaluation (IPP Office, 2019). Motivating this departure, which was granted by the Minister of Finance in 2011, was a commitment in line with the NDP to ensuring that socio-economic development accompanies the cultivation of a market for RE investment and a local RE industry in South Africa (Tait, 2012). These diverse policy goals were integrated in such a way that IPPs are required to structure their bids according to a 70:30 split: competing on price for 70 points, and outlining their ability to fulfil various economic development (ED) requirements for the remaining 30 points. The ED components include job creation, local content, ownership, management control, preferential procurement, enterprise development (EnD), and socio-economic development (SED). The REIPPPP is internationally recognised for this unique design, where both price-competitiveness and a fulfilment of ED requirements are built in (Eberhard & Naude, 2016; Schmidt *et al.*, 2017). And it has yielded results: across the SED, EnD, and community ownership categories, investments by IPPs in local communities are reported at around R 50 billion over the duration of

the 20 year PPAs (IPP Office, 2019). It is this integration that points to the blending of aspects of the corporate and social logics of RE development.

In accordance with the IRP 2011, four ministerial determinations were announced by the DoE and overseen by the IPP Office between 2011 and 2015 (IPP Office, 2019). Over the course of these four 'bid windows', the programme procured 6 323 MW of RE from 92 utility-scale, grid-connected projects of various technologies, but predominantly wind and solar PV (GreenCape, 2020). Despite the complexity of the bidding process and the stringent ED component, the REIPPPP positioned South Africa as an attractive destination for private-sector investment in utility-scale RE (Baker, 2015b; Eberhard & Naude, 2016). During this time, the REIPPPP demonstrated promising growth, attracting R 209.7 billion by 2019 of private investment through 92 approved projects (IPP Office, 2019). On the whole, the first three rounds were largely oversubscribed and the programme has demonstrated continual learning and iteration (Montmasson-Clair & Ryan, 2014). A significant reduction in costs has also been witnessed, with a drop across all technologies.

Baker (2015b: 146) describes how "global dynamics of renewable energy, finance and investment are embedding themselves within South Africa's unique social, political, economic and technological context". Baker's analysis highlights a number of concerns regarding the evolving role of finance and ownership in the REIPPPP. These insights are located within the broader phenomenon of financialisation of the MEC (Baker, 2015b) and the extent to which financialisation has impacted the electricity sector in particular (Sovacool, Baker, Martiskainen & Hook, 2019). Baker (2015b) describes how ownership in the sector has become largely dominated by equity investor and foreign utilities, as well as how South African firms have struggled to enter and/or retain market share in the emerging utility-scale RE sector. The predominance of corporate actors and financial institutions is a clear marker of the corporate logic manifesting in the South African context.

According to Baker (2015b, 149):

> Despite attempts by the South African government to create an industry with national interests at its heart, increased competition by round four has seen smaller national players priced out of the market and unable to compete with the low costs offered by foreign companies.

This can be attributed to the dominance of project finance as a mode through which investment has accrued, which in turn can be traced to the competitive auction programme designed by the South African government (Steffen, 2018).

The roll-out and expansion of the programme has not been straightforward, with the most recent bid window announced in 2015 being stalled until early 2018. This impasse thwarted the progression of the country's RE sector and was instigated by Eskom's refusal to sign PPAs and inhibiting 27 preferred bidders from reaching financial close. Their blocking of the RE programme took place even though the Electricity Regulation Act of 2006 mandates the DoE to make such procurement determinations. Having briefly sketched Eskom's deepening techno-economic and governance crises, it is possible to locate their opposition within this wider

institutional context. As Baker and Burton (2018: 10) describe, this refusal to comply "highlights the extent to which Eskom is able to subvert the policy process and the DoE's procurement programme and essentially block steps towards a low-carbon transition as they act to protect their own interest as a monopoly generator".

5.6 Governance and development challenges in the REIPPPP

In the preceding sections, I described how the REIPPPP was introduced into a context of heavily centralised electricity governance. Moreover, I pointed to the gathering together of different elements, rooted in the corporate and social logics of RE development, that culminated in the unique design of the competitive procurement programme with a concession to economic development. As I argue below, this blending together of differing logics has had troublesome implications for the governance of place-based investments by IPPs across dispersed localities across South Africa. Naturally, the abovementioned 'developmental' local government (envisioned and enshrined in policy as a partner and collaborator to drive local economic development) is relevant here. While the devolution of power towards local governments mandates that they oversee integrated development plans (IDPs) within their jurisdictions, a similar devolution has not taken place with regards to the governance of energy planning, particularly with respect to the governance and oversight of IPPs operating within the REIPPPP.

Against this backdrop of centralised electricity governance and the developmental mandate for local government, this section unpacks the particular emergent dynamics resulting from the implementation of the REIPPPP's unique configuration, that is the arranging together of heterogenous elements rooted in the different corporate and social logics of RE development (as detailed in section 5.5). Of particular interest here are elements that speak specifically to the social logic, namely, three of the ED targets which have specific place-based implications: SED, EnD, and community ownership. As mentioned, IPPs are required to spend a portion of revenue on SED and EnD in the local communities surrounding their projects. Additionally, they are required to provide a minimum of 2.5% project ownership to the local community, which is predominantly facilitated through the establishment of representative community trusts. Clearly, these requirements are, in part, reflective of the social logic of RE development that emerged in the democratic development conditions of RE in niche conditions in two frontrunner countries. These investment flows are significant and worth scrutinising, primarily because they have a distinctly 'place-based' nature, manifest distinct socio-spatial realities and can result in strong cumulative effects around these geographically dispersed infrastructures. This is further complicated when, as is often the case, beneficiary communities of IPPs often overlap. Indeed, the fact that the REIPPPP requires IPPs to engage in a much wider range of activities (that are themselves rooted in seemingly incongruent logics) – far beyond their 'usual' business competencies of developing and managing RE plants – has unlocked a host of emergent and unprecedented development challenges.

Mirroring wider energy governance practices in South Africa, the REIPPPP is centrally governed by the IPP Office within the DoE, now the DMRE. In practice, this means that a small but relatively well capacitated body

is responsible for the implementation, management, and monitoring of the programme, including the activities of the (currently 92) projects across the country. IPPs are legally obligated to report on their activities to the IPP Office, to whom they are entirely beholden through a range of contractual agreements (described in 1.2.2). This potentially reveals something of a disjuncture: while *oversight* for the programme sits at a national government department in the country's capital, the *footprint* of the programme is spread across the country.

As dynamics have evolved over time, the dispersed and decentralised nature of the RE infrastructure itself has led to various incongruencies in the programme's implementation. Further, the centralised governance of the REIPPPP, together with its requirements for IPPs to make place-based investments, is in tension with the development planning and public policy context described in section 5.4 above. These incongruencies and tensions are largely the outcome of a specific feature of the REIPPPP: that IPPs are *not* legally required to consult with or report to local municipalities as part of the compliance and accountability regime (McDaid, 2014; Marais, Wlokas, de Groot, Dube & Scheba, 2017). IPP accountability is the province of the IPP Office (which oversees the various ED functions they are required to carry out), and the DoE (to which IPPs report as part of stringent compliance frameworks), but *not* of the local governments where the projects actually *are*. This is despite the fact that, according to public policy, municipalities are the mandated agent to facilitate LED. IPPs' engagement with local authorities is formally limited to obtaining the necessary permits as part of their initial bid submissions, even though these place-based investments and ED activities occur within a multiplicity of local government jurisdictions and are guaranteed to have a lasting impact. As such, it should be clear that these conditions are ripe for tension, misalignment, and governance failures, even before considering other development challenges (such as the absence or weakness of coherent community development practices amongst IPPs, or poor monitoring and evaluation frameworks across the RE industry).

On the one hand, there is local government. While local government has the authority, and in theory the requisite resources and capabilities, in reality, it is ill-equipped to meet local needs. Indeed, it has largely failed to realise service delivery, LED, and the infrastructure development required to overcome pervasive spatial and socio-economic disparities. All the same, local governments engage in integrated development planning to try to achieve these ends. On the other hand, there are the IPPs. IPPs are mandated to engage in various ED activities and fulfil considerable place-based investments, with the very same goal of addressing societal disparities. Many are going beyond their area of expertise in engaging in such activities, yet they can nevertheless do so without having to engage with local authorities. That this is *not* an arrangement conducive to integration, coordination, and alignment, is obvious.

Within the context of this disjuncture, various problematic governance implications have become apparent. IPPs find themselves operating in conditions where infrastructure backlogs, depressed economic conditions and significant socio-economic development challenges are the norm. The capacity of local municipalities to address developmental challenges is often insufficient, and the same can be said for their capabilities to

engage with international RE developers (McDaid, 2014; Mthembi, 2015; Krebs, 2016; IPP Office, 2019). Human and financial capacity constraints mean that municipalities are not well positioned to engage with IPPs strategically, and in accordance with comprehensive development plans (Krebs, 2016). IPPs face similar issues in building the internal socio-economic development capabilities required to deliver on their objectives (Mthembi, 2015). What has resulted is an environment characterised by misalignment, tension, and conflicting developmental logics (Wlokas, Westoby & Soal, 2017a). Mthembi, in the IPP Office report in 2017 (IPP Office, 2017), describes the 'compliance design' of the REIPPPP, where the misalignment between its intentions and resulting practices compromises meaningful development.

At this juncture, it is useful to return to the framing of development as part of conceptualisation of energy democracy described in section 3.2. There I stated that development is the self-defined social processes of facilitating resourcefulness and cultivating individual and collective capabilities to advance social-ecological wellbeing while also sustaining the structural conditions to enable the process of development itself (Evans, 2002; Westoby & Kaplan, 2013; Castells & Himanen, 2014).

As part of a comprehensive survey of the local community development requirements of the REIPPPP, Wlokas (2015: 31) states that "in the absence of a clear framework [from the IPP Office] guiding the investment of funds or providing clear objectives for community benefits, project teams establish project- or company-specific practices and objectives". The diversity of approaches and practices in the RE industry stem from this lack of a coherent framework and binding long-term vision for the developmental impact of the REIPPPP's community benefits. Speaking to the translation of development theories into practice, Wlokas *et al.* (2017) argue that the REIPPPP does not refer to the rich history of theoretical and practical community development and experience, largely overlooking these resources in providing guidance and support for good development practice. The absence of a coherent and meaningful development vision in the REIPPPP is further exacerbated by the 'compliance design' of the REIPPPP. Together, these dynamics manifest in the dominant corporate logic constraining the particular social logic of RE development. This constraining of development impact by the corporate logic is evident across the three broad challenges described below.

Relevant to the requirements related to place-based investments by IPPs, the following sub- sections elaborate on three pertinent challenges, including the (a) coordination of development initiatives; (b) the procurement framework and implementation; and (c) reporting, monitoring and evaluation requirements. The first challenge pertains to how IPP activities are organised, the second is about grappling with the implications of these activities, and the final aspect concerns how the impact of these activities is understood and measured. Together, these culminate in a complex set of spatially-constituted dynamics which provide fertile ground for experimental place-based governance arrangements. At this point, it is fruitful to connect to the unfolding argument about the nature of the REIPPPP as a policy assemblage, whereby diverse elements emblematic of both the corporate and social logics of RE development, were gathered together towards certain strategic ends at the time of its design and implementation and interwoven in contradictory and complementary ways

that were deeply context specific. The specificities of what these elements manifested in practice and elaborated in the remainder of this chapter.

5.6.1 Alignment and coordination: organising community benefit delivery

The first broad area of concern regarding the implementation of projects in the REIPPPP pertains to the (lack of) coordination of development initiatives. The compliance frameworks in bid windows 1 to 4 require IPPs to focus their SED and EnD efforts in clearly delineated geographic areas surrounding their plants – specifically, within a 50 km radius. As a result of the considerable uptake within the REIPPPP and the subsequent multiplication of IPPs in specific areas, the duplication of SED and EnD initiatives has occurred, along with varying and (at times) conflicting interactions between IPPs and beneficiary communities (WWF, 2015). Fortunately, the duplication of funding for specific projects has not occurred due to the oversight of the IPP Office in approving and monitoring SED and EnD projects. 'Duplication' refers to the fact that, in some instances, IPPs 'have to fight over the same communities' (ZF Mgcawu District Development Coordinating Forum, 2017b).

Insufficient coordination amongst IPPs is further compounded by their unstructured and often limited interfaces with provincial and local government authorities. Moreover, the annual development plans of IPPs are not required to align with local, district, and provincial development strategies, let alone with other IPPs operating in the same areas. This is evidence of a severe lack of integration in the REIPPPP's development objectives in local economies. As mentioned, IPPs report to the IPP Office at a national government level and are not required to demonstrate alignment with local development planning processes (Atkinson, 2016). This has surfaced tensions in the relationships between local municipalities and IPPs, where officials lament the fact that IPPs do not consider their IDPs as informing their place-based investments. For their part, IPPs bemoan the lack of capacity at local government level to outline clear development priorities (as opposed to merely lists of development needs and infrastructure backlogs), and tend to fall back on their ultimate obligation of reporting to a national government department. Largely, the sentiment of municipalities is that the centralised management of the REIPPPP undermines the capacity and position of the local authority as the level of government that is (in theory) best positioned (and constitutionally mandated) to support the socio-economic development of local communities (Nel & Rogerson, 2015; Atkinson, 2016; Marais, 2016; SALGA, 2017).

Another stark example of ineffective alignment and coordination is the fact that there seems to be a lack of clarity and consistency regarding the payment of rates and taxes by IPPs to local authorities (Atkinson, 2016). Regulatory frameworks have had to 'catch up' with the rapid pace at which the REIPPPP has been rolled out. This has played out in the lack of meaningful integration of IPPs into municipal economies and, in particular, the fact that IPPs in different regions do not contribute uniformly to the local tax base. While an exploration of the ramifications of RE for municipal finances is beyond the scope of this chapter, this example

demonstrates another way in which a transforming energy system has implications for a municipality's ability to fulfil its service delivery and local economic development mandate.

5.6.2 Implementation: operationalising community benefit delivery

Secondly, several elements of the procurement framework and implementation agreement have proven to be problematic, most notably the 50 km radius demarcation for beneficiary communities. This has been widely debated and is seen as an impediment to coordinated socio-economic development strategies (Wlokas, Boyd & Andolfi, 2012; Wlokas, 2015; Mcewan, Mawdsley, Banks & Scheyvens, 2017). The 50 km radius requirement surfaces a tension between responsibility to communities in close proximity to IPPs, and issues around equity, conflict, and the determination of needs (Mthembi, 2015; IPP Office, 2017). The necessity of adjusting the strict geographical demarcation has since been recognised; however, alternative approaches to structuring the IPPs' place-based investments have not come into effect.

In fulfilling the community ownership requirements of the ED component, most IPPs have established community trusts, which operate as independent legal entities with a minimum shareholding of 2.5% in the project company (Mthembi, 2015; Wlokas, 2015). In practice, community trusts are challenging to establish and operate in a sound manner (Wlokas, 2015), and questions have been raised as to whether there might be more appropriate structures for enabling community ownership (Mthembi, 2015). A statement in a recent IPP Office Quarterly Report is indicative of this, identifying a 'key learning' as "opportunities or alternate vehicles to be investigated that will enable a more even distribution of community trust cash flow and realising community benefits sooner" (IPP Office, 2016: 35). Further to complications in the governance arrangements of community trusts, their structuring of financial flows to have a primary focus on debt repayment means that communities only realise the extent of their investment late into the project lifecycle (IPPPP Office, 2017). Trustees' mandates to enable community development initiatives must take into account the disbursement of dividends, which is skewed towards the latter half of the project lifecycle.

Finally, the stipulations for SED and EnD expenditure speak to the REIPPPP's developmental vision, and focused on education and skills development, social welfare, and local economic stimulation through measures supporting skills and small and medium enterprises (SMMEs) (Marais *et al.*, 2017; Wlokas *et al.*, 2017a). IPPs are limited to SED and EnD expenditure that focuses broadly on education, community wellbeing, and skills development (IPP Office, 2017). This demands careful deliberation, on the part of these private-sector players, to figure out how to utilise their funds in a way that makes a meaningful contribution, all in the context of an overwhelming need for reliable service delivery, infrastructure provision, jobs, and sustainable livelihoods.

5.6.3 Monitoring and evaluation: assessing community benefit delivery

In terms of reporting, monitoring, and evaluation, a stringent reporting framework focussed solely on SED and EnD expenditure holds limited potential to generate the kind of learnings and reflections that are relevant

from a developmental *impact* perspective. As one IPP CEO stated, "it's easy to spend, but the impact question is harder" (B41). IPPs are required to report to the IPP Office and DoE on their expenditure on SED and EnD initiatives every quarter, according to annual development plans. The unintended consequence of this reporting arrangement is that expenditure tends to drive development, as opposed to development driving expenditure (B2). This quantitative and largely 'box-ticking' approach to reporting disincentivises IPPs from investing in more meaningful and longer-term impact evaluation and learning, and the quarterly reporting is misaligned with the kind of timeframes that are known to be required for successful developmental practices in communities (Mthembi, 2015; Wlokas *et al.*, 2017a). Moreover, the reporting framework limits the IPP Office's capacity to properly interrogate the impact of SED and EnD spend. In essence, the reporting framework tends to favour compliance, as opposed to impact.

This section has elaborated some of the emerging challenges associated with the fundamental misalignment between the REIPPPP's prescribed place-based investments, the relatively lacking national ambition for development within the REIPPPP, and the often tense and fractured relationships amongst local development actors.

5.7 Conclusion

South Africa's long-standing socio-technical energy regime has been configured through the strategic arrangement of policy frameworks and governance practices that reinforce a particular form of carbon-intensive capital accumulation, and sustain a highly centralised nexus of political and economic power. The present-day relations of incumbency that see South Africa locked into a carbon-intensive development trajectory are products of the long-time historical alignment of particular social, political, and economic forces (Power *et al.*, 2016). However, in response to domestic energy supply and economic development challenges and further motivated by global decarbonisation agendas, the South African government encouraged the exploration of appropriate RE policies. This exploration ultimately resulted in the design and implementation of a competitive procurement programme. These were the local conditions of possibility into which policy ideas circulating about the prospects for RE development were inserted.

The REIPPPP was conceived at a moment in South Africa's history when climate commitments topped the national development agenda as the country hosted the 21st Conference of Parties (COP21) in Durban in 2011. In direct response to these international and local priorities, the programme was deliberately designed with certain parameters and ambitions in mind. The conditions of possibility at the time prioritised certain strategic goals for the RE programme. Specifically, the programme was tasked with demonstrating South Africa's commitment to climate change action, while also urgently addressing a supply-side crisis by timeously integrating RE into the electricity supply. Over and above these decarbonisation and energy security justifications, the programme's contribution was taken one step further: to speak to an explicit socio-economic agenda. Together, these developmental ambitions translated into explicit policy goals for the REIPPPP and the

construction of an innovative institutional entity mandated to oversee the programme's implementation and maintenance, namely the IPP Office. Thus, it is possible to see the existence of the traces of the corporate and social logics of RE development that emerged in the context of the global energy transition, described in Chapter 4.

Institutional and regulatory innovation on the part of South African policy makers and government officials resulted in the unique arrangement of specific criteria (price *and* ED) in the evaluation of bid submissions by IPPs, as well as the installation of strict accountability mechanisms within the IPP Office. It is clear that a logic of risk mitigation is operative in the programme's design, resulting in a preference for short-term compliance on the part of IPPs, and a procurement approach that broadly aligns with existing dominant approaches to public procurement within South African legislation. This signals the existence of the corporate logic of RE development in the REIPPPP's conception. However, differing from this compliance regime, and resonating with the ED ambitions for the programme, is the recognition by responsible policy-makers that investments in RE infrastructure ought to be material drivers of socio-economic development in diverse localities across the country. In contrast, this resonates with the social logic of RE development that was pioneered in the early phases of the RE sector in two frontrunner countries.

Just as the policy assemblage literature describes, the REIPPPP did not emerge fully-formed from a neat, stepwise policy development process. Instead, the choice of a competitive procurement programme, with its explicit decarbonisation, energy security, and socio-economic development justifications attached, was wrangled into being following an intensive period of political contestation. This took place within the context of South Africa's carbon-intensive political economy of energy and against the background of the global energy transition. The country's policy evolution was, to a certain extent, a microcosm of the global energy transition, also having an initial preference for feed-in tariffs to cultivate a niche RE industry, only to ultimately pursue a competitive procurement approach. The result of this preference for competitive procurement was that the South African government could deliver on its climate change commitment with a flagship RE programme that went further than any instrument of its kind to channel private investments into the country's economic development efforts. This had the positive effect of elevating South Africa's status with respect to policy commitments in support of the energy transition. Less positively, it kept intact national government's prominent role in managing the electricity sector and protected the primacy of Eskom as the single buyer.

Like in the case of RE emerging in frontrunner countries, an analysis of the complex process of introducing and implementing the REIPPPP reveals that it was not *intended* to disrupt the dominant socio-technical regime or disturb the strongly centralised policy and governance regime. However, as this chapter demonstrates, the socio-spatial realities of the utility-scale RE infrastructure, along with the particular configuration of the policy framework (with elements both the corporate and social logics) and its accompanying governance and accountability mechanisms, have led to various unintended and disruptive outcomes. These will be analysed in Chapter 7 as part of discussion of 'socio-technical interferences'. Following Mitchell (2011), each energy

socio-technical system has specific socio-spatial impacts. As revealed in this chapter, this also applies, to the introduction of RE in South Africa where the two underlying corporate and social logics were blended together in ways that became a new international benchmark. However, the policy frameworks and governance practices that were developed to implement the REIPPPP resulted in a number of incongruences and tensions.

This chapter is a 'country-level' picture of the processes that shaped the design and enactment of the REIPPPP and how, in turn, its unique configuration of diverse policy goals has resulted in chronic governance challenges of alignment and coordination, implementation, and monitoring and evaluation. Chapter 6 'zooms in' on that picture, showing how, together, these features characterised the socio-economic and political milieu in which the ZF Mgcawu District Development Coordinating Forum was cultivated. The specificities and peculiarities of the REIPPPP (in particular, its blend of the corporate and social logics of RE development) shaped the 'conditions of possibility' for this group of diverse stakeholders to come together and attempt to form a response to the place-based impacts of the REIPPPP. To this extent, the social actors involved with the ZF Mgcawu District Development Coordinating Forum were acting out the inherent social logic that decentralised and distributed RE infrastructures makes possible.

Chapter 6
Governance experiments in the REIPPPP: a case study of the ZF Mgcawu District Development Coordinating Forum

6.1 Introduction

The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) has (unexpectedly) attracted large volumes of local and international investment through a transparent and competitive procurement mechanism, facilitated extensive expenditure by the private sector in economic development (ED) priorities, and contributed towards South Africa's climate mitigation efforts. Chapter 4 presented dimensions of the global energy transition and evidence of two co-existing corporate and social logics that has shaped RE development at different stages since the 1980s. It was argued that the corporate logic became entrenched globally since 2004. This, however, did not vitiate the propensity inhere in the decentralised and distributed nature of RE to enable the persistence of the social logic.

Chapter 5 then demonstrated how these two logics of RE development, informed the emergence and evolution of the South African energy transition. Further to this global context, Chapter 5 also presented the domestic socio-economic and political landscape, or the distinctive conditions of possibility, that shaped how the country's flagship renewable energy (RE) policy was configured. The specific dimensions of the competitive procurement framework that essentially adhered to a corporate logic was described, including the overarching developmental ramifications of the concession to ED inscribed in the REIPPPP. This clearly reflected the obstinate persistence of the social logic within a governance framework that essentially favoured the corporate logic.

In this chapter, I take this high-level picture of the national-level dynamics further by delving into the grounded realities of the REIPPPP, tracing the implications of the blending of corporate and social logics in the REIPPPP for the social actors in the ZF Mgcawu District Municipality. I demonstrate how the Forum's experiment in trying to advance their collective impact in the region can be understood as these stakeholders acting out the social logic while also grappling with the corporate logic at play in the REIPPPP's design and implementation. I argue that, in effect, the Forum was attempting to rectify the bias in favour of the corporate logic inherent in the way the REIPPPP's policy frameworks and governance practices was designed, in a collaborative effort to better align the corporate and social logics at play.

In this chapter, I give an account of how the REIPPPP's place-specific development and governance challenges became a cause for concern for various stakeholders in a region with a high concentration of RE development. Specific focus is given to the efforts by an evolving constellation of regional actors from civil society, industry, and government, to convene and animate a governance experiment in the ZF Mgcawu District Municipality in the Northern Cape of South Africa. Their response took the form of a unique place-based multi-stakeholder

collaboration, initiated by the Industrial Development Corporation (IDC) in 2015 and hosted in Upington, a regional town in this same district municipality. In the vein of the argument developed thus far, this account signals how Forum stakeholders were acting out potential inscribed in social logic of RE development, while also contending with the ramifications of the dominant corporate logic of the REIPPPP.

This empirically rich account of the ZF Mgcawu District Development Coordinating Forum is a descriptive account that reveals the various tensions, unintended consequences, and emergent potentialities unlocked by the REIPPPP. It is important to note that this chapter lays out descriptively how these dynamics played out and provides the substance for the analysis of these socio-technical interferences in Chapter 7. Seeing the REIPPPP through the 'eyes' of this place-based collaboration, the case study captures how "pristine policy visions and political rhetoric meet the day-to-day routines, encounters, and materialities of policy-making" (Baker & McGuirk, 2017: 13). It is in that interface where the tension between the corporate and social logics built into the REIPPPP framework becomes most apparent.

This in-depth case study gives a detailed description of various stages in the evolution of the Forum between 2015 and 2018 and the dynamics of experimentation throughout. However, this is not merely a stepwise account of the Forum's activities during this time, but is rather framed around my direct involvement with the initiative between April 2016 and April 2018. Mirroring the framework outlined in section 2.4.3., five phases of the embedded research frame the case study: (1) building relationships and making connections, (2) immersion and exploration, (3) negotiating involvement, (4) leading an intervention, and (5) making sense and reflecting. While the reference to these phases in the methodology chapter noted the methods, strategies, and specific engagements across the breadth of my research process, in sections 6.2 to 6.6 they are employed to provide a framework for chronologically segmenting my involvement with the Forum.

6.2 Building relationships and making connections (April 2016 – June 2016)

A few months into my PhD journey, I was introduced to a municipal official who would be responsible for shifting the trajectory of my research. Up until that point, my initial engagements had been primarily with officials in the Independent Power Producer Office (IPP Office) (B10), experts at the Development Bank of Southern Africa (DBSA) (B2, B11, B12, B13), Independent Power Producers (IPPs) (B1, B9), and community development practitioners (B3, B4, B6) working in contexts related to the REIPPPP.

This meant that my high-level understanding of the REIPPPP and its associated implementation challenges was informed by officials and experts at a national government level, as well as by the perspectives and experiences of IPPs themselves. However, my exposure to, and understanding of, the REIPPPP was amplified when opportunities were opened up to me through the long-standing relationship I developed with this municipal director in the Kai !Garib Municipality in the Northern Cape.

I first met the director at the 15th International Winelands Conference in Stellenbosch in April 2016 (E1). The theme of the conference was the 'governance of transitions in a complex world'. During our interaction, he

relayed his experience of being a municipal official working in a heavily constrained municipal environment, with all of its difficulties pertaining to infrastructure backlogs, service delivery challenges, dire socio-economic conditions, and limited financial and human capacity within the municipality to address these pressures. In short, the development challenges seemed dire and overwhelming.

This first-hand account resonated with my understanding of other experiences of public-sector officials (Davies & Swilling, 2018) and, more broadly, with the state of local government in South Africa. The director painted a vivid picture of working in the kind of public-sector environment that is not conducive to long-term planning or meaningful development impact. It seemed both ironic and fortuitous to have met this municipal official from one of the most obscure municipalities in the country at a governance conference in Stellenbosch.

What was most striking to me was his account of recent developments in the region, since the introduction of the RE programme saw the arrival of a number of RE companies at the Kai !Garib Municipality. At the time, he was a Director of Planning, and had previously served in a number of other leadership positions, including that of municipal manager. His recollection of how the IPPs arrived seemingly out of nowhere and set themselves up on the barren landscape painted a striking image of high-tech infrastructures landing like asteroids into marginalised parts of South Africa. He also described the extensive investment that these IPPs were now making in local projects to support development. Now, suddenly, Kai !Garib Municipality was 'on the map' and yet, this was apparently the first the municipality had heard of the programme.

I was intrigued as to what the implications of such 'first encounters' might be, and indeed also, what this sudden influx of activity and investment might mean for these rural localities. After this first conversation, a research colleague (registered for the MPhil in Sustainable Development) and I quickly made plans to take up his invitation to spend time in the area, getting to grips with what was unfolding around these recent developments.

We were intrigued by the chance to physically be there and reflected on the sights that met our eyes. The below extract is from a blogpost about this first research trip to the region (Davies & Morar, 2016):

> After a long drive through the vast and desolate Karoo landscape, we sensed a distinct change as we drove off from Kenhardt, our last pit-stop before arriving in the lush oasis that is the Green Kalahari. As the landscape unfolded before us, we marvelled at outcrops of Quiver Trees, or Kokerbome, as they are referred to in this part of the world, and bright green vineyards nestled below craggy Kalahari koppies. At first, we were puzzled, beckoned, by a distant glare, but soon

realised it was the halo atop Africa's first concentrated solar power (CSP) tower. An anomaly on the horizon, this 200 m CSP tower, between Upington and Keimoes, hails the arrival of the renewable

Figure 12a ZF Mgcawu District Municipality's location within the Northern Cape Province of South Africa (municipalities.org.za)

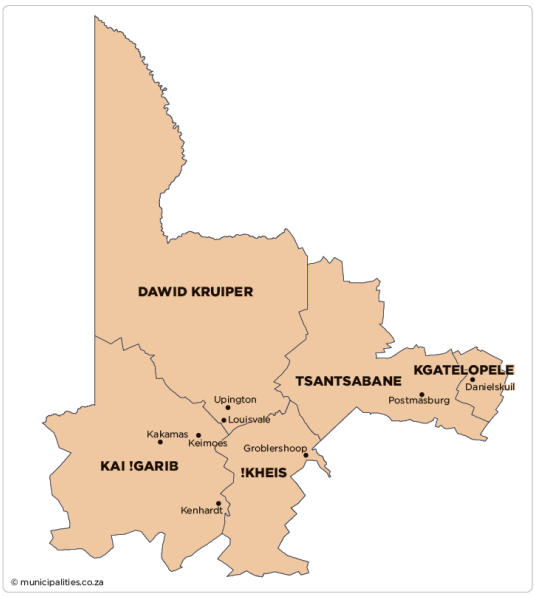


Figure 12b Local municipalities within the ZF Mgcawu District Municipality (municipalities.org.za, 2020)

Figures 12a and 12b are helpful to locate the Kai !Garib Local Municipality with the wider ZF Mgcawu District Municipality and Northern Cape Province.

These maps are helpful in seeing the region's vastness but also how the towns, such as Keimoes, Kenhardt and Kakamas, that operate as critical sites for encounters and engagements in this inquiry, are so far removed from the urban centres of the Western Cape and Gauteng provinces.

Figure 13 Photograph taken in ZF Mgcawu District Municipality (author's own)

Figure 14 Photograph taken in ZF Mgcawu District Municipality (author's own)

Figure 13 and Figure 14 (photos that I took during my time in the Northern Cape) hint at the contrasts in the landscape, the first showing the iconic Quiver Trees and the second capturing the oasis-like quality of the banks of the Orange River, ripe for agricultural activities and a life-source for the region's population.

Right from the outset, the director was a key figure in the unfolding of my research journey. His introductions were invaluable; yet, while I benefited from his assistance in making connections, I was careful to remain slightly distanced in order to have open conversations and not be associated as 'one of his people'. It quickly transpired through initial engagements that the director was a well-known municipal official, with a strong political network and explicit connections to the African National Congress (ANC), the country's ruling political party, which also held a majority in the Northern Cape Province, the ZF Mgcawu District Municipality and the Kai !Garib Local Municipality. Regardless of, and perhaps in part due to, his positionality, having the director as a close contact in the region was invaluable for finding my feet in this new context, and for gaining entry into the relevant intersecting and overlapping political, administrative, cultural, and social networks. As I became more familiar with people and was able to build a reputation independent of the director, I was more easily able to navigate introductions and engagements, and was able to participate autonomously in meetings, social gatherings, and other public events.

In those first few visits to Kai !Garib Local Municipality and the surrounding municipalities, I spent the majority of the time immersing myself in as many wide engagements as possible. These were valuable for getting a sense of the socio-economic challenges in the region, the relevant stakeholders across the private and public sector, as well as the wider socio-cultural and environmental dynamics. This immersive exploration included participating in social events such as soccer tournaments, public meetings hosted by municipalities or IPPs, one-on-one conversations, and observation at as many other public engagements as possible. During this

exploratory phase I visited each of the IPP plants in Kai !Garib Local Municipality, as well as a number of their socio-economic development (SED) and enterprise development (EnD) activities.

These diverse encounters were valuable for deepening my understanding of the region and especially its people: what the nature of the local politics was, the quality of engagements between IPPs and local governments, as well as the views of members of the public about the REIPPPP in general, but also about IPPs and local municipalities.

Photographs in Figure 15 below are evidence of my site visits to various IPP projects in the ZF Mgcawu District Municipality (a comprehensive list of IPPs in the region is provided in Figure 17). Their inclusion is significant in that they speak to the impact that these encounters with infrastructure shaped the quality of my immersion in the context. These visits to two CSP plants, a hydro facility and a solar farm stand out in my memories, cementing these infrastructures in my consciousness and lodging them firmly in the growing picture that diverse encounters in the region brought to life. I was struck by the other-worldliness of these infrastructures, the complexity of the technological processes at play, and the sophisticated skills required to bring them to life and sustain their operations. Each site visit gave the impression that these were 'world-class' infrastructures – from the technical skills of international and local engineers, to the cutting-edge technological components assembled together thanks to billions of Rands of investment, into shiny, carefully orchestrated energy generation facilities.

As well as touring these sophisticated infrastructures, I also visited many of their beneficiary communities and community projects, accompanied by the IPP representatives (often community liaison officers or SED managers). While I have chosen to not include photos of the creches, care centres and schools to which many of these IPPs direct their SED and EnD investments, they stand in strong contrast to the high-tech infrastructures to which they were tethered. This can be attributed to the socio-economic and development conditions in the area, a sparsely populated region with little economic activity and high levels of poverty and inequality.

Figure 15 Photographs from site visits to IPPs in ZF Mgcawu District Municipality (author's own)

6.3 Immersion and exploration (May 2016 – June 2017)

In many of my conversations with SED officials from IPPs or government officials from local, district, and provincial government, the name 'ZF Mgcawu District Development Coordinating Forum' kept being referred to. I began to get a strong impression of the initiative, through descriptions of it as a space where many of the emerging tensions and local issues were being addressed. It seemed likely to me that it was issues of governance that were uppermost in the Forum, as the activities of IPPs were taking place within municipal jurisdictions, and this was creating havoc for coordination and communication. Boundaries seemed unclear, modes of engagement were lacking and, where present, tenuous. Understanding governance as 'the process of steering for collective action' these were, to my mind, overtly matters of governance.

These initial impressions about the Forum were later confirmed and it quickly became apparent that it might be a gateway through which to become more deeply immersed in the place-based implications of the REIPPPP. In April 2016, the director assisted with an introduction to the Forum's chairperson and, following a short explication of my research interests, my research partner and I were invited to participate as observers in the following Forum meeting which took place at the end of May 2016 (D3). This initial engagement with the chairperson, and the subsequent negotiation of access to the Forum, set the tone for my subjective experience of the initiative. I experienced the Forum to be quite protected and formal, with stringent criteria for participation (D4). Before we were able to sit in on a meeting, for example, the Forum had to gain approval from the group after relaying our research interests to them. The Forum's Terms of Reference (ToRs) were shared with us and provided me with insight into the structure and history of the Forum (D5, D6, D7). This also revealed to me that the Forum endeavoured to operate as a protected space, where involvement was carefully considered and mediated.

An important component of the initial immersion was gaining a deeper understanding about the foundations of the Forum. This helped sensitise me to the diverse sentiments and experiences of stakeholders within and beyond it. Primarily, I was interested in finding out why the IDC had such an apparently strong role in driving the Forum. From discussions with regional IDC officials (E6, E34, E37), I came to understand that the Forum was the outcome of a much longer process, with its foundations in the IDC's role, at a national government level, in the National Infrastructure Plan. The emergence of the Forum can be understood as three phases through which the IDC established a mandate, convened a regional intervention, and then formalised a framework of engagement. These are explored in turn in the sub-sections below.

6.3.1 Establishing a mandate

The Forum was initiated by the IDC in 2015, at the same time that the organisation set up a similar initiative in the neighbouring Khai Ma Local Municipality, where comparable dynamics were being experienced.

The IDC is a South African development finance institution (DFI) with a focus on the promotion of economic growth and industrial development. In 2012, the South African government launched the National

Infrastructure Plan (NIP), recognising the critical role that the expansion of infrastructure plays in realising the socio-economic development targets outlined in the National Development Plan (NDP 2030) and operationalised through key economic policies such as the New Growth Path (NGP) and Industrial Policy Action Plan (IPAP). The IDC, as a state-owned enterprise and DFI, is one of the key strategic players in the financing of infrastructure development, to the extent that it financially supports the development of the country's industrial base, as well as of other countries in Africa. This strategic mandate means that the IDC was involved as a funder in many large-scale infrastructure and industrialisation projects in various sectors, from mining to agriculture and renewable energy, across the Northern Cape.

The NIP set out to lead investments in infrastructure that build the foundation for South Africa's future growth prospects, that is, inclusive and job-rich growth. The NIP is spearheaded by the Presidential Infrastructure Coordinating Committee (PICC), which was set up as a body to integrate and coordinate the long-term infrastructure build, drawing in a number of partners to implement 18 Strategic Infrastructure Projects (SIPs). The IDC was appointed as the implementation agent of SIP 5 (Saldanha-Northern Cape development corridor) and SIP 8 (Green energy in support of the South African economy). This required the IDC to compile and submit business plans, play a coordinating and facilitating role, identify opportunities for localisation within the respective SIPs, and report regularly to the PICC. To fulfil this mandate, the IDC initiated widespread engagements across the Northern Cape in early 2013 with various government departments and industry players to assess the readiness of implicated stakeholders. In the process, the IDC became cognisant of various complexities that might inhibit the successful realisation of the respective SIPs. With respect to SIP 8 (green economy), and in particular, the REIPPPP that had launched in 2011, a number of potentially adverse conditions were identified that provided ample rationale for the IDC to conceptualise an intervention. In essence, the IDC's exploration raised numerous red flags about the impact of these impending large-scale infrastructure projects from a developmental perspective. On the other hand, these findings also pointed to the potential that such infrastructure investments might bring to the region. Primary among the adverse conditions that they identified was the fact that the lion's share of IPPs awarded through the REIPPPP are located in the Northern Cape, a region with a glaring deficit of basic infrastructure to support large-scale long-term infrastructure developments, and a profound lack of awareness and capacity regarding the burgeoning RE sector, particularly on the part of local governments. This was not a promising recipe for success.

A socio-economic development specialist (who was later elected as the Forum's chairperson) at the IDC operating in the Northern Cape, echoed this assessment by the IDC, saying (E34):

> So, coordinating the green economy, the IDC went around municipalities and the different areas, the metros, the provincial governments, just trying to find out the readiness of municipalities and local government generally to accommodate the green economy and how prepared they were. What they discovered was that there were lots of problems. There were, for one, infrastructure problems that the municipalities were raising and saying these projects are going to happen in our

> backyard, but we don't have infrastructure to accommodate the number of people that will be coming. Our roles, our basic services will be affected, we don't feel that national government is actually consulting us on those things and there's no kind of plan and communication.

Regarding the awareness in municipalities about the implementation of a RE programme in the country, the SED specialist (E34) continued,

> The other thing, while we're still on communication, they then raised the issue that apart from infrastructure, then they did not know much about this green economy, what was happening. Although the Integrated Resource Plan was released in 2010, the local people in the province were kind of blank on what was happening.

Presenting its findings to the PICC in June 2013, the IDC suggested a proposal for a coordinated approach within the region, particularly in places where there was a concentration of projects, as a way of laying the groundwork for the longer-term realisation of SIP 8 and the expansion of the green economy in the region. Driven by their mandated role as implementation agent of SIP 5 and SIP 8, the IDC had reason to table these proposals. The fact that the IDC was involved as a funder in many large-scale projects in various sectors across the region, from mining to agriculture and renewable energy, was further motivation. In sum, having established the rationale for an intervention to support regional integration (with the legitimacy to do so derived from the PICC mandate and the additional motivation of their vested interests across diverse economic sectors), the IDC was well positioned to drive this coordination agenda.

6.3.2 Convening a regional initiative

Following its initial assessment of conditions in the Northern Cape relevant to its mandate from the PICC to drive the NIP, the IDC entered a phase of intensive stakeholder engagement in the region. A team from the former Development Agency Support department, which became the Development Impact Support (DIS) unit, began engaging in 2014 with stakeholders in the Khai Ma Local Municipality around the idea of a coordination forum. This culminated in the Khai Ma Development Coordinating Forum. A similar process was followed in the ZF Mgcawu District Municipality and resulted in the formation of the ZF Mgcawu District Development Coordinating Forum in 2015.

Having identified the emerging risks of the expansion of the REIPPPP (as well as its immense developmental potential), the IDC recognised their own (high) level of exposure to them, having invested in a number of IPPs in both the Khai Ma Local Municipality and across the ZF Mgcawu District Municipality. The DIS team were of the view that it would be favourable to have an initiative to serve as a meeting point for the various stakeholders, and a means by which to align development frameworks and avoid duplication. While an underlying reason for the IDC to push for such an initiative was to reduce risk to their investments from a social performance perspective, it was made explicit that the public sector, namely local and district municipalities, were intended as one of the primary beneficiaries of the initiative.

The IDC's SED specialist recalled these early engagements in the Khai Ma Local Municipality after having been given the go-ahead to explore a possible coordination initiative, saying (E34),

> So, we went to certain areas. We met with different people, like the Khai Ma Business Forum. We met with the mine. We met with the municipality. We tried the municipality. Every time we went there, we met different people, but we tried. We met with organised agriculture, with the farmers' union in that area, both irrigation and livestock farmers. We then spoke to Abengoa, we spoke to BioTherm and we said, look, wouldn't it be better if we have something that was coordinated, that included both of you, because there will be overlaps also. There will be overlaps between the different planning frameworks: the municipality with its own planning, the companies with their own obligations, renewable energy with their own obligations and the mine office, other obligations in terms of labour. Wouldn't it be better that there's a meeting point of coordinating the development so that there's no overlaps and no duplications? And at least you can start talking to each other and we can then know what the municipality's also thinking. So, that's how it started. We thought, yes, if we could get the municipality participating, they were the main beneficiaries of these initiatives, so they would take over the process and run with it.

Another member of IDC DIS team, a socio-economic development specialist in IDC's Northern Cape office, also involved in these early negotiations, confirmed the IDC's awareness of duplication among IPP projects, saying, "Everyone is working blindly, they can't see what is being done by the other IPP" (E6).

Community trusts were another area of significant concern, given the low levels of preparedness in communities to receive and manage significant dividend flows from shares for community ownership, also intended to support local development. Having been involved in the preparation of IPP bids and providing the financing for the community ownership component of many of these projects, the IDC was cognisant of the complexities involved in operationalising this ED commitment.

Moving now specifically to the ZF Mgcawu District, the DIS team clarified another central justification for the Forum, namely, the frustrations voiced by municipalities. Across the region, municipalities cited a sense of exclusion, a lack of understanding and awareness, and insufficient consultation about the structuring and implementation of the REIPPPP. It was obvious that a number of issues were going to play out eventually, and the intention of the Forum was to ameliorate them by being proactive and bringing diverse stakeholders together from the onset. As the SED specialist and the Forum's chairperson said, at the heart of it, the intention for the Forum was simple: "We just said if we have everyone in the same room, we can then start talking to each other about what we want to do and you can look at certain initiatives" (E34).

6.3.3 Shaping engagement by defining the Terms of Reference

The Forum took a regional perspective and was structured to support wide and diverse participation from IPPs, mining companies, agricultural entities, business chambers and private-sector players, community trusts, local

and district municipalities, and provincial and national government. Indeed, the IDC cast the net wide and included a long list of relevant regional stakeholders. Interestingly, the chairperson (E34) indicated that certain sectors were more amenable to the initiative, reflecting the varying perceptions of the value of a coordinating forum, saying:

> The mine was easier. We went and saw them and they were willing. They said 'yes, we would appreciate something like that because we would want to know'. They understood that it would put them in a better light at their stakeholder meetings.

He continued explaining that (E6),

> The original idea was that the Forum will be a point of coordination of the different plans and implementation by the different stakeholders. The Forum was to be registered as a non-profit organisation (NPO), to have some funds from IDC to do the initial work of employing a 'Project Management Capacity' that would assist the Forum to develop a long-term development plan, coordinate activities of the Forum on the ground, and prepare reports for the Forum on a regular basis. It was envisaged that they would also take up the Secretariat role and be the repository of the records of the Forum.

This function was envisaged as an external role to be fulfilled by a professional entity obtained through a formal procurement process via the IDC. The IDC, and its SED specialist working in the region, took the lead in drafting a Terms of Reference, which took almost a year to finalise. Two national and two regional IDC employees from the DIS team were involved in this work. The final Terms of Reference (ToRs), completed in 2015, were the outcome of protracted negotiations with regional stakeholders.

The SED specialist (REF) recalled this lengthy and complex process, saying (E34),

> I think what we did not anticipate was that, or we did not plan well for, was getting people together of different interests to take some time in themselves getting to know each other and actually agreeing and forming a vision for themselves. So, in the beginning we put together a Terms of Reference which we discussed with everyone. We said okay, you can make your comments. It took us I think almost a year to agree on a Terms of Reference and to say okay, are you happy? Because everyone thought no, we can't. There was always this, particularly from the IPPs, this thing about this confidentiality and they were forever, 'no, we can't agree to this'. We said no, that's not the message, we're not saying give your money to the municipality, we're not saying give your money to IDC to implement any project. You will still implement your own projects. The only thing, let's do it in a coordinated way.

This initial negotiation was instrumental in surfacing vested interests, misconceptions, and divergent agendas, thereby highlighting to the IDC team the deeply conflictual dynamics at play. These engagements identified the legacy of competitive bidding and how it translated into IPPs' hesitation about, and often resistance to,

sharing information about their ED activities. The SED specialist confirmed that this was a hurdle right from the onset.

He said (E34),

> I don't know what was communicated to them in the beginning about this confidentiality thing about not sharing. The only competition was around price. Okay, apart from the split in terms of 70:30, the development criteria and that. So, the only thing that we think people were competing around was the price. So, I do not know what they were so wanting to protect, because I understand the price [component].

The IDC hoped they might be able to alleviate some of these barriers, given their role as funders across a number of different projects.

The SED specialist (E34) recalled,

> It was still difficult even now when we say, look, where IDC is invested it should be easier to get reports and get plans, say from Abengoa or any of the guys where we're involved in a three-way [blended finance arrangement], unlike where we had just bought a community share. We have given them a loan. We have bought a share. We are shareholders ourselves. So why can't we have access to the plans to know what they're doing? They can remove the figures if that is a big issue. They can remove the figures but give it to you and tell us, okay, this is what we are planning to implement in the next financial year. But that is still a challenge for us.

Another obstacle in the ZF Mgcawu District Municipality was the engagement with different spheres of government and the tensions between local, district, and provincial government. The decision to locate the initiative at the District Municipality level was based on evidence of strategic capacity there, as well as of effective coordination amongst the five municipalities.

The regional IDC team took the further decision to avoid provincial-level politics and, as the SED specialist (E34) explained,

> The context was that the province was just coming to some knowledge of the renewable energy sector. The Premier's office had employed someone in the office [to focus on renewable energy]. They were running around, thinking there's money to be made and money to come into the provincial coffers.

Speaking about the provincial government's view of the IDC, he (E34) stated that,

> It took, I don't know, six meetings, that we went to the Premier's office to brief them and brief them. And sometimes the Premier would sit in with the Director General. But every time they met, they still have a misconception about IDC and IDC's involvement in setting up trusts in particular, irrespective of the six meetings.

Despite clarifying their coordination mandate from the PICC, the IDC's continued misalignment with the Province meant that the Forum continued as a District Municipality level initiative.

Another matter mired in misconceptions was the mechanisms of accountability around IPPs. To address the confusion about where and to whom IPPs are required to report on their activities, the IDC facilitated direct involvement by the IPP Office with regional stakeholders. As it turned out, municipalities were none the wiser, and, as the IDC's SED specialist explained, "They didn't even know. So, we had to tell them these things and tell everyone that they [IPPs] report directly to the Department of Energy, not to us" (E34).

Given this background, it should not be surprising that the articulation of the ToRs was an arduous and protracted process, but one that was nevertheless vital to solidify the Forum and its structure. Elements of the final version of the ToRs are significant and worth noting here, to the extent that they created the principles upon which subsequent interactions would be shaped. Moreover, the ToRs served as a prominent point of reference in my own introduction to, and familiarisation with, the Forum. The main elements are outlined below (D5), along with relevant excerpts from the document (quoted verbatim in the boxes).

A *background section* describes the scope of the coordination challenge, with an overview of the various stakeholders in the region and the nature of their interactions. It also spells out the intersecting policies that have a bearing on the operations of private- and public-sector operations. Importantly, the document recognises the fact that the ZF Mgcawu District Municipality had become a destination of significant investment and development in the province.

This is followed by the IDC's proposal for a Development Coordinating Forum in the district. It outlines *broad objectives* (D5) to substantiate this proposal. These objectives spell out an effective intermediary, leadership, and oversight role for the Forum, built around partnerships between private, public, and civil society stakeholders.

- To ensure that integrated development planning and implementation of the ZF Mgcawu region projects take place
- To make recommendations to the IDC and all the stakeholders in the forum on the projects to be initiated
    - To scrutinise prospective projects and programmes against the following criteria: viability and sustainability; national and provincial legislation; and participation of beneficiaries
- To ensure monitoring and evaluation of all ZF Mgcawu projects arising from the SLP; SED/ED and community development plans (CDP) plans of the stakeholders
- To determine cash flows and time plans for project implementation

- To resolve any matters of dispute arising in the course of implementation
- To assess on-going management and implementation of all projects and programmes

Next, the ToRs define *principles to ensure successful partnerships* (D5).

- A shared common vision and purpose that builds trust and openness and recognises the value and contribution of all members;
- shared and transparent decision-making processes;
- shared can-do values, understanding, and an acceptance of differences (e.g., ways of working);
- effective communication at all levels within the partnerships, sharing and accessing knowledge and information;
- demonstration of accountability for actions taken and ownership of delivery of the objectives and targets for which they are responsible; and
- investing, subject to the approval from the Board of the respective stakeholders, in partner skills, knowledge, and competence needs to be highly valued within the partnership.

Thus far, the ToRs put in place a vision for the Forum that is well capacitated and comprehensive in its scope and has a culture of cooperation and sharing. This is further reflected in the *detailed purpose and objectives* (D4).

- To ensure that there is an alignment between and amongst the planning frameworks of the Municipality and those of stakeholders (IDP; LED and SDF and SLP, SED and CDP) as they are all operating in the same space;
- Appointment of a Project Management capacity to undertake the work plan as finalised and agreed upon with the Industrial Development Corporation;
- Ensure that an updated status quo report of the communities covered by the ZF Mgcawu Region is available (Carrying out a comprehensive Data Collection and analysis – covering the population demographics; trends, socio economic status; employment status; literacy levels; assets and resources within the communities and skills base existing in the area);
- Ensure that there is a coordinated approach to the implementation of the plans by all the stakeholders based on their SED, ED and SLP in relation to the IDP and SDF amongst others but in no way obligating any stakeholder
- Prioritise projects for implementation as identified by the forum

- Ensure sustainability of the projects implemented by the Development Forum within the beneficiary communities of ZF Mgcawu (by outsourcing feasibility studies and EIAs where required by law)
- Oversee the successful implementation of the ZF Mgcawu projects
- To coordinate, collaborate and avoid duplications thus ensuring more efficient, effective and economical project delivery
- Mitigate and avoid conflict, and
- To serve as a communication platform for the stakeholders, in the region and relevant government departments.

Clearly, the Forum envisaged a broad range of activities and expected firm and consistent involvement and membership of diverse stakeholders. The ToRs list a set of permanent members that spans all the mines, IPPs, community trusts, business chambers, large agricultural entities, as well as government departments, including local, district, and national government representatives involved in the region. The ToRs suggest that each organisation nominate two members to the Forum for consistent representation and ongoing participation.

From the onset, the IDC recognised the importance of having dedicated 'internal' capacity to support the Forum and execute its objectives, and this took the form of a 'Project Management Capacity' (D6). This post was envisaged as being funded by the IDC through its programme for Spatial Interventions, with appointment dependent on the establishment of the Forum as an NPO and approval from the Forum's stakeholders. However, the function remained vacant for the initial period of the Forum's existence. The objective of the post would be "to execute the work plan and ensure implementation of the decisions of the Forum and report back on progress and challenges" (D7).

The *main responsibilities of the Project Management Capacity* (D7) would be:

- To undertake all aspects as identified in the work plan towards the implementation of projects
- To ensure detailed reporting to the forum on the work undertaken
- To act as a liaison person, facilitator amongst the stakeholders between the meetings of the forum
- To ensure all decisions / resolutions of the forum are actioned, followed up and a reporting system is kept and maintained
- To ensure that credible support is provided to community projects and where there are challenges, they are reported to the forum for resolution

- To ensure that there is credible monitoring of projects in place (develop a monitoring and evaluation system)
- To liaise with the necessary government departments for assistance and/or information where required.

Given the level of formalisation that this implied for the Forum, the ToRs carefully note *standard rules*, including monthly meetings between formal stakeholders according to a structured agenda. Members of the public or broader stakeholders could be included on an *ad hoc* basis to give reports and presentations.

The ToRs also stipulate that the IDC, through its regional office, would fulfil the role of Secretariat and Facilitator; additionally, the IDC's regional economic development specialist would operate as Chairperson until the Forum elected its own. The ToRs also make note of the appointment of a Treasurer to manage the finances of the Forum.

The ToRs conclude with an overview of various ways of working for the Forum, including the Order of Business and proceedings at meetings. The ToRs also make recommendations for the basis upon which decisions would be made within the Forum, describing a stringent, consultative, and consensus-based approach to decision-making. Finally, the ToRs note that the Forum will exist for as long as there is agreement around its usefulness in addressing the needs in the region. It concludes with an overview of generic corporate governance considerations.

Besides the ToRs, there were no other concrete outputs for the Forum during this period. The focus was on establishing the group and building relationships, to the exclusion of other activities. Nonetheless, the comprehensive process that led to the formal ToRs provided a robust foundation for the Forum. The main underlying assumption in this formative stage is worth highlighting: that formalised governance structures, pre-defined focal areas, and clearly articulated ways of working are necessary prerequisites for implementation and action. The implications of this assumption, not all of them positive, became clear during the course of my engagement with the Forum. While the extensive consultative process was helpful for articulating the purpose and intention of the Forum, as well as for surfacing previously un- or under-recognised issues and tensions, it delayed the point at which 'action' was meant to take place, in this case the action of substantive experimentation with regional collaboration and coordination.

In sum, the initial phase was characterised primarily by intensive stakeholder engagement, driven by the IDC through its DIS and regional SED specialists. This cultivated a strong stakeholder network, with the IDC at its centre, where trust and effective communication were encoded in the founding document. The creation of the Forum was a step taken in recognition of the ambitious and urgent need for an alternative configuration for regional actors to address the place-based implications of the REIPPPP's design and implementation. To this end, the ToRs signify the emergence of a vision for regional development that is anchored in major industries (such as RE, mining, and agriculture) being effectively integrated into the local economy and

responsive to specific socio-economic imperatives - it was, in short, an effort to animate the social logic of RE development woven into the REIPPPP.

6.3.4 Grappling with regional collaboration

Once the ToRs were finalised, the Forum entered what was intended to be an operational phase. It was envisaged that the ToRs would immediately shape effective communication and aligned activities, leveraging the extensive period of consultation and stakeholder engagement. To this effect, the Forum proceeded as a monthly meeting convened and facilitated by the IDC and taking place at the Small Enterprise Development Agency (SEDA) premises in Upington. The regional IDC official was formally elected as the Forum chairperson. The chairperson explained the thinking around this decision, saying that (E34):

> The expression was that if IDC leaves or IDC does not coordinate, then there could be problems. People might get out or the Forum might collapse. The District Municipality liked the idea.

Accounts of the Forum's activity during this phase indicate that political leadership from the then-District Mayor played a significant role in garnering support and making concrete progress. However, he was later deployed to the Provincial Government, and the loss of this political leadership was a significant blow for the Forum and had the effect of diminishing public-sector representation.

On the whole, activities were limited to the monthly meetings, interspersed with meetings by a smaller Steering Committee that focused on more strategic aspects of the Forum's activities. These engagements followed the framework defined in the ToRs, which meant they were structured as formal meetings, inscribed with formal practices (such as deference to the Chairperson), and followed a formulaic procedure through agenda items.

Wide and diverse participation meant that the Forum, in principle, was comprised of a representative network of stakeholders from the region. This meant that the Forum was widely reported on in appropriate structures within local and district municipalities, as well as among the various private-sector players and business chambers operating in the region. Accounts of this phase affirm that, initially, municipalities recognised the value of the Forum and the role of the IDC therein. Having discussed the Forum's evolution, a representative from an IPP who had participated since the Forum's inception, reflected that (E32):

> The Forum can only get anywhere if there is leadership and support from the different participants. When it was formed there was a real willingness to have the IPPs and other stakeholders learn from each other while they tackle the great SED challenge.

Municipalities' awareness of the value of the Forum is reflected in the chairperson's (E34) comment:

> You know, that they see the importance of the Forum. I mean, at the last meeting we even had the municipal manager [MM] of the district council. We also had three people from municipalities which

> was a plus. So, you get a sense that at least people understand that we're not coming to take over their terrain and they're encouraging anyone who comes to them to do this or that project, to say okay, let's take you to the Forum. If you're going do this, there are other people there who can maybe collaborate with you. I said to the MM, look, at least now you know what is happening in your backyard. At least companies get to present, they tell you what they're doing in your backyard, so you more or less have a sense of where things are going.

The Forum came to represent a meeting place for these diverse stakeholders; an invaluable opportunity to share information and meet representatives from other regional stakeholders. In practice, this meant that the Forum became predominantly an information sharing platform about upcoming events or ongoing initiatives. Often, IPPs made *ad hoc* presentations about their activities in the region, or municipalities reported back about ongoing public participation processes. As the Forum became more widely known, many service providers with developmental projects (such as NGO's working in the education sector) requested to present their offerings there, with the hope that they might garner financial support or endorsement for their initiatives.

Open discussions coalesced around recurring challenges, most notably, the lack of municipal participation and representation, the difficulty in accessing information about the practices of IPPs, the disjointed operations of community trusts, and the form and function of the Forum. These challenges were clearly linked to the nature of the 'rules of the game' in the REIPPPP. To the last point, it became a recurring refrain in Forum discussions that overcoming the challenges of kickstarting action in the Forum would result from its formalisation as a legal entity (NPO). Nonetheless, this did not transpire, and the Forum continued in its diligent efforts to rouse collective action in the form of coordinated projects by IPPs and coherently structured engagements with local government.

In May 2016, I attended my first Forum meeting and presented about my general research interests, making clear that the intention of my participation was to observe and learn more about the Forum. During the course of 2016, Forum meetings were well attended by a wide range of stakeholders from across the public and private sector, as well as from civil society. The group met monthly but was highly dependent on the IDC Chairperson to convene meetings, provide administrative support and give guidance on the Forum's discussions and focus. My engagement with the Forum during the course of 2016 was helpful for building my understanding of how it functioned, the differing perspectives within the group, as well as how it related to other formal governance structures within the local and district municipalities. I was able to bear witness, through observations and subsequent personal engagements, to the reference to the fractured and problematic relationships between municipalities, IPPs, community trusts, and other stakeholders. I was also able to comprehend what it meant to 'deliver' on the rules of the game that IPPs were beholden to. Nonetheless, I was also about to appreciate the innovative ideas and experimental practices that were undertaken to kickstart the initiative. I also came to admire the ardent commitment to 'development' that was

expressed across different stakeholder groups and the sense of positivity they shared that the Forum would be a place where their commitment to being part of a better future for the ZF Mgcawu District Municipality and its people, might be made more possible by the existence, and success, of the Forum.

6.4 Negotiating my involvement (September 2016 – June 2017)

Despite that fact that people spoke highly of the necessity of the Forum and its potential, I got the impression that people were beginning to become disillusioned with its predominant focus on deliberation and consensus building. As one Forum participant stated, "We need to move away from having presentations for the sake of it" (D8). Another's comment reflects a sense of frustration, saying, "We sit in forums and talk about coordination but it never happens!" (D8, D9).

After that same meeting, I made the following fieldnote reflections (D9):

> Discussion at the forum today focused a lot on the importance of action. The Chairperson kept stressing that something actually needs to happen, rather than the Forum being just a space for presentations and conversations. But on this topic, they all look to the Chairperson and the IDC because it seems they don't want to do the work. It seems that nothing will happen if the chairperson doesn't do it – people don't seem to have the time or capacity to do the work. I wonder, what is the role of research in this context? Is this a forum just for sharing ideas and making sure they don't replicate them? Surely the value can move beyond this?

Despite the growing frustration that the Forum needed to 'show something for itself', its purpose and value to the stakeholders were continually and ardently re-affirmed. And indeed, the imperative for more effective coordination and collaboration was not isolated to the Northern Cape region. Significantly, the call for more effective regional governance also came from the IPP Office (IPP Office, 2017: 46) itself, which stated that:

> IPP commitments for SED and enterprise development interventions need to be better coordinated, monitored and aligned to existing needs identification and financing mechanisms for improved effectiveness and societal upliftment.

It became apparent that the intensity of the IDC's preliminary stakeholder engagement had set a tone of intensive consultation and deliberation, which had then spilled over into the Forum's operations once it moved into a more functional phase. I began to form the view that this way of working did not lend itself to innovative activities or quick experimentation, and it seemed that the espoused purpose of the Forum was indeed incongruent with the reality of the its operations. It also became clear, through my various conversations with Forum stakeholders, that the group nevertheless held onto the idea that the Forum was in some way both innovative and extremely necessary. All in all, it seemed counter-intuitive that this initiative was a novel and innovative response to an emerging dynamic but was setting itself up in a way that was not conducive to ameliorating those very dynamics (especially challenges of communication and trust building). Put simply, the

nature of the Forum's governance did not appear to be resulting in the kind of outcomes it was so well positioned to achieve.

Having formed an in-depth understanding of the Forum, my assessment at this point was that it was poised to fulfil an innovative function in improving the nature and quality of multi-stakeholder relationships in the region. However, if the process were to continue along the unfolding trajectory, the ambitions of the Forum ran the risk of being missed or undermined. It was time for my engagement to move into a new phase. Having only participated as an observer up until this point, it took time to reposition myself and negotiate a more active role in the Forum. As my involvement with the initiative deepened over time, I was always clear about the shifts in my intentions to contribute more constructively and actively. The need for a 'Project Management Capacity' (with a placeholder for such in the ToRs) provided a fruitful entry point for me to initiate a discussion into why this need had been identified and whether there were possible alternatives. My first-hand experience of the Forum's formalistic structure, as well as the concerns expressed by various stakeholders within it, provided further impetus for shaping a possible contribution to the group.

6.4.1 Proposing a possible offering

Moving forward, I began to have more focused conversations about the identified need for project management support and, more specifically, the long-term development strategy that the ToRs spelled out. The stipulation for an external service provider to support the Forum seemed to simply be a product of the lack of capacity within the Forum. However, the automatic deference to an external service provider for strategic input hinted at something more fundamental. The Forum seemed to be falling back on a well-versed course of action, especially familiar in the public sector (Migone, 2018), of tasking expert consultants to compile turn-key solutions or provide strategic direction that, once delivered, would unlock transformative outcomes (for example, see McEwan *et al.*'s (2017) examination of the private sector's involvement in community development). Having been unable to initiate this work internally, the assumption in the Forum was that it could move past its strategic misalignment by outsourcing 'the work' of collaboration and coordination to an outside expert. This preference for an external service provider to deliver a long-term development strategy and manage the operations of the Forum would, in my view, deflect from any meaningful engagement with the messy and political process of experimenting with collaboration and coordination.

I had the sense that this kind of (external expert) intervention would not deliver the shifts the Forum was looking for, having experienced their way of working for an extended period of time, nor assist them in connecting to their cope purpose of supporting meaningful development in the region. In June 2016, I proposed to the Chairperson that I prepare and facilitate an intervention with the group, that in some way spoke to the need they had already articulated through the ToRs for the project management facility. I made clear that I was interested in supporting their ambitions of addressing coordination and collaboration

challenges within the Forum, in order to achieve wider regional development impact. In July 2016, the Chairperson gave me the go-ahead to develop a more detailed proposal for consideration by the Forum. After some back and forth with the Chairperson to refine the proposal, I introduced it to the Forum in September 2016, with a brief overview of my vision for a 'framework of engagement' for a long-term development strategy for the ZF Mgcawu District Development Coordinating Forum (D12). The proposal was then deliberated by the Forum at subsequent meetings (D16). Minutes from the November 2016 meeting indicate broad commitment to the proposal and the clarity with which Forum members understood its intention: "The development strategy seeks to ensure the effective use of available resources and informs us of what is happening in the District" (D16).

6.4.2 Designing a facilitated process

The period immediately following the local municipal elections in August 2016 saw renewed commitment to the Forum, which opened a window of opportunity to recalibrate. Once new leadership and administrative teams were appointed and established in the local and district municipalities, there seemed to be renewed energy to participate in the Forum. In March 2017, the Chairperson reached out to me, saying, "It does look like the situation is ripe for the intervention you proposed regarding the Forum" (E34). Having received the Forum's go-ahead and this encouragement from the Chairperson, I elaborated the framework of engagement, taking inspiration from the existing ToRs for a project management facility to support a long-term development strategy for the Forum, while also including ambitions for a radically different approach.

I designed the process with the ethos of co-production at its core, where participation might also result in building internal capacity and strengthening engagement within the Forum itself. In short, the *process* of participating was an 'outcome' in and of itself. I framed the initiative as an experimental offering, tentative in my claims about what it might achieve and explicit about how these were contingent on the Forum members themselves. I was also upfront about my expectation that stakeholders be willing to avail critical information. This framing helped to amend any expectations among Forum members that this would be a conventional process where a well-resourced, professional external team (likely a consultant well-versed in processes such as this) extracts necessary information and then delivers a comprehensive product without them having to 'do' much themselves. Again, I was adamant in my view that such an approach ran the risk of being disconnected from the realities of the Forum's internal relational dynamics and ideals, and something more participatory and experimental was called for. That being said, I was also an 'outsider' to the Forum however I navigated this tension both within myself and within the group, reasoning that the extensive participation in the Forum up to that point, as well as my efforts to immerse myself in the context, went a long way in bridging this insider-outside dynamic. Also, as a researcher I brought a different set of resources, ideas and ambitions to the process, and, importantly, my participation was not contingent on monetary remuneration or the deployment of a pre-determined set of tools or practices. Because I was explicit about this, the Forum was

aware that they were entering into an exploratory undertaking and that *their* commitment to the process (in the form of information sharing, review, and participation) was critical to its success.

My intention was to facilitate a 'lite' intervention that focused on building relationships and shifting energy within the group, renewing its focus, and clarifying ways of working around a binding vision for the future development of the region. Conversely, the process was less about delivering a comprehensive toolkit. Moreover, I was committed to ensuring that participation in the process was not a laborious experience for stakeholders, but rather optimised their time investment and strategic input. Given the experimental approach, it was important that the process differed from stakeholders' usual experiences of working in conventional capacity development or strategic engagement processes. Instead, the process was designed to be collaborative and interactive, to ensure that the work was co-produced within the network of Forum stakeholders. The motivation for curating such a process was to both cultivate and distribute ownership *within* the group, rather than to further externalise the strategic function of the Forum to an outside player. This approach was built on the assumption that there was willingness and capacity within the group to engage, and this was confirmed by the expressed intentions of many stakeholders who seemed eager and receptive. This 'lite' collaborative approach was also motivated by a pragmatic response to the constraints on my research funding to resource the process. A further motivation was the fact that, while I did not personally have all the skills and resources to run a comprehensive management consulting type of process, I was willing and eager to work intimately with the group for a short period of time to try to reaffirm commitment and unlock creative, critical, and innovative thinking within the Forum.

In practical terms, I compiled a detailed proposal for a process that would run over 8 months (Figure 16). I proposed an initiative to run between July 2017 and April 2018 that would entail a number of workshops, interspersed between normal Forum meetings. The motivation behind weaving workshops between regular meetings was to maintain a sense of continuity and regularity, to ensure sufficient time to gather information, and provide opportunities for rapid implementation and trialling of ideas. Cognisant to the challenges of co-production as a research strategy, I was sensitive to not 'taking over' the Forum as far as possible, but rather endeavoured to structure a process that might cultivate collective ownership from the onset and throughout.

The overarching process was designed in response to the question, *How do we organise collective impact in the ZF Mgcawu District Municipality?* In light of this, each phase was framed around a more specific driving question:

1. *Stakeholder mapping*: What stakeholders make up the Forum and what can we learn from one another?
2. *Data analysis and spatial mapping:* What is our shared understanding of the challenges and opportunities in this region?

3. *Articulating inclusive development:* How do we understand 'development' and what is the future for the ZF Mgcawu District?
4. *Implementation and impact:* How do we measure impact, and what initiatives or activities will achieve this?
5. *Institutional plan and way forward:* How do we want to work together and what is the way forward for the Forum?

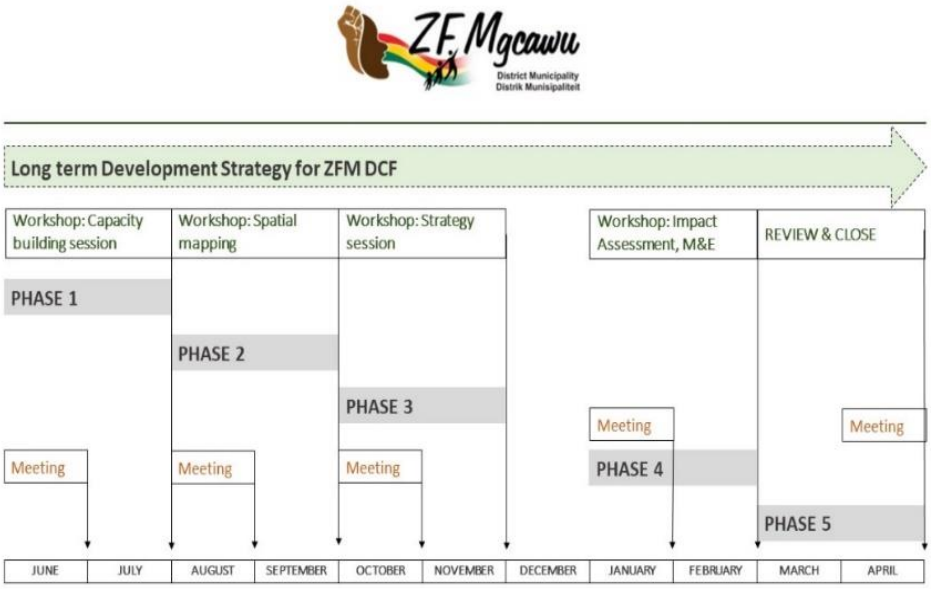


Figure 16 Schematic to visual facilitated process proposed to ZF Mgcawu District Development Coordinating Forum

6.4.3 Gaining institutional support

Another important element of designing the intervention was to galvanise support from institutions. Knowing that the Forum was a nested, multi-stakeholder initiative located within a district municipality and comprising diverse stakeholders from across the public and private sectors, I recognised the importance of having the support (and ideally endorsement) of the institutions that members were formally connected to. I describe the engagements, and varying degrees of success, with each of these institutions (the IDC, the IPP Office, the South African Local Government Association (SALGA), and community trusts) below.

In the case of the IDC, I worked through the Forum Chairperson as the formal IDC representative, to clarify the organisation's commitment to the Forum. The project management ToRs indicated that the IDC would make funding available to support the articulation of a long-term development strategy; up until that point this function had remained vacant. My query with the IDC was, however, whether (and why) the organisation was no longer willing to invest further financial resources into the Forum. Their position was that their long-standing involvement in the form of administrative and managerial support was sufficient. Indeed, discussions

with the head of the regional DIS team in the Upington office of the IDC (E37), and the Forum chairperson indicated that the IDC felt the Forum should take more responsibility for the initiative, and that the IDC should be able to step back from its intensive role as convener and facilitator. As such, they were not willing to provide further financial resources to support the Forum but were, in principle, in favour of a long-term development strategy.

As the Chairperson clarified at the November 2016 Forum meeting (D16),

> The IDC is having discussions to encourage those IPPs it has funded to encourage them to participate in the Forum. The IDC is *just a facilitator of the stakeholders* to plan and implement projects in a coordinated way.

A further comment by the Forum's Chairperson at the Forum meeting in June 2017 indicates the IDC's eagerness for the initiative to reinvent itself and become more independent of the IDC, that is, capable of functioning without their intensive facilitation and management.

To this effect, the Chairperson (D21) stated that:

> We want to refocus, we want better coordination on the ground, amongst other things. And it's not an IPP forum as such, it's a stakeholders' forum. So, it belongs to the members. It doesn't belong to IDC. We just happen to have been chosen to chair, but we're not necessarily benefiting anything from this. It's actually a burden for us that we want to flow into someone else.

Recognising that IPPs are contractually bound to report to the IPP Office, I engaged with the regional representative to find out whether the IPP Office might provide formal endorsement or support for the process I was proposing.

Their support of the Forum more broadly had already been expressed when the IPP Office official in attendance at the November 2016 Forum meeting reflected that (D16):

> The Forum is not conducive for the work that IPPs do and it begs the question of whether the Forum has been sold sufficiently especially to IPPs. The Forum will enhance the output and reduce the workload that an IPP has, therefore information sharing is crucial. The IPP Office will work with the Forum to encourage the IPPs to attend and participate effectively.

Working through the IPP Office's regional representative, I picked up on this prior expression of support and requested the IPP Office to send out a letter of invitation for the inception workshop in July 2017. I provided a draft template which only required a formal letterhead and signature. While the formal request and the draft invitation was submitted to senior management for review, I did not receive feedback in time for the workshop. In lieu of this formal request for participation, the regional IPP Office representative followed up with IPPs, individually requesting their participation. Thus, while the IPP Office expressed in principle support for the collaborative effort to leverage the Forum's potential, formal institutional endorsement did not

materialise. The regional representative of the IPP Office was helpful in providing information where possible, and, on the whole was encouraging about the initiative, including attending the Forum workshops. In email correspondence ahead of the July 2017 workshop, he reflected that "this is our chance to make the Coordinating Forum work effectively and generate great impact in the district, let's do all we can" (E26).

Aware of the constraints within the local and district municipalities, I also engaged with SALGA (E27, E35) as the constitutionally mandated organisation responsible for local government oversight. To have SALGA on board, I thought, might encourage more effective participation on the part of municipal officials and political representatives. SALGA was immensely encouraging and eager to support. Working through SALGA's national office, the Executive Director for Municipal Infrastructure Services at the time facilitated my engagement with the Northern Cape regional office. The team responsible for municipal engagement in the ZF Mgcawu District Municipality tailored the draft invitation template I provided and sent this as a formal request for participation to relevant municipal officials in the district municipality and the five local municipalities. An official from SALGA Northern Cape arranged for the chairperson of the Economic Development and Planning team to attend the inception workshop and represent SALGA. However, despite this robust support during the planning stage, SALGA's presence in the workshops and subsequent engagements never materialised.

Community trusts were another stakeholder group I recognised as critical to the success of the initiative. As independent legal entities, separate from IPPs themselves, eliciting their participation in the initiative was more challenging. Through my engagements with the IPP Office and with IPPs, I was able to access some names and contact numbers of community trust representatives connected to the IPPs in the ZF Mgcawu District Municipality. However, despite my best efforts, I was not able to identify all the community representatives in these trust structures; instead, a number of trustees were representatives based further afield, mostly in Johannesburg. A general lack of clarity about those in charge of community trusts, and indeed, the difficultly I experienced in accessing this information, meant that their awareness of, and representation in, the process was limited.

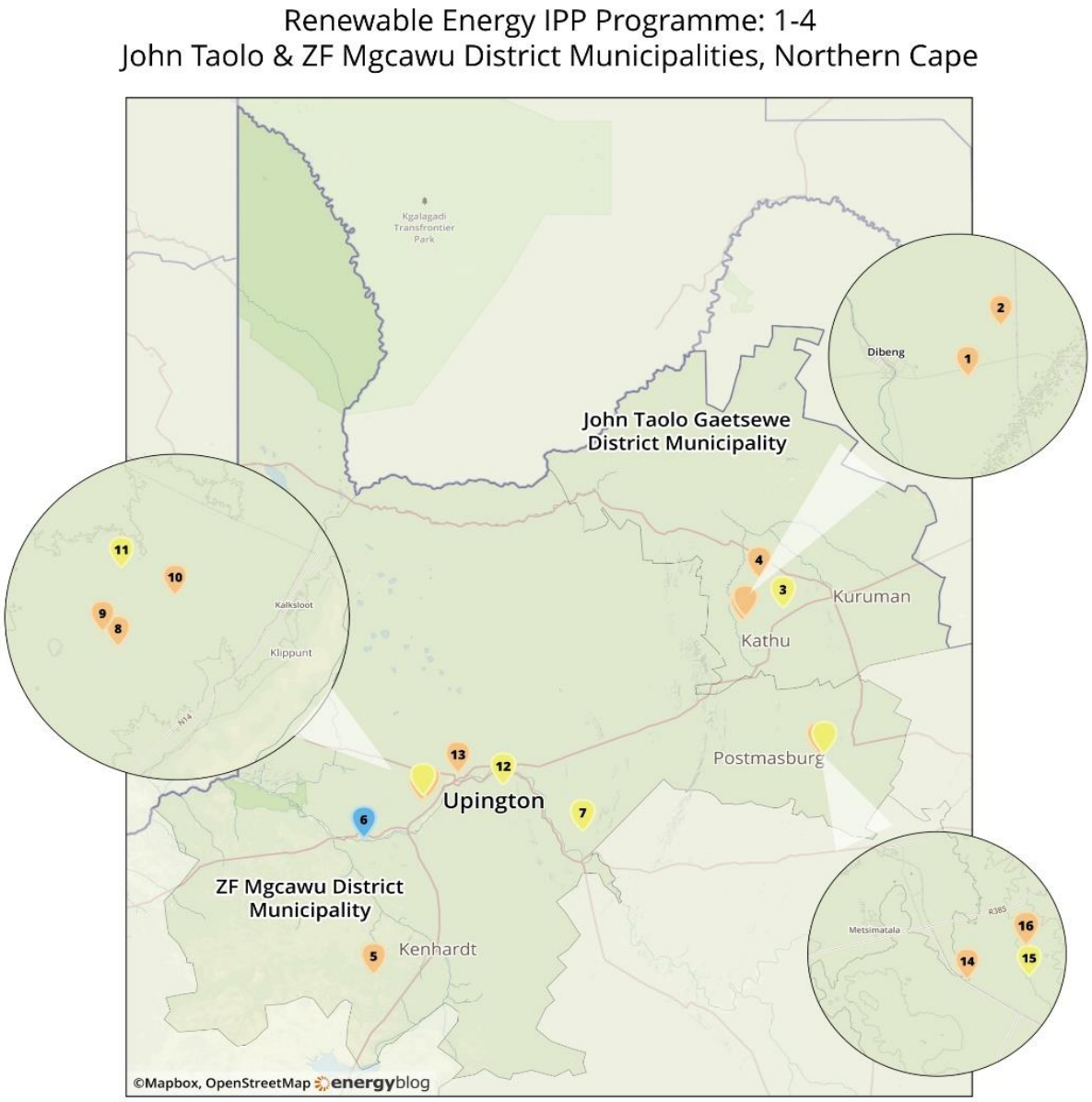
Prior to my involvement and right from its inception, the IDC had long been adamant that the ZF Mgcawu District Development Coordinating Forum was more than a place for municipalities and IPPs to meet and engage. I shared their recognition of the importance of stakeholders beyond municipalities and IPPs, and thus worked hard to engage with the private-sector stakeholders who were formally part of the Forum, as well as the civil society initiatives that participated regularly. I did this by organising in-person or telephonic conversations to explain the process and enlist their participation. These efforts were well received, both by the business and civil society stakeholders that I approached. On the whole, this wider network of stakeholders supported the need for a renewed approach to facilitating coordination and collaboration. Alongside intensive stakeholder engagement, my preparation for the inception workshop also entailed the careful design of an interactive programme and extensive logistical arrangements to ensure access to a conducive space.

6.5 Leading an intervention (July 2017 – April 2018)

Following the rigorous engagement and design phase, the facilitated process with the Forum kicked off with an inception workshop in July 2017 (D23, D24). By the time the inception workshop took place, I had refined a framework of engagement organised around a series of workshops interspersed between regular Forum meetings. This framework entailed five stages that built upon one another, yet each had a clear set of deliverables focused around a distinctive theme. An appropriate set of activities was arranged to animate each stage. I felt comfortable to proceed, confident in my level of understanding about the various stakeholders and the socio-economic and political context more broadly. From an interpersonal perspective, I also felt that I had built up a positive rapport within the Forum, having worked for some months to cultivate trusting relationships. Each of the five phases (recall the five driving questions outlined in section 6.4.2 above) is unpacked in detail in the sub-sections that follow.

6.5.1 Phase 1: Stakeholder mapping and data collection

The first phase of the process focused on stakeholder mapping and data collection. With this focus, I intended to cultivate a strong foundation for the process going forward. Figure 17 below indicates the IPPs in the District Municipality and the status of their operations at the time.



Map	Name	Technology	MW	REIPPP	Closest Town	Status
1	Kathu Solar Energy Facility	Solar PV	75	1	Kathu	Fully operational
2	Sishen Solar Facility	Solar PV	74	2	Sishen	Fully operational
3	Kathu Solar Park	CSP	100	3	Kuruman	Awaiting construction
4	Adams Solar PV 2	Solar PV	82.5	3	Hotazel	Construction
5	Aries Solar	Solar PV	9.7	1	Kenhardt	Fully operational
6	Neusberg Hydro	Small Hydro	10	2	Kakamas	Fully operational
7	Bokpoort CSP Project	CSP	50	2	Groblershoop	Fully operational
8	Dyason's Klip 1	Solar PV	75	4	Upington	Approvals planning and financing
9	Dyason's Klip 2	Solar PV	75	4	Upington	Approvals planning and financing
10	Sirius Solar PV Project One	Solar PV	75	4	Upington	Approvals planning and financing
11	Khi Solar One	CSP	50	1	Upington	Fully operational
12	Karoshoek Consortium	CSP	100	3	Kimberley	Construction
13	Upington Solar PV	Solar PV	8.9	2	Upington	Fully operational
14	Lesedi Power Company	Solar PV	64	1	Postmasburg	Fully operational
15	Redstone CSP	CSP	100	3	Postmasburg	Awaiting construction
16	Jasper Power Company	Solar PV	75	2	Postmasburg	Fully operational

Figure 17 REIPPPP Round 1 - 4 Projects in ZF Mgcawu District Municipality

The inception workshop took place in June 2017 at the Belurana River Manor, a conference facility in central Upington on the banks of the Orange River. Having invested so much time and effort into building support and eliciting participation from Forum stakeholders, I anticipated good turnout from positive RSVPs. More than just advertising the workshop and the wider process, I had taken a step further to obtain institutional support from SALGA and the IPP Office as the two institutions with the most significant convening power. The legitimacy that came from SALGA's support was helpful, but not substantive or lasting, given that the confirmed official did not attend. Importantly, the IPP Office representative was in attendance. Nonetheless, the work that went into convening the attendants for the inception workshop proved worthwhile, as it was likely the most diverse and representative gathering in the Forum's history. In total, there were 36 people in attendance, with representation from each of the significant stakeholder groups in the Forum. Importantly, given that the Forum covers a large geographical area, it was gratifying that people from all the five municipalities and eight IPPs were in attendance.

The workshop took place from 09:00 until 15:30. The programme for the day had been carefully curated, with the assistance of a process facilitator with whom I worked prior to the event. With her assistance, I was able to think through the framing for the workshop, the intention underpinning each segment of the day's programme, and various activities around which to structure the engagement. The driving forces behind the workshop's structure was to provide a solid foundation for the remainder of the process and to begin building trusting relations through honest conversations addressing misconceptions, expectations, and tensions within the Forum. The programme was intended to begin with welcoming addresses from the ZF Mgcawu District Mayor and the SALGA regional representative. However, neither of these officials ended up attending the Forum. Instead, I facilitated the welcoming and introductions after informal greetings over tea and snacks.

Figure 18 ZF Mgcawu District Development Coordinating Forum workshop (D23)

On reflection (D24), I felt that the inception workshop was successful to the extent that it was filled with rich conversation amongst a group of people who usually never conversed in such informal and trusting ways. The discussions surfaced huge pride in the area, a sense of shared commitment to the region and its people, and the fact that people (regardless of their formal positionality) were all committed to similar developmental agendas.

The use of an 'appreciative inquiry' (Cooperrider & Srivastva, 1987) exercise at the start of the workshop served to bind the group together, highlighting the ways in which they were connected, as opposed to how they differed or competed. This workshop was also significant in that it unlocked an energy that had been absent in the Forum until that point. This had the effect of beginning to shift the relationships, to alter the tone, and to up the energy of proceeding Forum engagements. I noticed that, with each of the workshops, conversations matured and people reconnected, often staying longer after the formal closing to discuss matters bilaterally and exchange ideas and business cards. A critical outcome of the inception workshop was that it affirmed the importance, novelty, and necessity of the Forum. While it surfaced new ideas, it cemented and clarified the purpose of the Forum, articulating the features distinguishing it from other initiatives in the region. The group reaffirmed that the purpose of the Forum was to go beyond merely coordinating the activities of individual stakeholders, to facilitating collaboration on joint projects that might only be possible through the sharing or pooling of financial, technical, or strategic resources.

A short report (D23) was developed for this, and all subsequent, workshops. Reports were then presented at the following month's Forum meeting and shared for comment and input. Instead of writing these as detailed and laborious summaries of each workshop, I opted for succinct summaries capturing the key elements of the workshop. My focus was rather on synthesising insights from each workshop and phase of engagement into an evolving strategy document that responded to the driving question of *how to organise collective impact*.

This inception workshop provided the foundation for the remainder of the process and it set the tone of my engagement with the Forum, which emphasised shared investment in the process, a spirit of openness, positive cooperation, and appreciative inquiry.

A critical component of this initial phase included data collection, alongside comprehensive stakeholder mapping. Thus, during this first phase I worked hard to get hold of and process as much information about the various stakeholders as possible. What I was able to get hold of, I processed and assimilated into my rich understanding of the context and dynamics within and between each stakeholder, and captured in the evolving strategic document that accompanied each phase of engagement. Albeit for different reasons, information was generally extremely difficult to get hold of. I had structured the process on the understanding that it would be feasible to compile an accurate and comprehensive database of information, and that this would be relatively straightforward to access from stakeholders committed to participating in the Forum. However, this proved not to be the case. First, where possible, I tried to access the most up-to-date documents

from municipalities and IPPs located in the public domain. In the case of local municipalities, I found key strategic documents, such as the IDPs and local economic development (LED) plans, challenging to digest in my efforts to summarise critical development priorities and opportunities, given their length and complexity. With respect to IPPs, I was provided with district-level data from the IPP Office, as well as the categorisation of their expenditures. However, this aggregated data provided no indication of specific activities across the five municipalities.

Having assembled as much public information about IPPs and municipalities as possible, I then requested more tailored, digestible inputs from these two key stakeholder groups. From municipalities, I requested a summary of the strategic priorities for the coming year; only one municipality provided this information. Despite the lack of available tailored municipal data, things improved when a presentation about the provincial LED strategy was made at the August 2017 Forum meeting. Later in the same month, the District Municipality's Spatial Development Framework was also presented.

For IPPs, I put together a compact table for each to populate with high-level SED and ED data. The table distinguished between collaborative projects, those related to infrastructure or service delivery, enterprise development, education, health, social welfare, and agriculture. This template for internal reporting also required IPPs to populate high-level data about the duration of projects, partners involved, and the specific municipality where projects were based. The internal reporting template did not require IPPs to specify financial expenditure or any other potentially sensitive information. The template was intended to be forward-looking, to sketch out the projects that IPPs were committed to in the coming financial year. The idea was that these internal reporting templates could then serve as a basis for more effective coordination. The responses from the eight IPPs in the Forum were diverse and even contradictory. Some were willing to share summaries of ED activities developed as part of their public communications, as well as populate this high-level internal reporting template. Others were hesitant or unwilling to provide details about their place-based investments in the district. Overall, responses from IPPs were far from expeditious; in fact, it was not until the final stage of the process, in early 2018, that I received more detailed information from IPPs.

Information-sharing remained an impediment for the entirety of the process. Not having the envisioned comprehensive database of information from the onset had spill-over effects for the remaining four phases of engagement. While I was not able to access information from individual stakeholders, SALGA's municipal observatory team were helpful in providing an analysis of district-level data. This was circulated to the Forum stakeholders and was instructive as a base-level understanding of major development indicators. The analysis covered the population structure across the five local municipalities, as well as more granular household dynamics, education levels, and employment trends. The economic and service delivery performance for the district detailed the state of the public sector. Some notable insights from SALGA's findings indicate that major economic drivers include mining, agriculture and tourism but that unemployment rates, like elsewhere in South Africa, remain a challenge as a result of the single sector economic structure. The district has a total

land area of 102 524 km^2 and a (relatively young) population of around 258 359 since around 2016, which, like the rest of the Northern Cape, indicates a low population density compared to other provinces. Interestingly, the SALGA analysis indicates that aaccess to service delivery has consistently remained high – higher than the national average. While these statistics resonate with wider South Africa's socio-economic development indicators, the region faces unique challenges in attracting and sustaining economic activity.

6.5.2 Phase 2: Data analysis and spatial mapping

The second phase was intended as a stakeholder mapping activity, building on the information gathering in the previous phase. A second workshop was scheduled for September 2017 (D26). However, without a comprehensive database of information about the activities of stakeholders in the region, it was not possible to undertake a comprehensive mapping of stakeholders and their associated activities. There was simply not enough practical information to achieve this and so an alternative plan for the workshop was required.

This workshop was severely under-supported by the Forum and only a handful of participants were present, despite encouraging RSVPs ahead of the event. In preparation, I had printed maps, which the group used as part of the conversation to surface the development activities of IPPs in various areas, and then to interface these with what municipal officials knew of various development challenges in their jurisdictions. The map, indicated in Figure 19, was used as a boundary object (a focal point open to multiple interpretations and applications) to spark conversation about IPPs' activities in different municipalities and to illuminate how these might be more impactful with thoughtful coordination. For the few participants, eight in total, the workshop was an illuminating and constructive conversation.

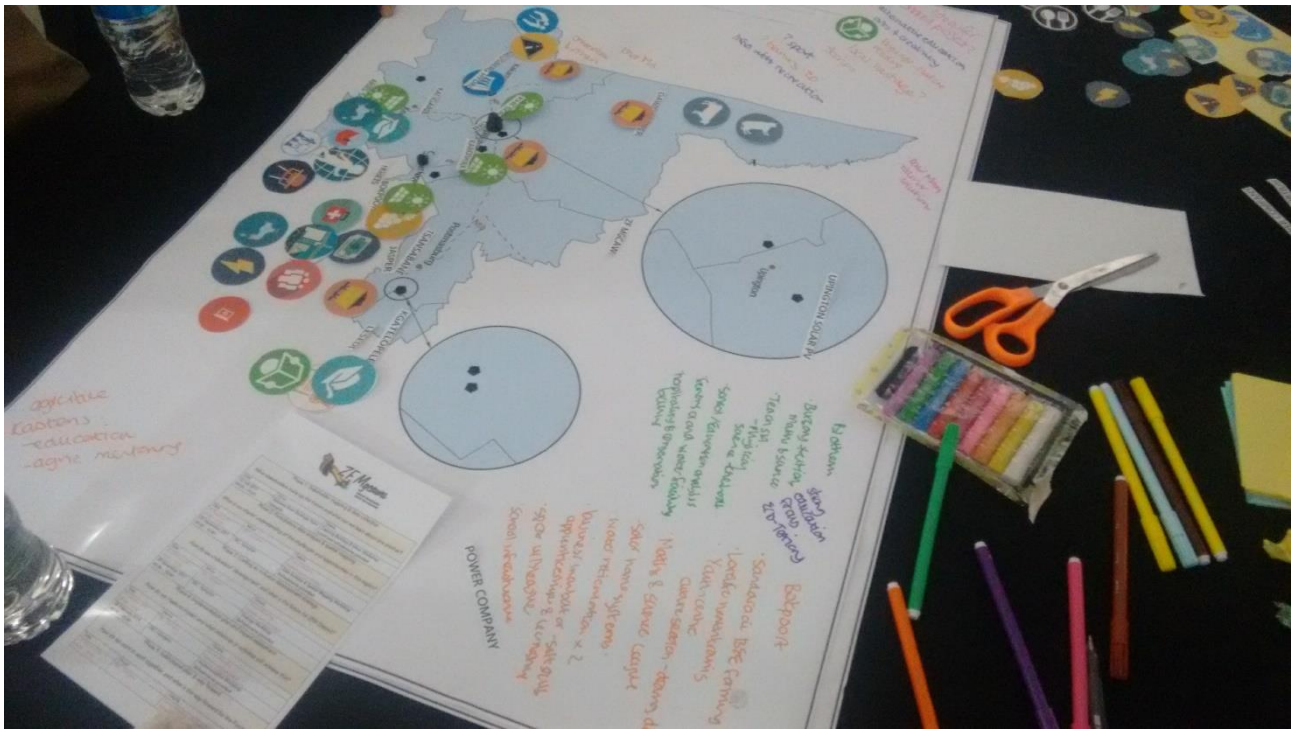


Figure 19 Mapping stakeholder activities in the ZF Mgcawu District Municipality (D26)

Following this workshop, I continued with the ongoing work of compiling a strategic document for review at the following Forum meeting. Initially, this document was intended as a long-term development strategy that would inform an associated project pipeline according to which the Forum could apply its collaboration and coordination mandate. However, in response to the emerging process of engagement, I reformulated the ambition for this document to become a framework for ways of working as a Forum. This meant that the initiative as a whole still responded to the driving question of *how to organise collective impact,* but through a slightly adjusted output. At this stage in the process, it was no longer viable to articulate a comprehensive long-term development strategy without the requisite information from stakeholders. Moreover, it was unfeasible to confidently present a comprehensive analysis of regional socio-economic development challenges and a detailed review of the activities of Forum stakeholders. My thinking was this: if the Forum was not able to co-produce a strategy that spelled out a series of collaborative activities and mechanisms for coordination, then perhaps their efforts were best spent figuring out ways of working that could underpin these ambitions. To this end, I created a simple figure to distinguish how the Forum might support more effective thematic and functional collaboration. This became known as 'the triangle' and the its first iteration is depicted in Figure 20 below. This early version of the framework was used to indicate the distinction between thematic collaboration, around a set of jointly determined priority areas, as well as functional coordination and collaboration across the five local municipalities. In practice thematic collaboration might be a shared approach to enterprise development, whereas functional collaboration would translate into how associated activities are coordinated across institutional boundaries. The visualised hierarchy was intended to demonstrate that communication, capacity development and coordination might constitute the bulk of the

focus of such shared action, however that at the apex would be the collaborative undertakings between stakeholders.

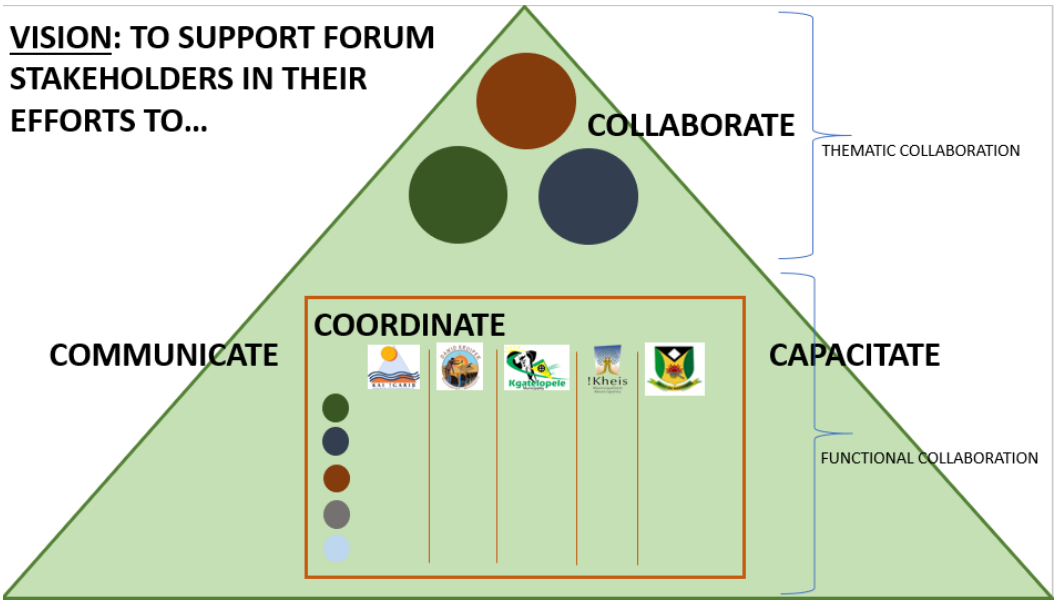


Figure 20 'Triangle' capturing the ways of working for the ZF Mgcawu District Development Coordinating Forum

The triangle visualised the Forum's vision to support stakeholders in their efforts to, most importantly, collaborate around key thematic priorities for the district, and then to achieve functional collaboration in how they coordinated across municipal jurisdictions. The framework was introduced at the Forum meeting following the first workshop and it was continually developed and referred to from then on. In support of collaboration and coordination, the triangle emphasised the importance of communication and capacity building, such that Forum stakeholders agreed to functional collaboration to achieve more effective information sharing and the development of appropriate skills. The triangle came to represent the core element of the Forum's efforts to co-produce a framework for ways of working.

This phase of the engagement with the Forum was particularly challenging for me personally. As I encountered blockages and frustrations at every phase of the process, I became attuned to the deeper structural issues at play. I came to realise that, regardless of my efforts, I was tinkering on the surface, coming up against institutional lock-in within the public- and private-sector institutions. This was most obvious with respect to IPPs who had little incentive to investment meaningfully in the Forum and ultimately, they were accountable only to the IPP Office when it came to sharing information or demonstrating their delivery of ED commitments. From the initial two workshops, as well as the two forum meetings that took place during these first two phases, it was clear that the relationships between people in the room were improving. But it became glaringly obvious that those present at monthly Forum meetings were not vested with meaningful decision-making power within their respective organisations. It was around this time that I became somewhat disillusioned with my efforts to reinvigorate the Forum, fearing that they were only serving to exacerbate an already vicious cycle where the Forum became its own worst enemy, proving to various factions that their efforts to invest in

the process were indeed futile. Recalibrating my expectations, I reaffirmed my belief that having stable and engaging participation from a core group of stakeholders was a positive outcome in and of itself.

6.5.3 Phase 3: Articulating inclusive development

The initial purpose of this third phase was to articulate a shared understanding of development that might inform a binding vision for long-term development in the district municipality. The third workshop was hosted in November 2017 (Figure 21) at the recently renovated Centre for Entrepreneurship in Upington, on the invitation of the Centre's representative on the Forum (D30, D31). The workshop was well attended, compared to the previous workshop's dismal turnout of fewer than ten people.

Figure 21 Discussions during ZF Mgcawu District Development Forum Workshop (D30)

There were officials from two local municipalities that had, up to this point, been underrepresented in the process. This turned out to be significant in at least one way, as it was the first opportunity for an ED practitioner from an IPP in that local municipality to meet and engage with the local economic development (LED) official from the same area.

By this point in the process, the intention was to have already compiled a robust analysis of the region's stakeholders and their associated activities, against the backdrop of the respective municipalities' strategic development priorities. The IPP Office was forthcoming with aggregated data for the District, the summary of which is indicated in Figure 22 below. However, the lack of more granular detail inhibited a richer picture of IPPs' activities in the region.

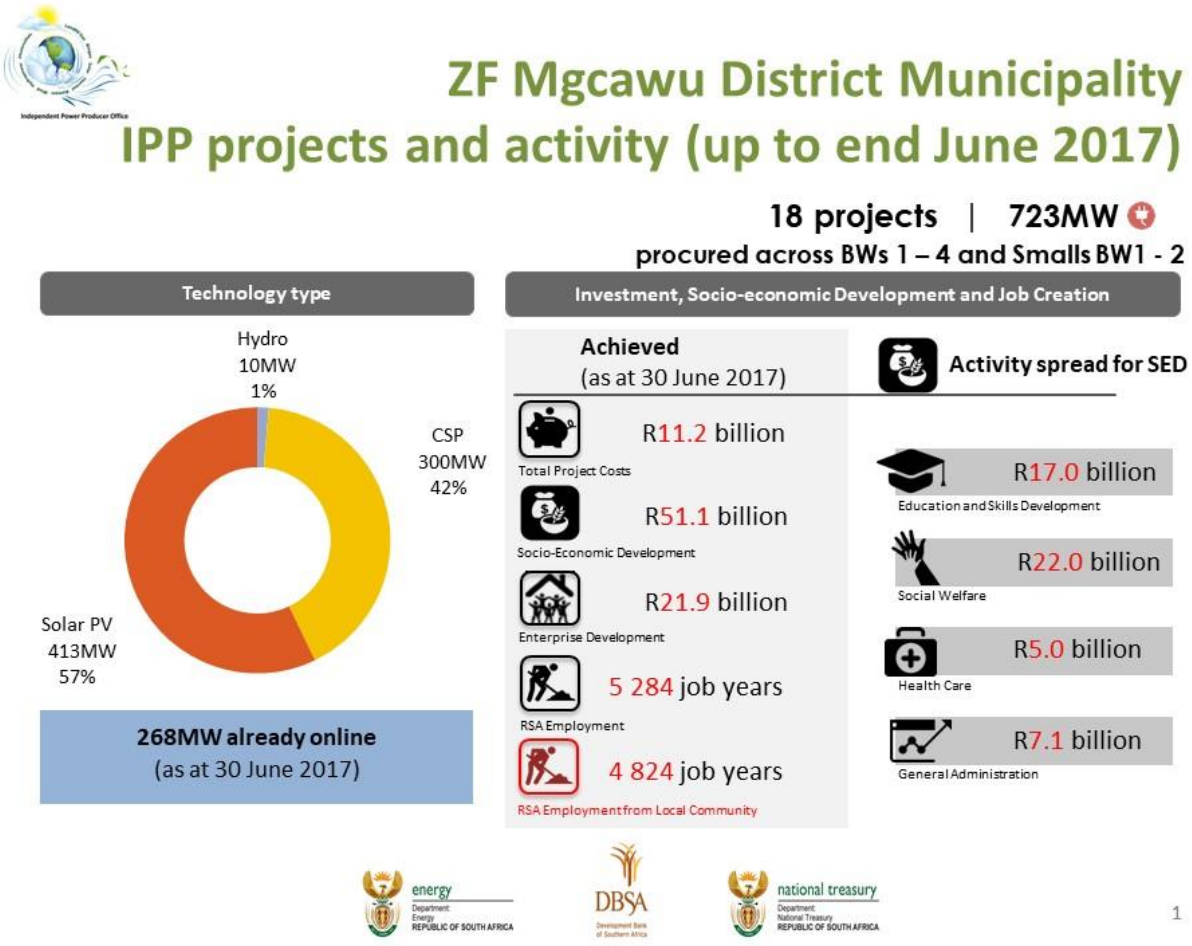


Figure 22 Aggregated ED data provided by IPP Office for ZF Mgcawu District Municipality

The aim of this third workshop was to surface Forum stakeholders' underlying assumptions about what they thought 'development' meant. Through this dialogue, the Forum might have reached a shared understanding of development which, in turn, would inform a so-called 'development strategy'. In practice, this development strategy needed to translate into a project pipeline that operationalised the Forum's commitment to collaboration and coordination. This had been the rationale behind the third workshop. However, with the preceding elements incomplete, it was challenging to co-produce this shared perspective and imagine an accompanying strategy outlining a project pipeline for the Forum. Nonetheless, we proceeded with the workshop, which proved a fortunate decision. In retrospect, this phase signified a turning point in the entire undertaking, a shift towards a stronger focus on the relational dynamics of collaboration, coordination, communication, and capacity building.

A key objective of this phase of the process was to interrogate stakeholders' perspective on development. Their differing conceptions came to light very concretely in the kinds of projects and agendas that the various stakeholders adopted. As a clear example, for municipalities, officials saw service delivery as their core development activity, and that the 'delivery of services' equalled 'development'. IPPs' activities, for their part, embodied a development perspective that was oriented towards social welfare, social improvement, and upliftment. Given that expenditure in communities was required of IPPs, the REIPPPP itself implied a

community-centric and social understanding of development. This clear focus on social welfare has a sense to it, since IPPs' place-based investments were not intended to duplicate the role of municipalities by directing their expenditure towards service delivery. For other stakeholders in the Forum, for example those from the agricultural or tourism sector, they saw skills development and job creation as their development contribution.

This workshop was designed as an opportunity for joint inquiry, with the hope of arriving at a shared understanding of development that the Forum could support while not undermining or contradicting diverse perspectives and institutional mandates. The discussion was successful in coaxing out these divergent, and sometimes contradictory, views as stakeholders stood around a map of the region and narrated for one another their company or municipalities' involvement in different places. Figure 23 is a map complied by a town and regional planning company in Upington and it served as the basis for group discussion.

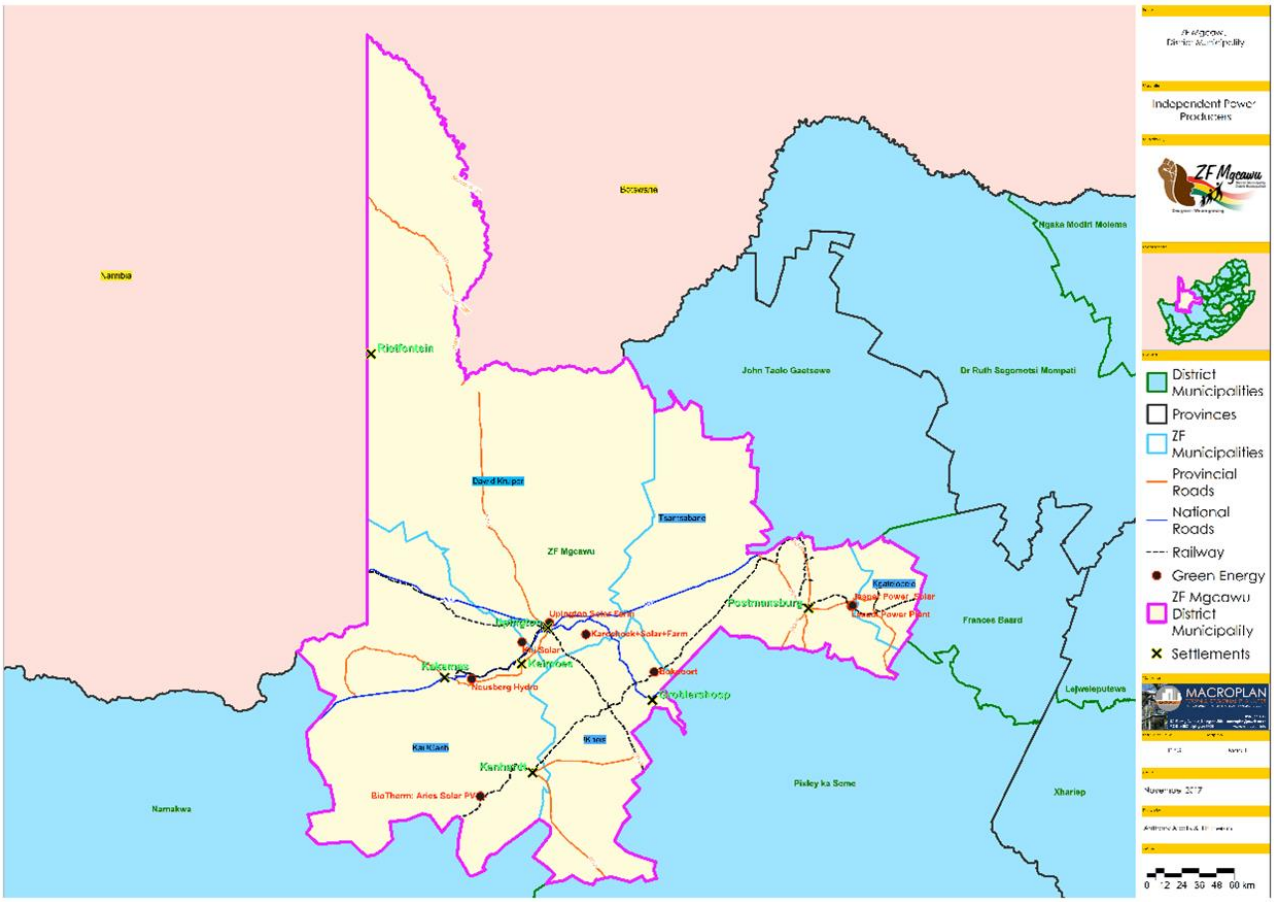


Figure 23 ZF Mgcawu District Municipality map

With these disparate ideas and diverse activities laid out on the table, the group was confronted with stark evidence why it was challenging for them as a collective to envisage any shared, coherent, and measurable undertaking in the name of 'development'. Pinpointing ED activities on a physical map, in front of industry colleagues and public-sector representatives, was an instrumental activity that led to the affirmation of emerging thematic areas: enterprise development (EnD), education, health, social welfare, and agriculture. Participants, especially those from IPPs, were able to corroborate that their ED activities in the district fitted sufficiently well within these broad priority areas.

Again, this discussion highlighted the large extent to which collaboration and coordination around EnD was a low-hanging fruit for the Forum. As it turned out, workshops and monthly Forum meetings were now being hosted by the Centre for Entrepreneurship and Rapid Incubator (CFE), which provided a much more energetic and engaging space. The CFE's objective to provide entrepreneurship training to youth in the region, with a specific focus on the Upington Special Economic Zone, meant they were well positioned as drivers of a collaborative approach to EnD in the ZF Mgcawu District Municipality. EnD had just been affirmed as a critical focus area for the Forum and, to give effect to this espoused commitment, the Forum supported the CFE's representative in proposing a collaborative approach to EnD. The CFE's representative presented some initial findings and made suggestions about how their organisation might spearhead a joint approach to EnD training.

6.5.4 Phase 4: Implementation and impact

The fourth phase of constructing a long-term development strategy was focused on implementation and impact. However, given the evolution in the process thus far, this phase was reoriented towards grappling with 'monitoring and evaluation', with respect to ways of working within the Forum (D34). It was no longer relevant to think about mechanisms for impact evaluation for a portfolio of collaborative projects as part of a long-term development strategy. Instead, this phase of the process focused on imagining principles or qualities that might distinguish a successful and effective Forum.

Figure 24 Discussions during ZF Mgcawu District Development Coordinating Forum workshop (D34)

As a follow up from the previous meeting, a presentation about the District's spatial planning department was useful for understanding the SDF as a policy framework and how this should inform coordinated long-term

development activities (Figure 24). Before grappling with these two aspects, the strategic framework was revisited, with a focus on the health sector.

A presentation from the ZF Mgcawu District Health Department helped to shed light on the health processes and challenges in the region. This discussion gained a lot of traction as it demonstrated to stakeholders the possibility of public-private collaboration within the health sector.

6.5.5 Phase 5: Institutional plan and way forward

The final phase aimed to consolidate the entire process of engagement with the Forum and, on 24 April 2018, I made my last presentation to the group (D38, D38, D40, D41). At the very same time, in Pretoria, the then Minister of Energy Jeff Radebe officiated the signing of Power Purchase Agreements (PPAs) with 27 IPPs that had been stalled since 2015.

It seemed fitting to present this framework with guidelines for ways of working to the Forum on the day that the Minister of Energy took the necessary steps to trigger the next wave of investment and construction in the REIPPPP. At this final session, I presented a package of documents and a set of recommendations that I had harvested through the series of workshops and meetings. At the core of this, was the strategy document which captured the entirety of the process. The key elements are presented in excerpts below (D40, D41).

Firstly, the below excerpt speaks to the clarified purpose and strategic intent of the Forum (D41).

> PURPOSE AND STRATEGIC INTENT
>
> The following phrase captures the purpose of the Forum: *The ZF Mgcawu District Development Coordinating Forum aims to support collaboration, coordination, communication, and capacity building amongst its members to ensure effective project implementation and enhanced developmental impact in the region*.
>
> Supporting this overarching purpose, the Forum's strategic aspiration in each of these four areas is to:
>
> - Support collaboration that achieves greater socio-economic development impact in the region and improves the efficiency and transparency of project implementation;
> - Ensure coordination across diverse stakeholders to align SED initiatives with community needs;
> - Facilitate communication that ensures compliance with regulatory frameworks and builds social capital; and
> - Build capacity that empowers and upskills stakeholder groups represented in the Forum.

> This strategic aspiration serves as a focal point for all activities by the Forum, and bridges the overarching vision of support collaboration, coordination, communication, and capacity building with a tangible programme of action to realise transformation in the district.

Thereafter, a perspective on long-term development was articulated (D41).

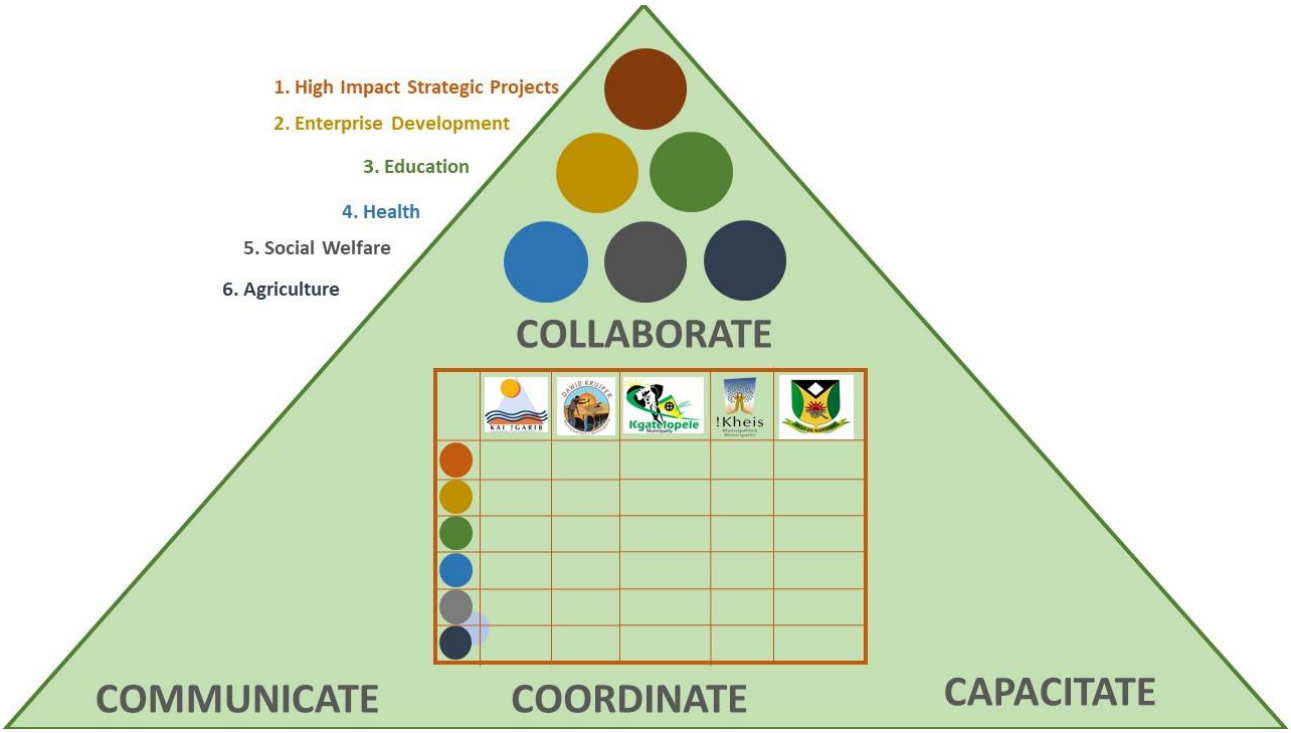
> PERSPECTIVE ON LONG-TERM DEVELOPMENT
>
> The diversification of the district's economic activities has been enhanced through the expansion of the renewable energy sector and complements the contribution of the agricultural, tourism, and mining sectors. A long-term outlook on economic development is required in order to respond to the core developmental challenges of eliminating poverty, reducing inequality, and stimulating employment, as prioritised in the National Development Plan, and to ensure the sustainability of investments in socio-economic activities by the private sector in particular. As such, the Forum supports a perspective on long-term development that prioritises investments that build human capabilities, cultivate vibrant and productive local economies, and support industrialisation. This perspective on economic development must also recognise collaboration and partnership at its core.

The following excerpt describes the rationale for the framework, as well as the proposed guidelines for ways of working, centred around the operationalisation of 'the triangle' framework (D41).

> FRAMEWORK RATIONALE
>
> The proposed framework is aimed at supporting collaboration and coordination between stakeholders. In support of these two primary functions, coherent communication and capacity building activities are required. All of these activities are underpinned by a number of identified principles to support an outcomes-oriented approach.
>
> An important distinction is necessary to assess the success of the Forum as an intermediary governance arrangement; that is, the Forum's role is not directly to be an agent of local economic development or community upliftment, but rather to be an entity that supports and facilitates diverse stakeholders already operating in the region. Therefore, the focus of the Forum, and the manner in which it reflects about its success or failure, must be oriented towards the four identified functions, with the knowledge that these might translate into tangible developmental impact in communities across the district.
>
> The Forum is also not intended to duplicate or draw away from any existing statutory processes, for example, local government Integrated Development Plan processes or district-level inter-governmental structures. The Forum will support stakeholders in their current activities and functions; however, its unique offering is to support initiatives that might not be otherwise possible, most significantly, the collaboration around high-impact strategic projects.

FRAMEWORK OVERVIEW

The framework ('the triangle') is structured in such a way that both thematic and functional aspects of collaboration are addressed. The framework is also derived from inputs by Forum members in reflecting on the value that such a coordination forum presents.



Collaboration across five thematic areas will support Forum stakeholders to work together on joint initiatives that focus on enterprise development, education, health, social welfare, and agriculture. These thematic areas have been identified through a process of consolidation across various stakeholders' activities and aligned with priority development challenges in the region.

However, while joining forces on projects across these various themes has the potential to amplify impact, the Forum's unique offering is the opportunity to facilitate collaboration on specific, carefully targeted, and high-impact strategic projects. Operating individually or working together within their existing range of socio-economic and enterprise development initiatives is feasible, however, transformative potential lies in moving beyond this. This could translate into a portion of the funding committed to SED / EnD expenditure, corporate social investment (CSI), or social labour plans (SLPs) being allocated to collaborative projects of public-private-community partnerships within the region.

Coordinating activities of IPPs and community trusts will ensure alignment and avoid duplication. Moreover, creating awareness about socio-economic and enterprise development initiatives across different thematic areas and geographic locations might identify gaps or opportunities for various stakeholders.

> Collaboration and coordination are only possible if supported by consistent and constructive communication about shared experiences, projects, and activities within the network of stakeholders. This will be further enhanced if the capacity of stakeholders is developed.

Next, the document detailed each of these four elements, with corresponding recommendations for activities to support collaboration, coordination, communication, and capacity building (D41). The final section made three governance recommendations (D41).

> Framed around the ZF Mgcawu District Municipality, the Forum brings together stakeholders from across five local municipalities. The geographic spread of this coordination effort is expansive. While the structuring according to formal municipal boundaries is useful, the Forum needs to be responsive to differing and sometimes overlapping areas of responsibilities. For IPPs, communities within a 50 km radius of the plant are priority areas. This has implications for the governance processes and institutional structures of the Forum. A number of issues have been highlighted that influence the participation of stakeholders, including the broad representation within the group, the geographic spread of organisations, and the varying priority areas.
>
> Cognisant of these challenges, it is suggested that the Forum considers an organisational structure that is responsive to the distinctive priority areas for stakeholders, as well as the dynamics shaping involvement from such a diverse network of participants across the public and private sector.
>
> AN ORGANISATIONAL STRUCTURE THAT BALANCES LOCALISED PRIORITY NEEDS AND REGIONAL ENGAGEMENT
>
> A distributed model is proposed as a response to the organisational challenges of the Forum. A possible way forward might be that the Forum continues to meet every quarter as a district-wide entity. In between, and on a monthly basis, sub-groups meet to discuss more localised issues. In this way, the cluster of mines, IPPs, and other private-sector and civil society stakeholders within the Tsansabane and Kgatelopele Local Municipalities meet on a more regular basis to engage with opportunities for collaboration and coordination within this priority area. Parallel to this, the cluster of IPPs, mines, and other private-sector and civil society stakeholders within the Kai !Garib, !Kheis, and Dawid Kruiper Local Municipalities, engage around issue of mutual concern and opportunities for coordination and communication.
>
> FORMALISED AGREEMENTS TO SUPPORT MEANINGFUL STAKEHOLDER ENGAGEMENT
>
> Some level of formalisation is required to support trust building, cultivate an attitude of shared ownership, and clarify roles and responsibilities within the Forum. A Memorandum of Understanding or Memorandum of Agreement might be the kind of arrangement that provides sufficient accountability and flexibility to operationalise the framework of activities described in this document.

DEDICATED RESOURCES TO SUPPORT INTERMEDIARY GOVERNANCE

Currently the IDC fulfils the function of the Chairperson for the Forum. To fully realise the potential of the Forum in line with the framework presented in this guiding document, dedicated skills and resources are required. Following the formalised agreements between stakeholders, appropriate mechanisms to resource the Forum need to be identified.

Finally, principles for monitoring and evaluation were outlined (D41).

Stakeholder engagement within the Forum have surfaced the following principles as the basis for a comprehensive monitoring and evaluation framework. It is suggested that further exploration of measurable targets for each of these aspects be explored by the Forum.

- Shared ownership and commitment
- Collective vision for future development
- Capacity for administration and leadership
- Collegiality within stakeholder group
- Effective networking and information sharing
- Broad and inclusive stakeholder engagement, participation, and attendance
- Clear strategic programme of action
- Deliverables with clear monitoring and evaluation framework
- Alignment with national development priorities
- Clarified ways of working with clear roles and responsibilities
- Legitimacy and visibility

6.6 Making sense and reflecting (March 2018 – September 2018)

As my involvement with the Forum drew to a close, I felt conflicted about extracting myself from a process in which I had become so deeply immersed. Moreover, I felt that I had become an important feature in the Forum as, to some extent, my participation had animated the initiative at a crucial juncture in its experimental existence. This discomfort was assuaged by my ongoing endeavours to embed the process within the very functions and interactions constituting the Forum. The facilitated process had been an experiment with navigating the tension between novelty and routine, an attempt to infuse new ways of working into the more regular interactions of this hybrid institutional structure as it straddled sector and public and private institutions. Ultimately though, my involvement in the Forum came from a place of sharing their ambitions for achieving something meaningful from the significant investments by IPPs in local communities and the array

of relationships and interactions triggered by them. Reflecting on the scope of my participation and level of investment in the Forum, I felt confident to draw a line in the sand and conclude my involvement. This required coming to terms with what my own expectations had been for what I might achieve with the Forum, and appreciating the actual process and its outcomes, of which there were many.

In my final presentation to the Forum, I reflected on five objectives as a summary of the process I had facilitated (D40). The purpose of the process was to:

- Clarify its purpose – articulate the role and value of a coordinating forum
- Convene the right people – encourage participation from local municipalities and IPPs
- Cultivate trust – nurture open conversations in an environment conducive to sharing and relationship building
- Coordinate existing efforts – acquire a richer source of information from stakeholders as a basis for coordination
- Collaborate for wider impact – identify strategic thematic areas and identify expert partners to support these efforts

On the whole, there was movement on each of these fronts and, together, we could demonstrate how the process that I had facilitated with the Forum between July 2017 and April 2018 had resulted in some positive outcomes across these objectives. The Forum's value and distinctive role had certainly been clarified and affirmed through the process. However, there was little movement with respect to convening influential stakeholders. It became apparent early on that stakeholders attending the Forum meetings were not those with meaningful decision-making power. There appeared to be a tacit approach, shared by all stakeholders, that to mitigate any risk of *not* attending the Forum, it was important that a representative was present. In reality though, there is a big difference in being represented by a CLO or ED manager (in the case of IPPs) or a mid-level employee within the LED department (in the case of a local municipality), who has very little agency within organisational decision-making structures, and a more senior figure who takes seriously the interactions within and decision of the Forum. In short, inclusivity and representation 'for the sake of it' was not helpful for actually making things happen within the Forum. Nonetheless, for those consistently in attendance, the Forum provided a space for open conversations and trust building. Finally, with respect to the final two objectives, the strategic framework for collective action and the guidelines for ways of working presented to the Forum through 'the triangle' unlocked significant energy and a number of potentially viable and exciting initiatives. However, 'the triangle' did not stipulate in detail any tangible strategic collaboration initiations and an associated project pipeline.

After my final presentation to the Forum, I had a number of follow-up conversations to reflect with stakeholders about the process and, specifically, my role therein (E39, E40, E41, E42, E43 E44, E45, R46). These were useful for distilling key takeaways from the process, and indeed also, for gauging the successes of the

facilitated process with the Forum. This final stage of reflection was affirming of the value that the Forum represented to those who invested continually. On the whole, the Forum was highly valued as an opportunity for information sharing and relationship building. Yet stakeholders lamented the fact that they were not able to reach the point of co-producing a tangible and operational project portfolio that corresponded to the re-affirmed value of the Forum in supporting collaboration and coordination.

The following excerpt is from my fieldnotes after the final presentation (E39).

> I can't believe the irony of participating in this final session with the Forum at the very same time as the Minister of Energy oversaw the signing by Eskom of the outstanding PPAs in Pretoria. While I sat in the conference room at the CFE, presenting for the last time, I felt a nagging distraction and found myself scrolling through my Twitter feed during the coffee break to check in with the reports of this momentous day in the REIPPPP's progression, one that the industry had been holding its breathe in anticipation for, for so long. And while so much will immediately be triggered by this announcement, nothing fundamental shifted in the room where I had spent such enriching and infuriating hours with this bunch of people. And yet, *this* is the REIPPPP—the messy, tense, frustrating and energising efforts by people who live out the programme or those who must deal with its ramifications. I feel torn to leave in this moment, on the hand I feel dejected about how little things appear to have changed in the two years I have been spending time here, and on the other hand, hopeful that the Forum might be better equipped to face the renewed activity in the REIPPPP and what it will mean for this area.

I have included the below photograph (Figure 25) to accompany this excerpt from my fieldwork notes.

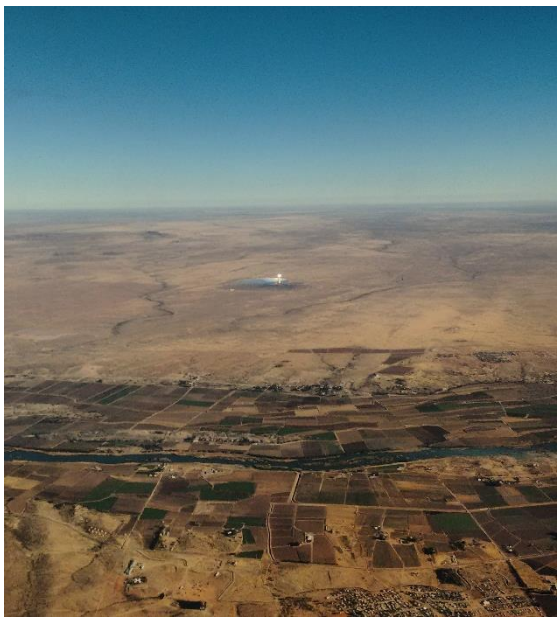


Figure 25 Aerial view over Orange River

It was the view I was met with looking out of the window on return flights from Upington to Cape Town. As the plane ascended, I was able to take in the vast landscape, the Orange River snaking through an otherwise

desolate landscape, agricultural land and human settlements following its course. And then, the CSP plant glinting in the distance, soaking up the sunshine, an anomaly in the landscape but now an enduring, and indeed disrupting, landmark and marker of the 'new kid on the block' in the Northern Cape – renewable energy.

6.7 Conclusion

The ZF Mgcawu District Development Coordinating Forum still continues (at the time of writing in 2020) in its efforts to facilitate impactful and coordinated development activities to address the region's socio-economic challenges. This situated and descriptive account delved into a distinctive phase of the Forum's existence, bookended by my participation as observer, and my zealous undertaking to try to ignite the imminent potential of this place-based multi-stakeholder initiative – a potential signalled by its very existence and the recognition by the Forum itself of the transformative potential of the REIPPPP's ED requirements.

I first encountered the Forum in early 2016 and quickly identified this hybrid, intermediary institutional structure as a direct response to the implementation challenges of the REIPPPP arising out of the tension between the social and corporate logics. In anticipation of RE infrastructures springing up across the Northern Cape, the IDC initiated a governance experiment to bring together the region's stakeholders to ready themselves for the arrival on these pieces of infrastructure and the host of place-based investments that would follow. The case study chronicled these efforts to bring together disparate stakeholders in a joint undertaking to manage and innovate around the very local, and social, impacts of the arrival of this global RE industry in the form of IPPs and their place-based investments in beneficiary communities. I did so by narrating the early years of the Forum and how its foundations were shaped by the IDC's mandate to find innovative ways to address the development of the green economy in the province. Additionally, I documented five phases of embedded research in which I facilitated a process with the Forum to rejuvenate and recalibrate the governance experiment. All this took place at a time when the REIPPPP, and the RE industry at large, was under great threat and policy uncertainty and political opposition jeopardised its very existence.

This experience with the ZF Mgcawu District Development Coordinating Forum functions as a lens through which to examine the co-existence of both the corporate and social logics embedded in the configuration of the REIPPPP as a policy assemblage. And in turn, the examination of the corporate and social logics at play in the Forum help to make sense of its inability to fully take off and realise its development ambitions. In its purest form, the Forum symbolises a recognition by its constituting members that the ED requirements were significant, not just for securing a social license to operate on behalf of the IPPs, but as the potential drivers of unprecedented coordination and collaboration for transformative regional development. On other hand, the Forum also recognised the importance of effective ways of working to ensure (financial and operational) compliance in line with the corporate logic underpinning the stringent procurement framework. In simple terms, for its members, the Forum could have achieved something outstanding, and this potential resided in the arrival of RE infrastructures that might animate a myriad of new relationships, investment flows and

development opportunities rooted in, and responsive to, the local context. However, in the end, the potential imbued in the social logic of the REIPPPP was compromised by the dominance of the corporate logic implied by the competitive procurement framework.

The case study of the Forum is significant as is crystallises the emerging argument about the manifestation and co-existence of the social and corporate logics of RE development in the distinctive arrangement of the REIPPPP. In the following chapter I move to make sense of these dynamics, synthesising and analysing the findings narrated here, through the discussion of five socio-technical interferences triggered by the REIPPPP. Thus far, the thesis has moved from an investigation of the global energy transition (Chapter 4), to an exploration of the country-level reality of South Africa's energy transition (Chapter 5), and finally, a detailing of the grounded socio-spatial realities of the REIPPPP in the context of the ZF Mgcawu District Development Coordinating Forum. Having done this deep dive, moving from global to national to local realities, I now begin to zoom out again, engaging at the level of the REIPPPP, its role in South Africa's unfolding energy transition and the extent to which the programme might catalyse a transition to energy democracy (which I conclude on in Chapter 8). I am able to undertake these analytical shifts precisely because I have first undertaken this deep dive that was the focus of the steps taken in the preceding chapters. Importantly, the case study of the ZF Mgcawu District Development Coordinating Forum provides the empirical foundation upon which the proceeding integrative synthesis and analysis is constructed. I now turn to this analysis in the penultimate chapter.

Part D
INTERPRETATION, DISCUSSION, AND RECOMMENDATIONS

Chapter 7
Integrative synthesis and analysis

7.1 Introduction

Cognisant of the way in which "electricity policy and regulation is embedded within long-standing political and economic forces" (Baker & Burton, 2018: 1), this chapter presents an analysis of South Africa's RE policy through the theory of socio-technical change that was developed in Chapter 3. To recall, the socio-technical change refers to the experimental practices whereby actors marshal resources and expertise to steer collective action within the policy frameworks, rules and regulations that support normative sustainability goals. The integrative synthesis in this Chapter pulls together the analytical description of the global energy transition in Chapter 4, the exploration of South Africa's nascent energy transition in Chapter 5, and the situated account of place-based collaboration and experimental governance in the ZF Mgcawu District Municipality in Chapter 6.

The framing of socio-technical transitions presented in Chapter 3 makes possible a relational appraisal of South Africa's energy transition and of the extent to which the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) has catalysed South Africa's transition to energy democracy. As argued in Chapter 3, 'energy democracy' is the normative orientation that establishes a particular 'favoured future' as the basis for the conceptual framework operative in this analysis. To enable this analysis, three conceptual tools were used, namely sustainability transitions, policy assemblages, and governance practices. Using these concepts, it has been possible to analyse what conditions in the present either favour or constrain the achievement of energy democracy.

More specifically, as argued in section 3.3.1., many agreed that the 'energy transition' could well catalyse a fundamental re-ordering of the socio-technical systems that underpin modern life as we know it. Embracing a relational inquiry into energy transition processes means being open to the 'ontological trouble' they manifest; that is, the capacity of renewable energy (RE) infrastructures, in their diverse socio-technical arrangements and socio-spatial manifestations, to trigger socio-technical 'interferences' (Labussière & Nadaï, 2018).

Furthermore, it was argued in section 3.3.2 that 'policy' is what influences the restructuring of socio-technical systems the pace and directionality of transition processes. However, what really matters is the development, enactment, and impact of policies. To conceptualise policy in this active contextual sense, the notion of policy assemblages was proposed. Seeing the REIPPPP from this policy assemblage perspective helps to uncover particular "points of intervention to unsettle hegemonic power relations such that more generative capacities and trajectories might be revealed and activated" (MGuirk *et al.*, 2016: 129).

Policy is related naturally and closely with the third building block, 'governance'. Recalling arguments to this effect in section 3.3.3, governance refers to the 'strategies to organise collective action' or, more specifically, the, often experimental, efforts by diverse actors to marshal resources, expertise, and relationships to facilitate and direct such collective action.

In short, the energy transition creates conditions for 'interferences' that occur within a given policy assemblage, while governance arrangements enable specific strategies for collective action that become available to particular actors within specific contexts. As argued in Chapter 3, these dynamics are theorised in terms of a theory of socio-technical change which elucidates how socio-technical change is the outcome of the experimental practices of particular societal actors to encode normative goals of positive and desirable futures into the policy assemblages and governance practices deployed by diverse coalitions of actors to marshal the requisite resources and expertise to shaped and steer collective action.

This theory of socio-technical change enables an analysis of the unintended consequences, contradictions, and emergent potentialities of the REIPPPP. These can be framed as 'interferences' that trigger 'ontological trouble' within the country's carbon-intensive socio-technical energy regime. Labussière and Nadaï (2018) emphasise that 'interferences' are necessarily interconnected with transition potentials, but that these pathways remain fundamentally open. This is indeed what has been emphasised throughout the narrative of this thesis thus far, that it is not a foregone conclusion that the global energy transition will unfold along just and sustainable pathways. A given policy assemblage may create the conditions for an energy transition, but interferences are triggered that affect the directionality of the transition that may not be what was intended by those who drafted the policies that resulted in the policy assemblage that got implemented in particular contexts. Making sense of these unintended consequences creates the basis for proposing reforms that could more explicitly affect the directionality of the energy transition in favour of an energy democracy outcome. Labussière and Nadaï (2018: 21) further acknowledge that interferences of a socio-technological nature aim not to "clear up ontological trouble, but to seize it as a viewpoint: as a perspective from which to follow emerging transition potentials". This is because (Labussière & Nadaï, 2018: 19):

> As long as 'interferences' remain external to the process of energy transition—for example, unacknowledged—it is impossible to bring to light both the impact of transition processes on the various entities they set in motion and the contribution of these entities to structuring these processes.

It is for this reason that the notion of 'interferences' is so useful for this analysis. These interferences have emerged because of the co-existence of the distinctive yet interconnected 'social' and 'corporate' logics introduced in Chapter 4 and further elaborated in the preceding chapters. It will be argued in Chapter 8 that the socio-technical interferences triggered by the REIPPPP at the national and local levels has helped catalyse

the first initial (and potentially reversible) conditions that could result in South Africa's transition to energy democracy.

The purpose of this penultimate chapter, is to trace five sets of interferences that have been unintentionally unlocked by the REIPPPP's rather elaborate and complex policy assemblage. By gathering together these interferences – the 'ontological trouble' - into a coherent analysis, it becomes possible to then formulate recommendations for transforming the procurement framework in ways that could redirect the energy transition away from simply decarbonising the existing socio-technical regime and more towards what has been referred to throughout the thesis as energy democracy. What this means in practice has been derived from both research and the experience of active participation in the discursive engagements instigated by the tensions, contradictions and contestations caused by the uneasy co-existence of the social and corporate logics within the REIPPPP policy assemblage.

7.2 The REIPPPP as a policy assemblage

The theory of socio-technical change places significant emphasis on policy assemblages as an instructive explanatory concept. Earlier in section 3.3.2.1, four dimensions of an assemblage perspective on policy were outlined within the wider context of the governance of sustainability transitions. It was argued that this perspective on policy frameworks and governance practices within socio-technical system transitions emphasises (a) an aliveness to context and the (b) provisional nature of assemblages, together with a sensitivity to (c) dynamic interactions, and presentations of (d) coherence and stability. This makes it possible to analyse the REIPPPP as a policy assemblage comprising these four specific dimensions.

As spelled out in Chapter 4, the current global political economy is a product of a carbon-intensive mode of capital accumulation based on carbon-intensive socio-technical energy systems. The policy assemblage literature emphasises how global and local logics crystallise different conditions of possibility (Baker & McGuirk, 2017). In the context of the shift from fossil fuels to renewable energy, the emergence of the renewable energy niche was the emergent outcome of innovations in frontrunner countries. During this early phase, the social logic of RE development was dominant which, in turn, became the cornerstone of the energy democracy movement. The mainstreaming of RE technologies in those two frontrunner countries was facilitated by the strategic shift towards a corporate logic of RE development which, in turn, shaped how RE spread beyond Germany and Denmark in the years that followed, including dramatic drops in prices. The global evolution of policy frameworks and governance practices that drove the nascent low-carbon socio-technical transition – specifically, the ascendance of the competitive auction as the primary instrument for the procurement of renewable energy – has resulted in the rise to prominence of the corporate logic of RE development. The co-existence of these two logics, or modalities, of RE development, have had distinct consequences, and partly shaped the 'conditions of possibility' for various national-level energy transitions in other parts of the world, including South Africa. Significantly, the co-existence of these two logics is not merely

the outcome of choices derived from ideological frames of reference (between neo-liberal versus heterodox economics, for example); but rather these choices are rooted in the materiality of the decentralised and distributed nature of renewables which by definition have a propensity to reinforce localised forms of collective action (such as cooperatives or 'municipalism'). It follows that no matter where RE development happens, these antinomies and tensions between the social and corporate logics will emerge. Energy democracy simply calls attention to the possibility that that balance can be tilted towards the social if a policy assemblage is introduced that explicitly recognises the benefits of the social logic over the corporate logic.

It is helpful then to move from global dynamics (Chapter 4) to unpacking the local conditions that also shaped the emergence of the RE sector in South Africa (as was the theme of Chapter 5). A close interrogation of the REIPPPP *as a policy assemblage* reveals that it is indeed "a contingent and potentially incoherent, unstable confluence of relations and forces from here and elsewhere" (McCann, 2011: 146). In the midst of intense transnational flows of policy ideas, and their associated governance practices, to support low-carbon transition processes (illuminated with reference to dynamics surrounding competitive auction schemes in 4.4), the South African government began gearing itself for the design of emissions reductions strategies, as was described in Chapter 5. These key decisions were being made at the same time as renewable energy was coming to scale. South Africa's ultimate preference for a competitive auction to facilitate investment in utility-scale RE infrastructure can, in part, be traced to the dominance of this corporate logic of RE development globally (signalled most powerfully in the widespread success of competitive auction schemes). In short, the corporate logic of RE development was approved as the primary logic expressed in the way the REIPPPP was designed. But *only* in part: as the policy assemblage literature reiterates, policy ideas and mechanisms are *not* uniformly transferred but, instead, they move and mutate across diverse contexts. It was argued that this is indeed what occurred in the case of the initiation of South Africa's RE sector, where the competitive auction (and its underpinning corporate logic) acquired 'a life of its own' and was reconfigured in response to the specific 'conditions of possibility' within South Africa's prevailing socio-technical energy regime and political economy (and in particular its well-known development challenges). This is where the social logic of RE development becomes significant as it helps to make sense of the insertion of the amplified ED requirements into the REIPPPP policy assemblage. In sum, the REIPPPP's policy assemblage is usefully understood in terms of how both the social and corporate logics of RE development that were at play in the global energy transition, manifested in the South African context.

The specificities of the REIPPPP indicate how the corporate and social logics was rendered place-specific and contoured by the conditions of possibility that characterised a distinctive moment in South Africa's socio-political milieu. Therefore, the REIPPPP was configured in response to specific challenges, policy rationales, and development ambitions prevailing *in* the country *at* the time. This is significant because it reveals the REIPPPP as a contingent policy assemblage "constituted by a range of forces and interests that may not be as internally coherent and unassailable as they often seem" (McCann, 2011: 146). The emergent nature of such

a policy assemblage meant that the process of strategic arrangement took into consideration a wide range of influences that were not neatly aligned with one another and thus the blending of these varying logics had a host of unintended consequences. One of the forces at play in the country at that time was the prevailing carbon-intensive socio-technical energy regime (underpinned by the minerals energy complex (MEC)). However, a number of other forces were also at play, including the array of urgent development imperatives to address the triple challenges of poverty, inequality and unemployment. It is here that the social logic of RE development can be identified, since policy makers in South Africa seem to have recognised the developmental potential of this new form of energy infrastructure.

However, perhaps most significant was the urgent need to address the country's energy security crisis that resulted in bouts of blackouts in the years preceding the launch of the REIPPPP (described in section 5.5). So, while the techno-economic rationale for RE had already been established in South Africa (signalled by the adoption of the 2003 White Paper on Renewable Energy), it had not translated into its actual procurement of RE. It was only when the electricity crisis came to a head with the start of regular loadshedding from 2008 onwards, that sufficient momentum was created for the initiation of a RE procurement programme. Urgency stemming from the escalating electricity supply crisis triggered definitive policy action (described in detail in Chapter 5) that then resulted in the cobbling together of various policy ideas and goals that became the REIPPPP.

The REIPPPP can, in part, be explained as an outcome of the ideas that were 'lying around' at the time. Seeing it as a policy assemblage helps to elucidate these ideas, to trace their origins, be alive to their interactions and interrogate their implications. However, this does not mean to say that the ideas 'lying around' happened to be there by chance. Instead, as I described in Chapter 3 with reference specifically to the competitive procurement programme, the diffusion of this policy idea was strategic and informed by a wider set of political and economic forces.

The enactment of the REIPPPP invited international investment, activated a global value chain, and triggered the building blocks of a domestic RE industry in South Africa. In effect, the launch of the REIPPPP kickstarted South Africa's energy transition. Yet it resulted in more than the encouragement of economic and industrial activity around RE development, as per a stricter understanding of what a corporate logic of RE development might entail. Through the multifaceted ED scorecard, the REIPPPP demanded far more from this budding industry than generating power for a profit. The REIPPPP required that RE take the dire imperative of 'development' on board as well and in doing so it invoked another modality for RE development, one more akin to the social logic cultivated in niche conditions of the RE boom in frontrunner countries. The governance and developmental challenges resulting from the place-based investments by IPPs in local communities across the country manifested in distinctive socio-spatial relations among stakeholders (such as those described broadly in 5.6 and in more detail as part of the situated account of the ZF Mgcawu District Development Coordinating Forum in Chapter 6).

It is on the ground (in places like the district municipalities in the Northern Cape) that the interplay between policy ideas (such as the competitive auction scheme), RE technologies (such as the Concentrated Solar Panel tower in the arid terrain near Upington) and situated, messy practices (such as Forum members' reluctance to share information) is illustrated. Moreover, the situated account of the Forum is evidence that policy is something productive, performative, and contested, where outcomes and impacts are not easily predicted. Instead, as Baker and McGuirk (2017: 6), explain:

> The determinants of policy outcomes in any given situation are not linear, cannot be pre-determined, and are an empirical question, resolved contingently in specific contexts, as assemblages of heterogeneous actants cohere, and the properties and capacities of these actants are variously mobilised.

This 'empirical question' is half answered in Chapter 6 and requires further analytical exploration to unearth the unintended consequences and contradictions of the REIPPPP, and especially its emergent potentialities as a contributor to energy democracy. Undertaking this exploration, in the context of the REIPPPP's corporate and social logics, is the primary purpose of the current chapter and made possible specifically through the focus on socio-technical interferences in the following section.

Heterogenous elements, exemplified in the inclusion of the ED scorecard, were thus arranged to create a governable form in response to specific strategic ends; that is, the REIPPPP itself. In the decade since its inception, the oversight from the Independent Power Producer Office (IPP Office) has been integral in cohering the procurement programme. The successive Quarterly Reports released by the IPP Office powerfully bear witness to these efforts to cohere elements of the REIPPPP and to provide an overarching narrative about the procurement programme, including how it speaks to the National Development Plan (NDP). However, on closer inspection, it is evident that the various elements within the REIPPPP have been arranged and made to cohere without the existence of a single guiding essence or developmental vision (Wlokas *et al.*, 2017a).

Each of the five dynamics or 'socio-technical interferences' explored below reflect intersecting features of the REIPPPP as a policy assemblage. Knowing that policy assemblages are imbued with the rationale and guiding assumptions prevalent at the time of their creation, it is possible to tease out the implications of the contemporary justifications for the specific design of the competitive auction programme. Perhaps more importantly, the policy assemblage points to the provisional nature of these strategic arrangements and that points of tension might in fact signify possibilities for redirection. Essentially, the durability of the REIPPPP is now questioned by a number of stakeholders in light of the implementation contradictions that have emerged precisely because of the extent to which it exhibits the interwovenness of the corporate and social logics of RE development. This possibly suggests that this policy assemblage is a robust space of potential and change. Overt or covert clashes and unintended consequences leave room for contestation and reformulation. They create space for experimenting with new arrangements with different possibilities, as in the case of the Forum

described in Chapter 6. In other words, as an assemblage, the REIPPPP can be re-arranged and re-configured in ways that are more appropriate and responsive to its shifting socio-economic or political context. There is no inherent reason why the corporate logic should remain so dominant, and why the social logic should not be expressed in provisions that enable local governments and organisations likes cooperatives to become active participants. In the discussion of the five interferences unleashed by the REIPPPP, it is argued (with reference to the REIPPPP as a whole) that transformative potential (like that which was ignited in the Forum) can be cultivated in the midst of constraining conditions. Taking the ambitions for energy democracy seriously, it is these interferences that reveal more transformative potentials than the more limiting decarbonisation goals.

7.3 Ontological trouble in the fossil economy: socio-technical interferences triggered by the REIPPPP

In the following sections, five dynamics ('socio-technical interferences') unleashed by the REIPPPP are elaborated. Specifically, these socio-technical interferences have had the effect of (1) accelerating the just transitions discourse; (2) aligning energy policy and climate change commitments; (3) integrating socio-economic development into energy policy; (4) destabilising centralised energy governance; and (5) enhancing regional collaborative governance.

To recall, Labussière and Nadaï (2018) approach the energy transition as a period of 'ontological trouble' that must not be regarded as an external effect or outcome of various energy transition processes but as something that is constitutive of it. For Labussière and Nadaï (2018: 18), "interferences point to these sometimes-unintended consequences of project development and the way they disturb existing continuities in individual and collective experiences". Interferences are the diverse manifestations of this ontological trouble – they point to what is disturbed, perturbed, or opened up, in this case, as part of South Africans' individual and collective experiences of the demise of coal and the ascendance of RE as the resource base of South Africa's society, made possible by the implementation of the REIPPPP. For each of the following interferences, the dynamics that stir up ontological trouble in South Africa's political economy of energy are discussed with reference to how these dynamics can be traced back to the REIPPPP as a policy assemblage, in particular the implications of the interaction between the underlying corporate and social logics.

The problem statement articulated in the Final Report (D41) is a significant summary in this regard and points to the context within which these interferences came to the fore. The most tangible output of the process (elaborated in the previous chapter) was the framework document that served as an artefact of the process and a powerful summary of the context and challenges faced by stakeholders, as well as of their ambitions to operate differently. Nothing about it was particularly ground-breaking; however, it went through many rounds of consultation and deliberation and, as such, it stood as a consolidated perspective on the challenges, intentions and potentials f of the initiative. Most significantly, the co-produced problem statement became a

significant and useful summary of the collective perspective of a group of people caught up in the interstices and implementation dynamics of the REIPPPP policy assemblage:

> It must be recognised that local economic investments by IPPs and community trusts will take place where significant development challenges occur, namely small towns and secondary cities predominantly across the Northern, Eastern and Western Cape provinces. The location of these large-scale infrastructures brings into focus the growth and development trends in provinces that have historically been predominantly rural in nature, where the economic base has mainly comprised mining and agriculture. For the Northern Cape, host to 49 approved IPPs across the various bid windows, small towns play a key role as centres of growth, as gateways in regional economies, and as anchors of regional economic development. In this way, the rise of the renewable energy industry, if effectively coupled with the contributions of agricultural, tourism, and mining sectors, could become instrumental for the realisation of inclusive socio-economic transformation in the ZF Mgcawu District Municipality. However, IPPs find themselves operating in conditions where infrastructure backlogs, depressed economic conditions, and significant socio-economic development challenges are the norm. The capacity of local municipalities to address developmental challenges is often insufficient. Human and financial capacity constraints mean that municipalities are not favourably positioned to engage with IPPs strategically, and in accordance with comprehensive and investment-oriented development plans. IPPs have faced similar issues in building socio-economic development capabilities to deliver on their objectives, however, there seems to be willingness from the sector to support capacity building that is oriented towards a holistic social performance perspective.
>
> Experiences within the REIPPPP, surfaced through intensive and ongoing discussions within the Forum, suggest that the existing arrangements between IPPs, civil society, the commercial sector, and public sector agencies are such that the investments resulting from the REIPPPP might not lead to the maximum deployment of this developmental potential. What has resulted in the ZF Mgcawu District is an environment characterised by misalignment, tension, and, to some extent, conflicting developmental logics. Challenges within the REIPPPP can be clustered around issues relating to the coordination of development initiatives, implementation according to the procurement framework, and reporting, monitoring, and evaluation requirements.
>
> More specifically, some of the key issues raised within the Forum include:
>
> An apparent lack of openness to share information and collaborate on the part of IPPs as a legacy issue of strict competition at the bidding and procurement phases;
>
> The limited capacity of community trusts to operate as developmental actors within local communities, alongside other civil society, government and private sector actors;
>
> Stemming from…

> A stringent, centralised and national level regulatory framework for the renewable energy sector that does not incentivise long-term cross-sectoral collaboration;
>
> Resulting in…
>
> Isolated planning processes and insufficient consultation across sectors in the drafting and implementation of economic development strategies and plans;
>
> Further exacerbated by…
>
> Short-term political cycles within local government that undermine consistent and cumulative engagement with both political and administrative representatives;
>
> Limited financial and human capacity within municipal, district and provincial departments to engage with or take on responsibility beyond existing institutional structures;
>
> A deficit of civil society capacity to advocate for community needs, support community mobilisation, or hold the public and private sector accountable.

Seen together, the Forum's problematisation points to the array of emergent dynamics largely triggered by the assemblage of the REIPPPP according to the corporate and social logics of RE development, and in turn, how the policy framework and its associated governance practices, 'landed' in the context. On the one hand, the corporate logic accounts for the competitive, risk-averse and compliance-oriented behaviour of IPPs. And on the other hand, the social logic is evident, most obviously, in the extensive place-based investments required of IPPs. The interaction between these logics was sometimes complementary and other times contradictory. However, on the whole, the social logic in the REIPPPP, and thus its developmental potential, was subordinate to the corporate logic. This dynamic will be further elaborated in the analysis below. In short, the problem statement provides fertile ground from which to explore the following five socio-technical interferences in the REIPPPP more broadly, in order to then tease out their associated transition potentials. Critically though, the conversation, process and learnings signified by this problem statement would not have happened if the material fact, or ontological reality, of 49 IPPs in the Northern Cape (and 18 in the ZF Mgcawu District Municipality) did not exist and trigger the socio-spatial dynamics described in Chapter 6. The fact that these dialogues, the efforts to coordinate and collaboration across sectors and industries, is only explicable with reference to the emergence of these IPPs, the funding flows and institutional processes they are responsible for.

7.3.1 Emergence and evolution of the 'just transitions' discourse in South Africa

The first socio-technical interference pertains to how the emergent dynamics unlocked by the REIPPPP's design and implementation have contributed towards the evolution of the just transition discourse. This includes the growing socio-political literacy about the multi-dimensional aspects of socio-technical transitions,

such as the one unfolding in the energy sector. Unpacking this interference is useful as it underscores that there now a number of actors or constituency groups in South Africa who are concerned by technological developments in the electricity sector and attempting to make themselves relevant to the processes through which these developments are decided and steered. Put simply, in the last decade electricity has become even more prominent in public discourse and a subject of intense political contestation and the REIPPPP has played a critical role therein.

The techno-economic rationale for the REIPPPP, though market-oriented (and underpinned by the corporate logic of RE development), is well established, and provides a strong business case for the role of RE in the future of South Africa's electricity sector (Bischof-Niemz & Creamer, 2019). This rationale is ratified in the guiding national electricity policy, the Integrated Resource Plan (IRP) 2019-2030, which spells out South Africa's electricity pathway with renewables playing a major role. But this has not been without strong criticism and pushback from various corners. For starters, the dominant player in South Africa's socio-technical energy regime and long-time incumbent of the MEC, Eskom, has executed various strategies to subvert and resist the expansion of a renewable energy niche (Sovacool, Baker, *et al.*, 2019; Ting & Byrne, 2020). Opposition has also been expressed by various constituencies in the country's labour and civil society movements (Räthzel, Cock & Uzzell, 2018; Scholtz, von Bormann, Mulaudzi, Davies & Nicholls, 2019). These different vantage points represent a spectrum of normative orientations towards the role of energy policy and the transformation of the electricity sector, and the REIPPPP has certainly aided in crystallising their positions. From the diverse (and even ideologically incommensurate) vantage points among them, one idea has emerged as something of a commonality: the notion of a 'just transition' (Scholtz *et al.*, 2019).

Since the REIPPPP's inception, the language of 'just transitions' has entered South Africa's mainstream political discourse, starting with its roots in the labour movement and moving into policy deliberations, academic research, civil society organising, private-sector positioning, and community resistance. Invoked as it is by nearly all sectors of South African society, the call for a just transition has come to refer most acutely to the imperative of protecting affected workers and vulnerable communities in the move away from a predominantly coal-based political economy. Beyond this narrow application, a just transition also implies the shift of the country's socio-economic development trajectory away from the prevailing *status quo*. Given the ever-worsening levels of poverty and inequality in the country, re-configuring South Africa's development trajectory towards a more sustainable and inclusive future is part and parcel of what the just transition has come to signify.

At its core, the notion of a just transition rests on the potential opened up by the shift towards a new socio-technical energy regime (Jasanoff, 2018). However, the term has been so widely used by so many people in so many contexts, that it is now at risk of having its transformative potential diluted, thwarted, or co-opted (Newell, 2018; Cock, 2019). Without consensus or interrogation, the notion of 'just transitions' runs the risk of becoming a nebulous and impotent call for action without any impact on the nefarious *status quo* (Sovacool,

Baker, *et al.*, 2019). This could lock South Africa into a development trajectory that exacerbates financialisation and the centralisation of political and economic power. In this case, the country will fall short on its developmental mandate and be driven towards unprecedented levels of poverty and inequality under conditions of an accelerated climate crisis. So how ought the meaning and power of the term 'just transition' be preserved? In its shallowest terms, a just transition will manifest through moderate and reformist adjustments to the prevailing socio-technical regime. On the other end of the spectrum, a just transition is constituted by the transformative and radical disruptions that cultivate a more just, equitable, and sustainable society (Cock, 2019).

The question becomes though, how the REIPPPP connects to these wider structural dynamics. To a large extent, the REIPPPP, as a specific procurement modality shapes the co-existence of both the social and corporate logics of RE development, has become synonymous with what renewable energy signifies more broadly in this societal debate about a transition away from coal. Put more plainly, as South Africa's flagship RE programme, debate about the REIPPPP has become the locus of wider energy transition contestation. In this way, the REIPPPP has become a 'political football' in the battle between a carbon-intensive *status quo* and the possibility of a low-carbon and inclusive future. To illustrate this point, for labour unions connected to mining and energy-intensive industries, a key criticism of the REIPPPP concerns the significant job losses from industry decline and the alleged insufficiency of job opportunities within an electricity sector dominated by RE. For the labour movement and its civil society allies, then, the just transition equates fairly narrowly to ameliorating the implications of job losses for affected industry workforces and communities (Munnik, 2019; Strambo, Burton & Atteridge, 2019). And in turn, this is the vantage point from which the REIPPPP is assessed and criticised, the result being that the REIPPPP's performance with respect to its job creation and skills development commitments thus become equated with the (in their view, the limited) potential that a renewable energy-based electricity sector might deliver, in general. Nonetheless, there is merit in how opposition from the labour movement has called attention to the employment and ownership implications of the REIPPPP. This signals the important consideration of questions of equity and justice so central in energy transition processes and demonstrates the manner in which the REIPPPP has contributed to the evolution of the just transitions discourse in the country. However, having the REIPPPP pitted against the incumbent coal-based electricity with respect to the narrow dimension of job creation, skills development and employment has resulted in an unhelpful duality that is wrapped up within the prevailing just transition discourse playing out in South Africa. It is here that the ramifications of the social and corporate logics embedded in the REIPPPP are evident.

Criticisms of the REIPPPP from the labour movement have also been directed towards its market-oriented logic. In line with this market logic and its preference for global value chains, the participation of international developers and investors has become a point of contention and national debate (Baker, 2015b). The National Union of Metalworkers of South Africa (NUMSA) has been ardently opposed to the REIPPPP, describing the

procurement programme as "another capitalist grab to enrich a few and to commodify natural resources for profitable sake in the world-market" (NUMSA, 2016). Instead, NUMSA calls for a

> just and democratic transition towards a socially-owned renewable energy sector that achieves cleaner forms of energy, develops the manufacturing base of our economy and avoids job losses and provides reskilling.

AMCU, the Association of Mineworkers and Construction Union (AMCU, 2018), backs the call for a rapid move to a low-carbon economy, demanding

> that government ensures a just transition to a wage-led low-carbon economy, where renewable energy both becomes the main energy source and the basis for affordable electricity for all. We demand an end to the privatised renewable energy programme known as the REIPPPP to be replaced by a state-driven and socially-owned renewable energy sector(AMCU, 2018).

The mobilisation of South Africa's labour unions around the notion of a just transition, and their opposition to private-sector driven neoliberal energy transitions (Newell & Phillips, 2016; Erensü, 2018; Furnaro, 2019), is significant, given the important role that unions have played in energy transitions throughout history (Mitchell, 2011; Stevis & Felli, 2014; Prinz & Pegels, 2018). Moreover, it resembles a similar framing of a just transition in the international labour movement (Olsen, 2010; Harrahill & Douglas, 2019). The 'job-killing' argument has also provided the impetus for just transition planning in other countries such as Germany (Abraham, 2017), Canada (Williams & Doyon, 2019), Australia (Della Bosca & Gillespie, 2018; Snell, 2018), and the United States (Stevis, 2018).

There is no denying that the "political consequences of extreme distributional effects" (Vona, 2019: 525) resulting from policies aimed at transforming the energy sector must be taken seriously. Having said that, the pervasive 'job-killing' argument is by no means neutral or straightforward. For Vona (2019: 529), "the job-killing argument is just a weapon in the basket of brown lobbies" operating as "a gift to the true vested interests defending the *status quo* of lax carbon regulations: the companies in heavily polluting sectors". Deploying this framing of the just transition uncritically might thus have perverse and undesirable outcomes, namely, an 'orderly retreat' from a coal-based electricity sector that prolongs the operations of incumbent actors. This would be carried out in the name of job protection, but would be at the expense of wider structural transformation and decarbonisation.

The stalling of the REIPPPP between 2015 and 2018 was also tied up with wider political struggles during Jacob Zuma's presidency. Momentous change, which the election of Cyril Ramaphosa signified, saw a shift in political leadership and the appointment of Jeff Radebe as Minister of Energy (and later in 2019, following national elections, the formation of the Ministry of Mineral Resources and Energy under Gwede Mantashe). Radebe's previous role was as Minster in the Presidency where he oversaw the National Planning Commission (NPC) and, in this capacity, played a role in initiating a national consultation process (the *Just Transition Initiative*

described below) on just transition pathways in South Africa (Essop, 2018; National Planning Commission, 2019). After that, in April 2018, he signed the outstanding Power Purchase Agreements (PPAs) that had been stuck in a state of stasis since the 2015 bid windows and, later the same year, announced the possibility of a further bid window (which, at the time of writing in late 2020, had still not materialised). Beyond the lack of policy certainty for the REIPPPP, this period of disruption and delay opened up a much wider national discussion about South Africa's energy future, including appropriate mechanisms for the procurement of RE.

This period of malaise (Naidoo, 2019) within the policy landscape played out significantly 'on the ground', drawing attention away from the effective implementation and management of projects and their associated ED activities, to a battle to 'keep the industry alive'. This imbalance was especially relevant to the facilitated process that I co-produced with the Forum, the detail of which was presented in Chapter 6, which suffered immensely from the seemingly unending state of policy uncertainty.

The just transitions discourse is connected with the re-structuring of South Africa's electricity sector, the shaping of future electricity policies, and the general recognition that energy plays a central role in determining sustainable development pathways. South Africa's NDP 2030, which is overseen by the NPC, operates as the overarching strategic framework for the country's development trajectory. It references a 'just transition' as part of addressing the triple challenge of reducing inequality, eradicating poverty, and creating employment (National Planning Commission, 2011). In the strategic pillar focusing on an 'equitable transition to a low-carbon economy', managing a just transition refers to strategies for mitigating the socio-economic costs of shifting towards an environmentally sustainable, low-carbon economy. The NPC's *Just Transition Initiative* to explore pathways to a just transition in South Africa took the form of a social dialogue process, integrating high-level stakeholder engagements among business, labour, and government, with broad-based grassroots inputs (National Planning Commission, 2018, 2019).

The significance of the just transitions discourse is that it begins to consider the alliances that could move deep decarbonisation forward. The REIPPPP has played a key role in expanding the discourse on just transitions, with energy and electricity policy taking centre stage. According to Avila (2018: 613),

> Rather than framing opposing voices as selfish expressions blocking the cultural change needed to move towards renewables, the political value of these movements resides in their capacity to expand the possibilities of imagining alternative energy futures.

The introduction of the REIPPPP illuminates alternative energy futures for South Africa, the ways in which these might be configured through policies, and how they are contested, supported, and undermined by various vested political and economic interests (Baker *et al.*, 2014).

The emergence of this just transition discourse is indeed promising. However, it faces the threat of being narrowed down to decarbonisation and a 'shallow' restructuring of the electricity sector. The just transitions discourse needs to expand further to consider the 'deep' structural elements of the global economy, beyond

just the ramifications of the transformation of limited sectors or the protectionist agenda of safeguarding the position of workers in threatened incumbent industries. This will entail a wider reconfiguration of the systems of production and consumption, which in turn, requires conceptualising a progressive and regenerative economic paradigm that is commensurate with social-ecological realities.

A narrow, disproportionate focus on the precariousness of coal-sector jobs hijacks public attention and policy deliberation, inhibiting the nation's collective ability to grasp the systemic inadequacies and structural injustices of a carbon economy that has exacerbated poverty, inequality, and unemployment (Cock, 2019). Invoking a narrow conception 'captures' the just transitions discourse, benefits the incumbents, and holds to ransom much-needed wider structural transformation. However, considering the traction and political credibility that this framing has garnered in the South African consciousness, it is vital to ensure that the conversation is as empirically well-informed as possible. The extent of job losses across the coal sector and its associated value chains must be quantified. This must be done in conjunction with an assessment of the associated costs of mitigating these labour losses and a negotiation around the rate of change that the South African economy might be able to handle.

As it stands, the just transitions discourse in South Africa is trapped between these two intersecting dynamics. On the one hand, resistance from fossil-fuelled sectors punting the job losses argument; and on the other, the problematic possibility of a renewables-based economy reduced to private sector-led procurement (as per its dominant corporate logic). The resulting logjam presents a limited spectrum of options for the country's energy future, where the prospects for renewable energy are equated with privatisation and pitted against job security and so-called 'decent' livelihoods (if indeed fossil-fuel based jobs can be viewed as providing a decent livelihood). In short, the social logic of RE development is not fully appreciated or capitalised upon. The REIPPPP has indeed had a role to play in manifesting this logjam in its very existence as a complex ensemble addressing multiple imperatives, upon which the country's low-carbon, energy-secure hopes have been pegged.

7.3.2 Aligning energy policy and climate change

'Hooking' the purposes of climate change and energy policies onto development needs can, particularly in a developing world context, yield an apparently incongruent pairing (Newell & Bulkeley, 2017). In essence, climate change commitments and energy policies often stand in opposition, which is especially true for South Africa where the electricity sector dominates the country's emissions and is thus the clear culprit therein. Now, as international commitments implore countries to implement meaningful climate mitigation and adaption efforts, the energy sector emerges as a site where such efforts are directed.

In South Africa, the attempted coupling of climate change strategies with development priorities is reflected in broader integrated development plans, such as the guiding framework of the NDP (Ziervogel, New, Archer van Garderen, Midgley, Taylor, Hamann, Stuart-Hill, Myers & Warburton, 2014). This alignment is signified

most prominently in the REIPPPP which demonstrates how the electricity sector can directly support economic development (ED) and how this might also align with climate change commitments. This is significant because for emerging economies in the global South, the coupling of development and climate change commitments is imperative (Tyler, 2010; Rennkamp, 2019). This alignment can be considered an interference since it serves to bolster the REIPPPP's legitimacy and demonstrate a viable and positive link between climate commitments and energy policy, at the same time as inadvertently 'showing up' the abysmal performance of the country's fleet of coal-fired power stations.

The REIPPPP positively aligns climate and energy policy. This has opened up new perspectives on the contributions of RE in the wider electricity sector. The alignment can be traced back to the REIPPPP's specific arrangement as a policy instrument meeting a range of strategic objectives. For example, in the international climate policy domain, the REIPPPP is punted as South Africa's primary emissions reductions strategy and in the domestic context, it contributed to the urgent agenda of enhancing electricity supply security. In this vein, there is certainly merit to the dominant corporate logic of REIPPPP with respect to its ability to deliver on decarbonisation imperatives.

International climate change agreements, most significantly, the 2015 Paris Agreement, require national governments to introduce policies to offset and reduce emissions in line with Nationally Determined Contributions (NDCs). South Africa is guided by the 2016 National Adaptation Strategy and the 2018 Draft Climate Change Bill which outline the country's position on, and response to, climate change. The National Adaptation Plan acts as a strategic reference point for aligning climate change adaptation strategies across key sectors, including energy. These key policies are informed by the 2011 *National Climate Change Response White Paper*, which presents the "South African Government's vision for an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society" (Republic of South Africa, 2011). The *National Climate Change Response White Paper* is the first explicit climate policy in South Africa (Rennkamp, 2019). In this document, the REIPPPP is positioned as one of eight Priority Flagship Programmes playing an integral part in South Africa's mitigation and adaptation responses. The REIPPPP is central to the country's climate response strategy, since "the country's main fossil carbon mitigation option lies in shifting away from its coal dependence in the power sector" (Oyewo *et al.*, 2019: 549).

Given the dominance of the coal-based electricity sector, South Africa's economy is extremely carbon intensive and the country is one of the highest contributors to greenhouse gas (GHG) emissions (Parr *et al.*, 2018). South Africa has made a voluntary commitment to reduce GHG emissions below business-as-usual by 34% in 2020, and by 42% by 2025 (Parr *et al.*, 2018; Rennkamp, 2019). In practice, these commitments imply a significant transformation of the economy, and rapid, extensive decarbonisation of the electricity sector (Burton, Caetano, *et al.*, 2018). In many ways, the REIPPPP is doing the 'heavy lifting' in this respect, when in fact, "the core of South Africa's mitigation challenge is a coal challenge, though it is seldom described as such in official policy" (Burton, Caetano, *et al.*, 2018: 10). The REIPPPP is the first energy procurement framework that

responds directly to this climate agenda (Rennkamp *et al.*, 2017). The IPP Office reports that the programme has generated 22 166 GWh of clean energy from the 62 operational plants and offset 22.5 million tons of CO_2 emissions (IPP Office, 2018). With the full realisation of the outstanding bid windows, an additional 8.1 million tonnes of CO_2 per annum will be offset (at which point RE still only comprises approximately 5% of South Africa's energy mix).

Simultaneous to the expansion of the REIPPPP, Eskom's own-build programme has continued with the construction of Medupi and Kusile, two of the world's largest coal-fired power plants, and funded by the World Bank (WWF, 2017). These two mega-projects have been widely criticised, following major construction overruns resulting in exorbitant costs to the national economy, not to mention the implications for South Africa's climate commitments (Steyn *et al.*, 2017; Ireland & Burton, 2018). Additionally, the IPP Office is also responsible for a procurement programme for gas and coal which have further negative impacts on South Africa's climate commitments (Baker & Burton, 2018).

While the REIPPPP's contribution to realising climate change mitigation and adaptation targets seems to be undermined by the continued expansion of coal-fired power stations, the explicit alignment of some elements of South Africa's energy policy with climate change targets remains significant. Nonetheless, while it functions as a legitimising force at a policy level, the alignment between climate change and energy policy was largely absent from the grounded reality of the REIPPPP. This was evident in the Forum where an acknowledgement of climate change as a driving rationale of the RE programme was entirely absent. Reference to the climate mitigation contributions of the REIPPPP did not feature in the ongoing contestation about the implementation of the REIPPPP and the management of its associated impacts.

7.3.3 Integrating economic development into energy policy

The REIPPPP's contribution to South Africa's developmental agenda goes beyond its mandate to provide adequate, reliable, flexible, and affordable electricity generation capacity that also contributes to meeting climate change targets. To this end, the REIPPPP has been constructed, in part, along the lines of the social logic of RE development. Much like the challenge of aligning climate and energy policy as was explored above, according to Rennkamp (2019: 1), the "goals of climate change mitigation and poverty reduction have often been seen as mutually exclusive". To this end (Rennkamp, 2019: 2),

> South Africa's coal-intensive and highly unequal economy represents a common challenge for governments in middle-income countries seeking to tackle climate change and poverty reduction: how to design and implement climate and development policies that allow for reducing emissions without compromising on economic growth and poverty reduction.

This challenge articulated by Rennkamp (2019) signifies the interference that the REIPPPP has unlocked in its attempts to integrate ED into energy policy. Again, like the interference described above in 7.3.2, the ambition

of aligning the RE procurement framework with the country's socio-economic development imperatives can be traced to its assemblage at a particular moment in time and in response to specific strategic priorities.

This commitment to a developmental agenda is demonstrated in the unique procurement design which integrates ED requirements over and above price competitiveness. This commitment to development, encapsulated in the ED requirements, is representative of a particular manifestation of a social logic of RE development. This context-specific interpretation translates into how IPPs are contractually obligated to meet ED thresholds and targets across seven aspects, namely job creation, local content, ownership, management control, preferential procurement, enterprise development (EnD), and socio-economic development (SED) (IPP Office, 2019). The contribution to the seven dimensions of development in the REIPPPP's ED requirements are in turn aligned by the IPP Office, with the NDP's orientation to the triple challenge of eradicating poverty, reducing inequality, and stimulating employment. The IPP Office has made attempts to explicate which bid categories are congruent with the various NDP targets (IPP Office, 2019), which is in turn, evidence of the 'active labour' requirement to make policy assemblages cohere and remain durable over time.

The developmental implications of these substantial place-based investments have been the subject of much academic and industry research (Wlokas, 2015; McEwan, 2017; Wlokas, Westoby & Soal, 2017; Shaw, 2017; Davies *et al.,* 2018). This includes numerous academic outputs by postgraduate students in the RE4T research group at the Centre for Complex Systems in Transition (Morar, 2019; Swartz, 2019; Stuurman, 2018) (recall that I described in section 1.2.3 my positionality within this research group). This thesis builds on the findings of studies such as these, and empirical insights gained from the ZF Mgcawu District Development Coordinating Forum serve to confirm the fact that the corporate logic of the REIPPPP constrains the developmental potential of the REIPPPP. This is over and above the fact that the conception of development, or in other words, the context-specific mutation of the social logic of RE development, is itself problematic.

The emergent practices by IPPs to realise these 'community benefits' have evolved since the onset of the programme and a diversity of approaches and institutional logics are evident. Having said that, the REIPPPP's ED contribution is underpinned by a stringent compliance-based framework overseen directly by the IPP Office (Mthembi, 2015). This stems directly from the corporate logic dominant in the REIPPPP. The corporate logic of RE dominant in the REIPPPP has ramifications for how the developmental ambitions of the ED requirements are operationalised. Thus, the corporate logic constrains the positive contribution that the developmental potential in the REIPPPP could unleash. For example, IPPs report quarterly on ED expenditure to the IPP Office and risk facing penalties if they do not fulfil their contractual obligations. Another example is the short-term nature of the mechanisms of oversight of ED expenditure. Quarterly reporting has the effect of limiting the horizon of possibility for development projects by IPPs. Although the SED and EnD plans for IPPs are communicated as annual development plans and submitted to the IPP Office for review, this timeframe is still largely short-term, considering the 20-year PPA legitimising these activities.

The result of this preoccupation with demonstrating the financial extent of ED investments within relatively short timeframes, is that expenditure drives development, rather than development driving expenditure. This preoccupation is derived directly from the corporate logic dominating the REIPPPP which limits the developmental potential in the REIPPPP. In reality a welfarist, compliance-driven approach to development means that ED activities by IPPs have tended towards a short-term, welfarist, or 'handout', approach to development, as opposed to a long-term one that builds individual and collective capabilities (Mthembi, 2015). The last point, that the framing of development in the REIPPPP, on the whole, translates towards a welfarist or 'handout' approach to development, does not align with the conception of development in the vision for energy democracy. In such a vision, development is understood as the self-defined social processes of facilitating resourcefulness and cultivating individual and collective capabilities to advance social-ecological wellbeing while also sustaining the structural conditions to enable the process of development itself (Evans, 2002; Westoby & Kaplan, 2013; Castells & Himanen, 2014).

Legitimate criticisms of the implementation of this ED approach abound, and the inclusion of non-price factors in the procurement framework is itself also contested (Leigland & Eberhard, 2018). For Leighland and Eberhard (2018), the ED component of the REIPPPP – in particular its local content stipulations – amounts to a protectionist strategy by the South African government that might have detrimental effects for the financial performance and investment attractiveness of the industry. The justification for ensuring IPPs are responsive to national development priorities can be found in South Africa's political commitment to a developmental state agenda. That much is a fairly straightforward rebuttal, and one which can be made sense of in terms of the social logic of RE development. However, despite the progressiveness of this commitment to development in the constitution of the REIPPPP, what has *not* translated in practice is a coherent, long-term, and transformative vision of development to inform the ED framework.

One manifestation of this lack of coherence was evidence in the misaligned expectations between IPPs and municipalities when it came to what investing in 'development' actually looked like, and in turn, who was responsible for such development. Revealing this incongruence and the lack of alignment with municipal strategic planning, at a Forum meeting in May 2016, one disgruntled municipal office said (of IPPs) that "they did not recognise our IDPs, then they ask for water and refuse removal. They didn't even approach the municipality with a list of projects!" (Fieldnotes May 2016).

Kai !Garib municipal official reiterated this sense of frustration in an interview, saying (E22),

> IPPs seem to work on their own. They're in fact undermining municipalities and undermining communities. The kind of efforts from them or the kind of projects coming from IPPs are very minimal. You can't even see it! It is here and there, for example, two people that have been trained. They're not looking at what we say [as municipalities] or the idea that it could be better executed if they focussed on issues like delivery of public goods, meaning, assistance with upgrading of soccer fields, netball, athletic tracks, creches, libraries and so on.

This official, expanding on the ways in which IPPs undermine municipalities by not directly supporting their service delivery efforts encapsulated in formal IDP documents, stated (E22),

> Yesterday at the Forum meeting, [Abengoa's CLO] made a very funny comment which is in fact not truthful, saying that municipalities, when they are asked for the IDPs, say that they are not ready. IDPs are on the web, right through the year. We've submitted IDPs to the Forum for the last three years. I even made a presentation last year as well. Up until now they have not delivered on a single project that is meaningful. They're not even paying rates!

In contrast, the Community Liaison Officer (CLO) from the same IPP, explained their difficulty with IDP documents, since the "IDP is too problem-focused. It has no visionary ideas of what the municipality wants for the future. It lacks strategic thinking, so we have no idea about what suggestions to make" (D4).

Speaking on behalf of communities, and thereby expressing how municipalities view their representative mandate, a municipal official said at a Forum meeting in June 2017 (D21, D22), that,

> The frustration [towards IPPs] in what people view and, from their expectations, is they want to see something happening, development in a real sense. They want to see physical issues being addressed. There were some of the projects that lean into that direction but others not, you know, that the entire community could benefit from. People want to see something happen for what we call, the public good. When something happens in an area of public good, this is where everybody can benefit from, not one or two individuals.

Revealing a contrasting (but still critical) view, IPPs sometimes experienced municipalities as gatekeepers, obstructing or undermining community engagement efforts, and claiming themselves as the ultimate representatives of communities as constituencies under their jurisdictions (D22).

This insight reveals the expectations directed towards IPPs, both by communities and, to an extent, municipalities as well, where communities face service delivery backlogs and dire socio-economic conditions. Furthermore, it surfaces the perception, held by many municipal officials, that IPPs have significant financial resources to invest in their ED projects and that these resources should be directed towards critical infrastructure and service delivery projects. The Forum surfaced these incongruences and attempted to clarify the distinctive roles of IPPs and local municipalities in particular. Discussion in the Forum revealed that for each stakeholder, 'development' means very different things – municipalities saw this as service delivery on large-scale infrastructure and IPPs delivered on 'development' that did not encroach on this official mandate and translated, on the whole, as welfarist-type investments in socio-economic upliftment activities. In an attempt to bridge these perspectives, the Forum articulated a broad view of development that was spelled out in the final strategic document (D41), which stated that:

> The Forum supports a perspective on long-term development that prioritises investments that build human capabilities, cultivate vibrant and productive local economies, and support industrialisation.

> This perspective on economic development must also recognise collaboration and partnership at its core.

This perspective on development was intended to create space for a diversity of activities and investments, cultivate a sense of shared commitment to a longer-term vision and enable alignment between this range of activities. Analytically, this effort was also an attempt to navigate the ramifications of the social logic integrated into the REIPPPP and translating this into a binding approach to development within the Forum. Nonetheless, these tensions and misalignments were not cleared up by such conversations, instead, they remained unresolved and increasingly intractable.

Explicit in the REIPPPP's ED requirements is a particular conception of 'community ownership' (Wlokas, Westoby & Soal, 2017c). The community ownership element in the ED requirements is an aspect where the potential of the social logic shaping the constitution of the REIPPPP comes strongly to the fore. The requirement for a minimum of 2.5% community ownership (introduced and explained in 1.2.2) necessitates that IPPs include a formal legal entity in the project ownership that represents the local community within the 50 km radius of the project. The implementation of these community ownership requirements became a major area of concern, for both IPPs and municipalities. Community ownership translated into the establishment of community trusts set up by IPPs to disperse dividends accrued from the IPP to beneficiary communities. An industry association member at a South African Wind Energy Association (SAWEA) workshop in August 2016 warned that a lack of forward-planning about the management of community trusts, and in particular the disbursement of dividends, was "creating a ticking timebomb" (A2). Another expressed a concern about community trusts being used as vehicles for political parties (A2).

The REIPPPP contains a fundamental tension between its support of a price-competitive, investment-oriented economic logic, and its developmental commitment through ED requirements (Sovacool, Baker, *et al.*, 2019). What becomes clear is that the development paradigm driving the ED requirements of the REIPPPP is, to a large extent, incongruent with the price-competitive market logic of the programme. The introduction of a procurement programme which enables the participation of private-sector players and international investors has the potential to encourage energy reforms that would stand in strong contrast with the country's espoused developmental state commitment (Newell & Phillips, 2016). This is what distinguishes South Africa's REIPPPP procurement framework: it contains an attempt to temper the impacts of the corporate logic of RE procurement with the ED framework which favours localised investment, community ownership, community benefits and job creation. Again, this has proved challenging in practice, and indeed exacerbated by the lack of coherence of this development ambition lodged within the competitive procurement framework. In short, the corporate and social logics blended together within the REIPPPP's design have resulted in a range of contradictory interactions.

7.3.4 Destabilising centralised energy governance

Electricity policy, planning, and governance in South Africa has historically been a centralised and highly secretive activity, largely overseen by Eskom (Baker & Burton, 2018). Centralised governance is a feature of carbon-intensive economies and, in the South African case, has been locked in with the path dependency of the MEC (Goldthau, 2014; Bridge *et al.*, 2018). The geographical concentration of South Africa's coal mines and coal-fired power stations in the Mpumalanga Province spatially mirrors this centralisation to some extent. Eskom operates 29 power stations, including a nuclear energy facility and a number of gas, hydro and pumped storage facilities (Eskom, 2019). Of the 44 559 MW of total national installed capacity, the largest portion of this relies on 15 coal-fired power stations, including the long overdue mega-projects, Medupi and Kusile (Kruger & Eberhard, 2018).

The REIPPPP was introduced into a centralised governance paradigm characterised by massive generation facilities and the dominance of Eskom in electricity policy and planning. Following others (Bischof-Niemz & Creamer, 2019; Ting & Byrne, 2020), a clear argument can be made that the REIPPPP was structured to assimilate *into* this centralised paradigm. One marker of this is the choice of a competitive auction, as opposed to a feed-in tariff, or in line with the emerging argument in this thesis, the dominance of a corporate logic for RE development, with the ED logic as its subordinate. The latter (a FIT) would have seen the National Electricity Regulator of South Africa (NERSA) playing a stronger role, while the former (a competitive auction scheme) retained central and direct state leadership through the DoE (Montmasson-Clair & Ryan, 2014). Another marker of the fact that the REIPPPP was assimilated into a centralised energy governance paradigm is the creation of the IPP Office purely as a project management facility: the institutional structure is mandated with operationalising the procurement of electricity from IPPs, but has no formal or legal function to execute strategic decisions (Rennkamp, 2019). Here again, the ramifications of the corporate logic become clear.

Nonetheless, the REIPPPP cannot but indicate a break with the historic paradigm of large-scale, centralised and state-owned electricity supply (Baker & Burton, 2018). Indeed, this break has manifested in a visceral socio-technical interference, that is, the construction of electricity-generating facilities in a multiplicity of locations that were previously deemed unviable or irrelevant to the country's socio-technical energy regime. The geographic location of IPPs is determined through a number of factors, most notably the prevalence of renewable sources of energy. The 92 grid-connected projects are of a much smaller capacity, compared to traditional coal-fired, gas, hydro or nuclear power stations. IPPs range from 5 MW to 100 MW and are dispersed across the country, with the majority of solar photovoltaic (PV) and concentrated solar power (CSP) projects concentrated in the Northern Cape, due to its high levels of solar radiation (IPP Office, 2019). Wind projects are located mainly along coastal regions in the Eastern Cape and Western Cape. While there are IPPs present in each of South Africa's nine provinces, the Northern Cape is host to the majority of projects, with a total of 59. The Eastern Cape follows with 17 projects, and the Western Cape has 14 (IPP Office, 2019). This

shifting geography of energy provides the material basis for the emergence of a social logic of RE development woven into the procurement framework.

The changing energy geography of the electricity sector has brought into question the logics and efficacy of the prevailing (centralised) electricity governance regime. The REIPPPP is managed by the IPP Office, which is mandated to oversee procurement from IPPs and various regulatory processes. This entity is tasked with the oversight of a nation-wide RE programme. IPPs spread across the country are connected to the national electricity grid, and through various contractual agreements, are ultimately responsible to the DoE, their lenders, and Eskom. However, given their diverse geographic locations, IPPs also operate within various local and regional government regulatory frameworks, including local municipalities. As one municipal official in the Kai !Garib Local Municipality expressed, "municipalities have been caught off guard", and reflected with an element of disdain that, having "landed in our backyard", "IPPs are treated with national importance" (D4). Worryingly, another municipal official was of the view that IPPs "are not here for the community, they just want the money" (D4). This comment speaks to the tension between the corporate and social logics at play in the REIPPPP, and ultimately, how IPPs are ultimately motivated by the associated incentives of the corporate logic, and in turn, regulated by its stringent mechanisms of oversight and accountability.

With some exceptions, municipalities implicated in the development of RE infrastructure as part of the REIPPPP have tended to be rural municipalities, significant distances from major urban nodes and economic hubs, and chronically under-resourced to deliver on their local economic development (LED) mandates. In short, the development challenges are extensive. To help, policy designers cottoned onto the idea that the establishment of IPPs in these localities could stimulate positive socio-economic development outcomes, hence their inclusion of such ambitious ED requirements. Despite the laudable ambitions of the ED requirements and the specific formulation of the REIPPPP's social logic of RE development, the place-based investments by IPPs are not required to align with local municipality development priorities, and IPPs are primarily accountable to the IPP Office. Unsurprisingly, this incongruence has been the source of tension among local and regional municipalities and IPPs. Things are a bit different in the long-established mining sector, which is governed by the Mining Charter. Unlike in the REIPPPP, this governance framework stipulates formal alignment between mines and the (comparatively fewer) municipalities that are affected by the industry (Atkinson, 2016; Marais, McKenzie, Deacon, Nel, Rooyen & Cloete, 2018).

The spatiality of South Africa's unfolding energy transition has implications for the socio-spatial organisation of the political economy. The emergence of decentralised and dispersed RE infrastructures creates the material conditions for challenging South Africa's carbon-intensive electricity governance, planning and control regime. The REIPPPP has played a role in breaking Eskom's stronghold on the electricity sector, demonstrating that viable generation capabilities exist beyond its fleet of coal-fired power stations. With respect to the country's economic trajectory, the REIPPPP illuminates possibilities for a new wealth accumulation and distribution strategy, one not solely reliant on the extraction and manipulation of coal. This

is already evident in that some rural, peri-urban, and urbanising settlements are quickly becoming prominent economic nodes as sites for international investment and the deployment of cutting edge RE technologies.

The expansion of the REIPPPP might signal the materialisation of alternative socio-economic and political opportunities (in line with its specific articulation of a social logic to RE development), ones that challenge or break with prevailing patterns of centralised power by the market and by the state. Nonetheless, these opportunities to configure more locally-responsive energy governance frameworks remain elusive within the current energy policy paradigm (Jaglin & Verdeil, 2017).

7.3.5 Enhancing regional collaborative governance

The REIPPPP has seen the emergence of novel initiatives in response to challenges related to implementation, alignment and coordination, and monitoring and evaluation. A number of formal and informal responses have been initiated in different parts of the country, featuring actors from the public, private and civil society sectors. Springing up in a variety of previously economically marginalised localities, such responses have been made possible by the emergence of decentralised and dispersed IPPs. This thesis focused specifically on the ZF Mgcawu District Development Coordinating Forum which is testament to the host of new relationships and interconnections triggered by the dispersed and decentralised RE infrastructure built in the region, while also signalling the developmental potential imbued in the REIPPPP's unique social logic to RE development.

The governance of RE has become a fundamentally 'local' issue, not a mandate exclusive to a national government department that has strict oversight of a closely-tied network of coal-fired mines and power-stations, together with a small set of mining-related local municipalities. In other words, the REIPPPP is demonstrating that any future RE-based electricity system is intimately connected to the functioning of all local and district municipalities, as in turn, a wider network of local institutions. The Forum exemplified this recognition and experimented with a governance structure that might animate these multi-scalar interactions.

The ZF Mgcawu District Development Coordinating Forum (explored in Chapter 6) is one example. The Forum aims to align the place-based investments and development activities of IPPs within and across local municipalities in the district municipality around. The Forum was not expressly intended as a space to explore alternative or decentralised forms of energy governance, yet it provides an opportunity to imagine them and in turn, give meaning to the social logic entailed by the REIPPPP's ED component. While in its current form the Forum might not be able to fully realise its potential due to various institutional constraints and the dominance of the corporate logic in the procurement framework, it is possible that such structures could experiment with institutional and financial arrangements to leverage the development commitment of the REIPPPP.

One such constraint was the aversion to information sharing, linked closely to the centralised governance of the REIPPPP, and more fundamentally, the corporate logic shaping its design and implementation. One

particular email is illustrative of IPPs' hesitation to provide detailed information about their SED and ED expenditure (Anon, 2018a):

> I understand the frustration that you must be experiencing right now from the inertia that exists within the forum – we have been involved since early 2014 and, in all honesty, there has been no movement so it is difficult not to question the efficacy of the whole initiative. I commend you on trying to catalyse progress and hope that you are successful in doing so. We are happy to provide high level information on our initiatives however we will not be providing actual expenditure for those initiatives as we have taken the transparent route in the past (you will remember attending one of our community meetings where we disclosed all spend) and there have been attempts to manipulate that transparency. I do believe that our decision to provide program descriptions without costing will not be detrimental to your intention behind the exercise – which is to determine what the development activities being undertaken in the area by various stakeholders are and determining collaboration at a larger scale.

Another affirmed commitment to the process, but expressed unwillingness to provide information to the Forum (Anon, 2018b):

> I just want to highlight to the forum that [the IPP] is very much committed to the process of collaboration and working together within the District and our Implementation Agent has taken over from me in attending the forum meetings when she is available. But due to the already onerous reporting we are currently doing on a quarterly basis with the IPP office, [the IPP] cannot commit to also report on a quarterly basis to the forum. Please note that we remain committed to the process but do not have the capacity to double report. In addition, some of information is confidential and meant for key internal stakeholders only. Going forward, I believe a high-level update from the Implementation Agent when she is at the forum will be sufficient from [the IPP].

Together, these insights reflect what I referred to in Chapter 1, as the dull compulsion to retreat to the 'rules of the game' where compliance-driven and risk-averse behaviour prevailed because of the specific configuration of the procurement programme. Ultimately for the Forum, the corporate logic prevailed.

Nonetheless, governance experiments in South Africa's renewable energy programme represent openings for change within energy governance practices in the political economy of energy in the country. The REIPPPP, as a policy assemblage constituting multiple dimensions, induced a particular kind of compliance-driven and competitive behaviour on the part of IPPs, which ultimately inhibited the potential for collaboration and coordination. This behaviour can be attributed to the dominance of the corporate logic in the REIPPPP. Experimenting with the Forum was an effort to cultivate counter-behaviour that might set the foundation for an alternative way of relating and behaving, and ultimately, fulfil ambitions for meaningful, inclusive development. Insights from governance experiments such as this serve to illustrate and illuminate the

contradictions and issues in the procurement framework, specifically, in the interaction between the social and corporate logics at play.

The primary success of the Forum (detailed in Chapter 6) was how a series of creative and boundary-pushing conversations was able to reveal to stakeholders that so much more was possible than what was currently in place. These conversations pointed to the transformative potential of the social logic woven in the REIPPPP. Moreover, it became apparent to the group that thinking through these possibilities and imagining radically different scenarios was accessible and energising. The social logic gained traction in the forum and unlocked considerable positive energy within the group. However, what was disheartening for the group was realising that certain things never seemed to change, such as, for example, the risk-averse nature of IPPs, the lack of capacity within community trusts, and the contained and highly-politicised conditions within local government. In short, behaviours induced by the corporate logic of the REIPPPP always seemed to prevail, undermining the emergent potential of activities to animate the potential of its social logic. The behaviours mentioned above meant that it was near impossible to take viable steps towards the scenarios the participants imagined for the Forum. Nonetheless, I was encouraged, in this final stage of refection, by how much the process had benefited those who participated on a regular basis. In the end though, nothing radical had shifted, but there were positive incremental shifts in terms of new relationships forged, connections made on projects between IPPs, and perceptions between IPPs and municipalities that became more realistic. It affirmed the need for safe spaces for clearing the air, for speaking freely, and for meeting one another outside of formal bureaucratic, political, and procedural environments. In sum, the process I facilitated with the Forum showed that the social logic knitted in the REIPPPP indeed had the potential to trigger what could be significant development activities.

As one of the first of its kind in the burgeoning RE sector in South Africa, this experimental governance arrangement was poised to shape cross-sectoral collaboration in direct response to specific regional development challenges. With the IDC as its anchor, the Forum made significant progress in articulating the structural conditions to support coordination and collaboration amongst a diverse set of stakeholders. The robust ToRs are emblematic of this emphasis on formalising the parameters for collective action. However, when the rubber hit the road and the Forum was expected to ignite its espoused ambitions, very little action transpired. The emphasis by the IDC on articulating the *structural* conditions for collaboration (in the form of a robust governance structure to be formalised as a non-profit company and managed by a third-party service provider) meant that the *relational* aspects of the Forum had been under-emphasised.

In essence, the intervention staged with the Forum between July 2017 and April 2018 was an attempt to cultivate the requisite relational capacities within the Forum. The IDC's efforts to manufacture shared ownership of the initiative through intensive consultation around the ToRs had not been sufficient. In response to the apparent deficit of relational capacities within the Forum, and the absence of a shared understanding

about long-term development, a facilitated process explored how to organise collective action around a coherent vision for the future.

Interrogating what took place between April 2016 and April 2018, the first key insight confirms that a relational approach to collaboration is vital, and is often overlooked or underemphasised, in favour of the structural and functional aspects of collaboration. Importantly, however, investing in a relational approach to collaboration is *not* sufficient when policy conditions and institutional frameworks (rooted in a corporate logic) are not conducive to or enabling of experimental governance approaches like that which the Forum hoped to cultivate in the ZF Mgcawu District Municipality.

It is within this tension that an analysis of the Forum must be located. On the whole, the Forum had many of the right ingredients in place but, while it made strides to improve its relational dynamics, it was hamstrung by institutional lock-in and policy inertia. Despite its challenges, stakeholders continued to attend the Forum, which speaks to the advances it made in cultivating effective relationships to underpin the more structural approach to collaboration and coordination. Returning time and again to the Forum, a regular group of stakeholders held onto the vision of what it could be. They had a belief that this entity had the potential to 'make their jobs easier', but also that the Forum could achieve greater development impact if they were able to work together on collective projects beyond their individual capabilities. In the end, organising for collective impact within the Forum was successful in facilitating more amenable relationships primarily between those officials delivering on the IPPs and municipalities' mandate. The process revealed the benefit of sustained engagement to support trust building between stakeholders as they imagined more effective ways of working together to realise their respective mandates and collective ambitions.

And yet, the initiative to organise collective action, which evolved into a guideline for ways of working, did *not* succeed in transforming power dynamics more fundamentally. The Forum became a site of contestation and imagination, shining a light on the frustrations of those closest to the lived experiences of public-sector officials and IPP representatives grappling with the complexities of enacting the REIPPPP. The Forum is a governance experiment being thwarted by policy and institutional lock-in rooted in the corporate logic of the REIPPPP, yet spurred on by the power of imagination and place-based connections. As such, it represents an opening for change within the country's political economy of energy. The REIPPPP, as a policy instrument of national government, induced a particular kind of compliance-driven and competitive behaviour on the part of IPPs which, in turn, inhibited the potential for collaboration and coordination in the ZF Mgcawu District Municipality. The Forum could not be operationalised as a functional regional governance experiment in line with its affirmed strategic intent. In this sense, the process to reinvigorate the Forum could be viewed as a failure. The framework for organising collective action did not translate into a viable pipeline of strategic collaborative projects. Additionally, a framework for effectively coordinating development projects across the five municipal jurisdictions was not activated. Moreover, the identified mechanisms to enhance

communication were only implemented in a piecemeal manner, and proposals to enhance capacity building (for example, community trustee training), remained out of reach.

While the Forum begins to pry open the imagination of stakeholders to think differently about governance, those represented in the Forum were not sufficiently capacitated or empowered within their own organisations to enact any of these emergent potentialities. Within the boundaries and constraints of the compliance-driven procurement framework, the contribution of this governance experiment is in itself insufficient for affecting systemic regime transformation. Instead, experimenting with new structures and practices, the Forum begins to plant seeds of transformative and progressive imaginaries of place-based, accountable, and democratic arenas in which deliberation takes place around interconnected local, regional, and national energy futures.

7.4 Conclusion

South Africa's RE programme, the REIPPPP, can be understood as an ensemble of interacting and often contradictory, projects, actors and materials that cohere in a policy assemblage that reflected the real-world dynamics of power in the South African social formation (Baker & McGuirk, 2017; Savage, 2018). These alignments and associations are what manifested in the REIPPPP's unique arrangement, their co-evolution resulted in the emergence of a wide range of dynamics and significant 'interferences' (illustrated across Chapter 5 and Chapter 6). The contemporaneous conditions of possibility at that time shaped how the REIPPPP emerged as an ensemble of distinctive elements, arranged together towards certain strategic ends. These strategic ends included the country's response to international climate change commitments, national electricity supply pressures, and multi-faceted socio-economic development challenges. The corporate and social logics at play in the REIPPPP clearly align with this range of strategic ends. As such, the REIPPPP demonstrates the quality of "active compositive—fitting, connecting, combining, and aligning relations between heterogenous elements within and across space" (Baker & McGuirk, 2017: 4). On their own, each of these strategic ends might be sufficient justification for a whole host of discrete policy interventions. However, in this case, policy-makers forged connections between these divergent goals, bringing disparate elements together in an unprecedented electricity procurement framework.

Engaging with the REIPPPP as a policy assemblage makes possible a constructive orientation towards the contribution of South Africa's first utility-scale RE programme to the country's possible (but not inevitable) transition to energy democracy. The lines of flight towards imagining and assembling "relational and equitable energetic futures" (Pinker, 2018) are contained within the emergent dynamics unleashed by the particular design and enactment of the REIPPPP, and the dynamic interplay between its corporate and social logics. As stated in Chapter 1, the concession by policymakers to economic development in the design and configuration of the REIPPPP set it on a trajectory that would trigger irrepressible tensions in South Africa's political economy

and destabilise the institutional web of incumbency confining the country in a carbon-intensive development trajectory and frustrating low-carbon transition processes.

The dynamics described above account for some of the interferences the REIPPPP manifested in the country's energy transition. These have been examined in the context of the energy transition as a 'period of ontological trouble'. Holding the tensions and building on the emergent opportunities presented by the REIPPPP is vital for configuring progressive alternatives that more strongly contend with the imperatives of decarbonisation and structural transformation. There are good reasons to 'stay with it' – as opposed to scrapping it and coming up with an alternative, as per the call from AMCU quoted above in 7.3.1 – in trying to realise a socio-technical transition. Firstly, the REIPPPP has played a critical role in advancing the public discourse around the energy transition, in particular, the concept of the just transition which priorities issues of justice and equity in socio-technical change processes. Secondly, the REIPPPP demonstrates a significant commitment within the electricity sector to climate change agreements and the contribution that South Africa can make in reaching its NDC as part of the 2015 Paris Agreement. Thirdly, the inclusion of ED requirements within the competitive procurement programme is an attempt to couple the advancement of a low-carbon agenda with that of a developmental one. Fourthly, the REIPPPP has brought into focus the socio-spatial features of decentralised and dispersed RE infrastructure and how this has the potential to re-embed the economy *within* society and transform traditional forms of governance and power which are highly centralised. The final dynamic pertains to the emergence of experimental and innovative governance arrangements which have brought to the fore the potential for new kinds of institutions that might embody and leverage the potential of decentralised RE infrastructure.

These insights must not be discarded but instead that they offer up tentative insights into how future RE procurement policies might be constructed *in support of* an energy democracy agenda, where the corporate and social logics of RE development are not undermining of one another, and indeed where the social logic can be further amplified. All of these insights rest upon the fact that the transition towards RE as the energy resource powering the South African political economy, and around which contemporary forms of collective life are assembled, is increasingly dispersed and decentralised. With this in mind, each of these interferences point to something generative in the REIPPPP. In the final chapter of this thesis, I conclude by summarising the inquiry and offer tentative 'answers' to the research questions posed in Chapter 1.

Chapter 8
Conclusion and ways forward: recommendations for research and policy

8.1 Introduction

This thesis presented a comprehensive nested account of the global energy transition for the purpose of making sense of the 'ontological trouble' that was opened up by the introduction of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP), informed by the transdisciplinary research experience of the ZF Mgcawu District Development Coordinating Forum. I have done so with the goal of contributing to the 'situational intelligence' (a concept introduced in 2.2.1) required in the current window of opportunity that South Africa's ever-worsening electricity, and wider economic, crisis presents.

In this final chapter I endeavour to conclude the thesis, demonstrating how it fulfilled the research objectives and responded to the research questions. Furthermore, I clarify the key findings and implications of the research for future research, policy and practice. I close off the chapter with some concluding thoughts about this transdisciplinary inquiry into the complex realities of South Africa's energy transition.

Ultimately, I hope to clarify how, and to what extent, the REIPPPP has triggered a potential turn in South Africa's energy transition towards more energy democracy outcomes. In so doing, my aim is to demonstrate that this is an original contribution to our knowledge of our understanding of the South African energy transition, and transitions to energy democracy in general.

8.2 Revisiting energy democracy

The purpose of this thesis has been to examine how, and to what extent, the REIPPPP has triggered South Africa's transition to energy democracy. Before spelling out precisely how the inquiry presented in the preceding chapters responds to this question, it is fruitful to revisit the normative orientation of energy democracy, which was first presented in section 3.2.

Substantiated by a review of the emerging energy democracy literature, energy democracy was conceptualised as a developmental perspective on the energy transition. The energy transition refers to the move away from a global political economy based on fossil fuels to one powered by renewable energy. Decarbonisation is thus the core driver, and ambition, of the energy transition, as well as the realisation of affordable, accessible renewable energy. Coupling this decarbonisation agenda with a developmental agenda is what distinguishes the energy democracy perspective that is employed in this thesis.

Development is understood as the self-defined social processes of facilitating resourcefulness and cultivating individual and collective capabilities to advance social-ecological wellbeing while also sustaining the structural conditions to enable the process of development itself (Evans, 2002; Westoby & Kaplan, 2013; Castells &

Himanen, 2014). The energy democracy perspective proceeds from the assumption that these two ambitions – decarbonisation and development – are enabled (but not fully delivered) by the deployment of RE infrastructures in a multiplicity of spatially-dispersed and decentralised socio-technical configurations. In short, renewable energy, through its diverse socio-technical configurations, sets in place the necessary but not sufficient conditions for an inclusive mode of development. These conditions are primarily the decentralised and distributed energy infrastructures that create the material basis for new forms of collective life, where visions of more just, equitable and sustainable futures are potentially possible.

However, for such a vision of energy democracy to flourish, a set of sufficient conditions are required, namely a mode of relational and developmental governance that ensures that an appropriate set of 'rules of the game' are in place to support this dual set of developmental and decarbonisation ambitions.

Having re-iterated this normative orientation, it is possible to more precisely frame how, and to what extent, the REIPPPP has catalysed South Africa's transition to energy democracy. Such a framing of energy democracy implies an assessment of the REIPPPP with respect to its contribution towards decarbonisation and development through the deployment of dispersed and decentralised RE infrastructures. Thus, the overarching research question asks for the specific ways and the extent to which the REIPPPP enables decarbonisation *and* development in support of just, equitable and sustainable futures within South Africa's unique socio-economic, political and ecological milieu.

8.3 Response to research questions

To recap, the main research question driving this thesis is as follows: *How, and to what extent, has the REIPPPP catalysed South Africa's transition to energy democracy?* The previous section situated the overarching research question in the context of a particular conception of energy democracy. In order to arrive at a summative response to this question, I will begin by recapping the argument and then working systematically through each of the elements of the thesis, demonstrating how they respond to the corresponding research questions. Ultimately, this helps to confirm the original contribution to knowledge made by this thesis.

Through this inquiry into the dynamics of the South African energy transition, it became clear that by the time that South Africa began considering the possibility of RE as a viable component of its electricity system, a specific modality of RE development had become dominant globally. In this thesis this modality has been referred to as the corporate logic of RE development that is distinguished by a set of policy frameworks and governance practices, most notably the competitive auction mechanism at its centre.

Indeed, the corporate logic has propelled the energy transition by effectively crowding in public and private investment, driving down technology costs and enabling widespread deployment of RE technologies. In short, the corporate logic delivers strongly on the imperative for the decarbonisation of the global electricity system through the deployment of utility-scale RE infrastructures. However, a closer interrogation of the emergence of RE in two frontrunner countries, Denmark and Germany, reveals that the innovations that ultimately led to

RE's global success, were cultivated in conditions shaped by a social logic with vastly different ambitions and socio-spatial realities to those associated with the corporate logic.

This social logic of RE development was characterised by different policy frameworks and governance practices, where specifically, the RE feed-in tariff enabled the participation of diverse coalitions of social actors in RE-based electricity generation. Put simply, the initial social logic that characterised the emergence of the RE boom favoured democratic and developmental outcomes and was premised on the existence of dispersed and decentralised RE infrastructures.

Through processes detailed in section 4.4, the corporate logic of RE eclipsed the social logic and resulted in the rapid capital investment in and uptake of RE technologies across all world regions. Meanwhile, around 2010 in South Africa, policy makers preoccupied with tackling the country's electricity crisis, initiated a process to design and implement a RE programme. As noted above, the corporate logic of RE development was entrenched at this point, as the preferred modality through which to advance the energy transition. Hence, the corporate logic was inscribed into the configuration of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) by the professional team retained to design the policy and regulatory framework. However, alive to South Africa's unique socio-economic context and responsive to the state's political directives and efficacy of trade union and civil society lobbies, those involved in compiling the REIPPPP recognised that the RE infrastructures that would inevitably materialise would be landing in spaces where there were major socio-economic development challenges.

This recognition resulted in the ramped-up ED component of the REIPPPP and is evidence of an acknowledgement of the ontological reality (of a multiplicity of dispersed and decentralised RE infrastructures as potential triggers of local development potential) knitted into the epistemological frameworks about how RE is deployed, as per the prevailing corporate logic of RE development at the time.

Importantly, however, is that this manifestation of a social logic of RE development, contoured by the specificities of the South African reality, was made subordinate to the corporate logic in the REIPPPP. This dynamic, analytically described through the course of this thesis using a dynamic theory of socio-technical change, induced a range of tensions, contradictions and unintended consequences in the implementation of the REIPPPP. And, framed as socio-technical interferences, these are instructive for assessing the specific ways in which the REIPPPP has catalysed South Africa's transition to energy democracy.

Upon the basis of these findings (elaborated further in section 8.5), I can conclude that the REIPPPP is limited in its ability to realise South Africa's transition to energy democracy because in its current form the procurement framework is not sufficient for meaningfully advancing the dual goals of decarbonisation and inclusive development. However, this conclusion does not do justice to the potential that the REIPPPP has opened up for such a transition to energy democracy. To reveal these antinomies, five interferences point to

the positive contributions of South Africa's first RE procurement programme to the creation of spaces for further efforts that could result in outcomes more consistent with the energy democracy vision.

The above argument is the culmination of specific steps taken through the course of this thesis. The thesis was broken up into four parts:

Part A contained the Introduction and research design. The introductory chapter described the background and motivation of the inquiry with respect to three aspects, the centrality of energy within the wider struggle for a more sustainable world, the extent to which the REIPPPP has kickstarted South Africa's energy transition, and the importance of a complexity orientation for grappling with these transition processes.

Chapter 2 spelled out the research design and the features of the methodological praxis that was cultivated through the course of this PhD journey. The research question framing this chapter was: *In line with the praxis of phronetic social science, how was this transdisciplinary inquiry conceptualised and operationalised*? As a response to the question, guiding principles were specified (that speak to how this approach was conceptualised) and practical methods (that refer to how it was operationalised).

This chapter has instrumental value as it details the process through which data was gathered, collected, organised and analysed that then provided the basis for empirical findings (in Chapters 5 and 6) to be presented and then woven together as part of an integrative synthesis and analysis (Chapters 7 and 8).

However, the significance of this chapter goes beyond this instrumental value (of detailing *how* the research was done), and touches on the question of *why* the research was conducted in this particular way, framing it as a transdisciplinary inquiry with the ambition of 'practising social science that matters'. In line with the purpose of sustainability science more broadly, doing research for a transformed world according to a transdisciplinary logic might be seen as (Flyvbjerg, 2001: 166)

> an activity done in public for the public, sometimes to clarify, sometimes to intervene, sometimes to generate new perspectives, and always to serve as eyes and ears in our ongoing efforts at understanding the present and deliberating about the future.

The findings and conclusions in this thesis must thus be read accordingly.

Part B of the thesis contained the literature analysis and conceptual framework. Chapter 3 was driven by the question: *What theoretical concepts and conceptual framework are instructive for analysing the energy transition?* With this guiding question, Chapter 3 elaborated the study's operative conceptual framework through a literature analysis that began with elucidating a normative orientation towards energy democracy. Thereafter, various strands of the sustainability transitions literature were reviewed, integrating literature on policy and governance to construct a conceptual framework that was deployed in further chapters.

The theory of socio-technical change underscored how socio-technical change is the outcome of the experimental practices of particular societal actors to encode normative goals of positive and desirable futures

into the policy assemblages and governance practices deployed by diverse coalitions of actors to marshal the requisite resources and expertise to shape and steer collective action, including investment flows. This chapter presented a range of interconnected theoretical concepts which constituted the conceptual framework deployed in the multi-scalar account of the energy transition.

The conceptual framework crafted in Chapter 3 made possible a description of the global energy transition Chapter 4 that responded to the question of: *What are the dimensions of the global energy transition and what precedent do these set for the emergence of an energy transition in South Africa?* Chapter 4 was thus the necessary foundation upon which to understand the dynamics of South Africa's energy transition and how these manifested in the ZF Mgcawu District Development Coordinating Forum. In sum, it was demonstrated how competitive procurement programmes for RE became the dominant policy mechanism through which RE was scaled up from these initial niche conditions.

It was further demonstrated however, that the policy frameworks and governance practices that facilitated this acceleration (shaped, as it was, by the corporate logic), differed vastly from those that cultivated these RE innovations in niche conditions in the two frontrunner countries of Germany and Denmark (shaped more by the social logic of RE development). While also underscoring the emergence and interplay between these two logics of RE development, this chapter helped to elucidate the value in analysing the democratic foundations of these niche conditions for the advancement of the energy democracy agenda.

Thereafter, consistent reference was made to the corporate and social logics of RE development to illustrate the precedent that the global energy transition set for South Africa's nascent energy transition. As mentioned above, this pertains to the existence of two modalities of RE development which manifested in unique ways in the design and implementation of South Africa's flagship RE programme, the REIPPPP.

Moving on from these theoretical and conceptual foundations, Part C of the thesis presented the empirical findings from the review of the REIPPPP and the embedded case study of the ZF Mgcawu District Development Coordinating Forum.

Having set in place a distinctive perspective on the global energy transition (signified by the reference to two distinctive logics of RE development), Chapter 5 explored the South African energy policy landscape and, in particular, the configuration and development of the REIPPPP. This chapter asked: *How did the REIPPPP become embedded and evolve in the context of South Africa's political economy of energy?* The critical review of the REIPPPP followed from the description of the dynamics of the global energy transition and demonstrated how these came to bear in the design and implementation of the RE procurement programme.

Specific reference was made to how the corporate and social logics of RE development moved, mutated and manifested in the REIPPPP as a policy assemblage. This was substantiated with an exploration of the historical relations of incumbency in the minerals energy complex, then the period of contestation leading up to the launch of the REIPPPP and the prevailing energy policy and governance regime in South Africa. Seen together,

these conditions of possibility explained how the procurement programme was moulded to South Africa's domestic socio-economic development challenges and translated into the operationalisation of both the corporate and social logics of RE development. In sum, this chapter captured a 'country-level' picture of the processes that shaped the design and enactment of the REIPPPP and how, in turn, its unique configuration of diverse policy goals resulted in the chronic governance challenges of alignment and coordination, implementation, and monitoring and evaluation.

Having established the national level dynamics, the following chapter (Chapter 6) drilled down into the regional and place-based implications of the REIPPPP – this is where the substantial empirical contribution of the thesis was presented through the case study of the ZF Mgcawu District Development Coordinating Forum. Chapter 6 asked: *How did the ZF Mgcawu District Development Coordinating Forum, respond to the unintended consequences, tensions and contradictions in the design and implementation of the REIPPPP?* To this end, the chapter provided a detailed description of the emergence and evolution of the Forum. It was in this chapter that the empirical evidence of the REIPPPP's intertwined corporate and social logics was presented, together with the ramifications of their complementary and contradictory interactions. The chapter bears witness to a significant moment in the Forum's existence, where for a brief time, a collective vision was articulated, whereby the developmental potential inscribed in the ED scorecard of the REIPPPP provided the impetus for a host of transformative activities in the region. Nonetheless, as the case study described, despite the best efforts of stakeholders committed to the Forum, their experiment with the social logic of the REIPPPP by organising their interactions and activities more effectively, was constrained by the rigidity of the 'rules of the game' within the REIPPPP that favoured a competitive corporate logic rather than a collaborative social logic.

The final component of the thesis turned to an analysis of the empirical findings. Part 4 thus comprised the discussion, analysis and recommendations for research and policy.

Chapter 7 brought the various elements of the thesis together with the question: *Seeing the REIPPPP as a policy assemblage, what interferences has it triggered in South Africa's political economy of energy?* To do so, the chapter elaborated upon the interferences (that is the unintended consequences, contradictions, and emergent potentialities) triggered in South Africa's unfolding energy transition, with the REIPPPP currently at its helm as the country's most prominent alternative energy procurement modality to date. Moreover, these interferences were attributed largely to the emergent outcome of the interplay between the corporate and social logics of RE baked into the REIPPPP's unique configuration. To answer its driving question, the chapter first analysed the REIPPPP as a policy assemblage and then interrogated these five 'socio-technical interferences' and what they might mean for the country's transition to energy democracy. The five socio-technical interferences triggered by the REIPPPP refer to how it has contributed towards (1) the evolution of the 'just transition' discourse; (2) aligning energy policy and climate action, (3) integrating economic development into energy policy, (4) breaking with centralised energy governance, and (5) enhancing regional collaboration.

Finally, in this Chapter 8, the conclusion threads together insights from each of these preceding chapters. The above section detailed how the thesis fulfilled each of the intended sub research questions. Before presenting a final response to the overarching research question as part of the key findings of the thesis, I first address the objectives. Thereafter, the key findings capture the thesis' substantive conclusion and knowledge contribution.

8.4 Response to research objectives

Here, I return to the research objectives (first introduced in section 1.4.3) to spell out how the work laid out in this thesis meets its theoretical, empirical, methodological and pragmatic goals.

Firstly, the research aimed to contribute to the literature on sustainability transitions as part of its theoretical and conceptual objectives. It does so through the in-depth literature analysis of the sustainability transitions literature and the integration of further policy and governance literatures therein. The comprehensive literature analysis culminated in a conceptual framework that was instructive for describing and analysing the global energy transition, how this relates to South Africa's unfolding energy transition and how this manifested in the case of the ZF Mgcawu District Development Coordinating Forum.

Linked to this, is the second objective which referred to the empirical objective of generating a deeper understanding of the dynamics of South Africa's unfolding energy transition. The thesis did so by documenting, and further problematising, the emergence and evolution of the country's energy transition that spanned an exploration of the dynamics of the global energy transition right down to the grounded reality of the ZF Mgcawu District Development Coordinating Forum.

The third objective spoke to the methodological aims of the thesis which was articulated as an ambition to contribute to the advancement of transdisciplinary research, with a particular focus on research conducted in global South contexts. It did so by articulating four guiding principles that were helpful for the cultivation of a distinctive methodological praxis that was responsive to the research context.

Finally, the fourth objective pertains to the pragmatic possibilities resulting from this research. In line with the transdisciplinary research approach, the intention of this inquiry was to elucidate scientifically robust but also societally relevant findings. To this end, the multi-scalar account that resulted in the articulation of five socio-technical interferences that the REIPPPP has manifested are instructive for considering the (re-)configuration of future RE procurement frameworks that might reinforce a turn towards an energy democracy orientation that may help to overcome the build-up of resistance to what is perceived by key stakeholders to be the privatisation of energy provision over the long term.

8.5 Key findings

In this section I summarise the key findings of this research. Firstly, a key finding of this research refers to the efficacy of the REIPPPP as a mechanism to realise decarbonisation. The second broad finding of this research

concerns the REIPPPP's laudable, but limited, efforts to support development. And finally, the substantive finding of this thesis pertains to the extent to which the REIPPPP has catalysed South Africa's transition to energy democracy (i.e., the realisation of decarbonisation *and* development).

7.4.1 The REIPPPP's efficacy as a procurement framework for decarbonisation

The REIPPPP can be credited with kickstarting South Africa's energy transition and demonstrating the possibility of successfully designing and implementing an innovative RE procurement framework. It has done so through the effective deployment of the corporate logic of RE development that emerged after 2004 at the global level. From a procurement perspective, the REIPPPP has attracted international acclaim as a highly competitive, transparent and professionally executed initiative. The creation of appropriate institutional capacity, exemplified by the IPP Office, has served as a robust mechanism for timeous execution and comprehensive oversight. Through the participation of DFIs and other financial institutions, the REIPPPP has cultivated widespread investor confidence and the deployment of substantial capital and investment.

From a technological perspective, renewable energy, most notably wind and solar, have proved to be highly efficient and cost-effective technologies (Calitz & Wright, 2020). On the whole, the performance of these technologies has been exceptional and in the last decade, significant improvements in efficiency have taken place. South Africa's wind resources and levels of solar irradiation present an irrefutable case for the applicability of RE technologies. In short, the viability of the technology has been proven. Similarly, the REIPPPP has demonstrated that a predominantly RE-based electricity generation system is the least-cost option for meeting South Africa's future electricity needs – this fact has been substantiated by a number of authoritative reports (Meridian Economics & CSIR, 2020).

Seen together, it becomes clear how the REIPPPP has become a reference point for energy transition processes in the global South. These positive contributions point to the success and efficacy of the corporate logic of RE development in advancing the decarbonisation of electricity systems.

7.4.2 The REIPPPP's laudable but limited development potential

The previous finding spoke to the deployment of the corporate logic of RE development in the REIPPPP and argued that the REIPPPP has merit in achieving decarbonisation. This second finding speaks to the subordinate role of the social logic that was blended into the REIPPPP as a policy assemblage. The REIPPPP's laudable, but limited, development potential clarified here as a key finding, has been problematised and substantiated throughout this thesis (with more in-depth analysis presented in sections 5.6 and 7.3.3, and across Chapter 7 more broadly). Moreover, the developmental potential of the REIPPPP served as a starting point for the research inquiry (described in section 1.4).

Through its unprecedented requirements, the REIPPPP has created an operational framework that required the private sector to participate in various development projects, thus providing an opportunity for learning

and reflection on the delivery of community benefits and the value of social performance. The financial extent of these community benefits (flowing from SED, EnD and community ownership) is substantial; the merits and shortcomings thereof have been explored throughout the course of this thesis. A further outcome of the ED requirements is that the REIPPPP has to some extent, sparked the cultivation of a renewable energy industry in South Africa. While this has suffered from a protracted impasse, the REIPPPP demonstrates the potential for the expansion of the green economy in South Africa's future economic development trajectory.

In the conceptualisation of energy democracy, first introduced in section 3.2, development was defined as the self-defined social processes of facilitating resourcefulness and cultivating individual and collective capabilities to advance social-ecological wellbeing while also sustaining the structural conditions to enable the process of development itself (Evans, 2002; Westoby & Kaplan, 2013; Castells & Himanen, 2014). From this vantage point, the interpretation of development informing the particular combination of incentives and accountability mechanisms in the REIPPPP is limited with respect to 'facilitating resourcefulness' or 'cultivating individual and collective capabilities' and further constrained by the dominance of the corporate logic of RE development.

7.4.3 The REIPPPP's contribution to South Africa's transition to energy democracy

The previous two findings capture the core dynamic problematised throughout the inquiry into the South African energy transition, namely, the ramifications of the distinct corporate and social logics blended into the REIPPPP. Through the analysis of the REIPPPP as a policy assemblage that combined these logics, it has been possible to understand the REIPPPP's contribution to South Africa's energy transition to potentially turn towards an energy democracy orientation.

This thesis demonstrated how the REIPPPP was introduced into, and was moulded by, South Africa's socio-technical energy regime that co-evolved with a carbon-intensive and highly unequal political economy. Moreover, the thesis argued that the REIPPPP as a policy assemblage, drawing on both global and local trends, reflected the blending together of both the corporate and social logics of RE development. The argument developed thus far also emphasises throughout the significance of how the REIPPPP has resulted in geographically dispersed RE infrastructures that have sprung up in unsuspecting and previously 'empty' landscapes in the country (McEwan, 2017), and that is in tension with the way the highly centralised socio-technical energy regime has evolved in South Africa over the past century.

In other words, vastly different to the concentration of coal-fired power stations and coal mines all within a 50 km radius in Mpumalanga, the REIPPPP has radically shifted the country's 'geography of energy', destabilising a century-old conception of how and where, and by whom, electricity is generated. Now, RE projects are dotted across provinces such as the Northern, Western and Eastern Cape; these are locations that, until the last decade, were largely irrelevant to (and underserviced by) South Africa's electricity sector.

As wind farms and solar plants are erected across windy escarpments and sun-drenched plains, South Africa's relationship with electricity is being reformed. Often landing like asteroids in marginalised and rural environments, these mega-projects span multiple jurisdictions and activate a multiplicity of complex interactions, but they remain intimately and often problematically tethered to the National Government departments, local and global finance institutions, and the multi-national corporations that are involved in delivering them.

The REIPPPP, as a competitive auction programme, is deserving of its wide acclaim as one of the most successful procurement schemes in the recent wave of RE auctions across the world (Kruger, Nygaard & Kitzing, 2020). It has been a transparent and effective procurement programme, made possible by an innovative public-private partnership that has attracted significant private and public investment in electricity generation and resulted in the timeous delivery of large-scale RE plants feeding into South Africa's electricity grid. The corporate logic dominating the REIPPPP has thus been successfully and effectively translated in South Africa's energy transition. And indeed, there are merits to the application of this corporate logic to RE development (as summarised in section 7.4.1). Similarly, the distinctive social logic brought to bear in the REIPPPP through its ED requirements has also resulted in many positive outcomes (summarised in section 7.4.2).

That being said, this thesis submits that the REIPPPP in its current formulation (assembled as a blend of corporate and social logics) is *not* sufficient for realising the dual imperatives of decarbonisation and development thereby meaningfully advancing energy democracy in South Africa. It has been argued that the specific 'rules of the game' shaping this energy transition play a substantial role in limiting South Africa's prospects for energy democracy because 'development' (as understood in the REIPPPP) gets delivered by corporates via a discreet set of development projects that are unrelated to wider strategic development plans for the respective local areas within which these projects occur. Moreover, the extent to which these 'rules of the game' continue to be based upon an imbalance between the corporate and social logics, further limits the prospects for energy democracy. This becomes particularly clear when it comes to the limited understanding of 'development' inscribed into the REIPPPP and the 'on-the-ground' practices of corporates. Compared to the widely accepted definition of development used in this thesis, development projects in practice that get delivered via the REIPPPP are – with key exceptions – largely inadequate.

The thesis has attempted to show (and, further, to *demonstrate* through the practical case of the Forum) how this reliance on the REIPPPP, as the sole mechanism for utility-scale RE procurement, will unfortunately see South Africa falling short on its espoused commitments to decarbonisation *and* development.

Should the REIPPPP, in its current formation, maintain its position as the primary driver of the energy transition, South Africa might be more favourably positioned to realise its carbon emissions reductions as per its Nationally Determined Contributions (NDCs). More serious: if the REIPPPP continues as the dominant

framework for RE procurement, South Africa runs the far greater risk of the disruptive and distributive potential of RE being constrained. In turn, the dominance of the corporate logic will lock South Africa into a development trajectory that reinforces financialisation and the concentration of political and economic power. In this scenario, the country would have failed to address the challenges of poverty and inequality under conditions of an accelerated climate crisis.

Following Labussière and Nadaï (2018: 6), an open inquiry into the energy transition "assumes that the democratic dimension of energy transition processes does not pre-exist the transition itself", instead, "the energy transition and its democratic dimension are jointly in the making, they are co-produced through energy transition processes".

South Africa's prospects for realising energy democracy, a development perspective on the energy transition that goes beyond narrow decarbonisation, are not a foregone conclusion simply because the REIPPPP exists. In other words, it is a dangerous mistake to think that more RE 'automatically' leads to greater social and ecological justice. The same might be said about the global energy transition (albeit on a far larger scale and with more far more dire consequences) that is at risk of accelerating a transition that is *not* just and does *not* lead to a more equitable and sustainable world – a concern expressed more frequently and with a greater sense of urgency in recent years.

Herein lies the lesson from South Africa for the global energy transition: if the current window of opportunity (expressing a social logic of RE development by reorienting the prevailing policy frameworks and governance practices towards the goals of energy democracy) is not leveraged in time, incumbent corporate interests will simply continue to take precedence, entrenching into the future the well-established deeply unequal, extractive, and resource-intensive political economy. In essence, for energy democracy to prevail, the social logic of RE development must be amplified.

8.6 Revisiting the significance and contribution of the research

The findings summarised above, and the body of research they depend on, come at a time when the South African electricity system, and indeed also the wider political economy, is in deep crisis. Just as South Africa faced an electricity crisis in the late 2000s and responded with the initiation of a competitive procurement programme for RE electricity generation and the procurement of two coal-fired power stations, so a similar crisis is faced now, a decade later. That being said, the extent of this crisis is far greater and tied up with dire socio-economic, political and environmental pressures.

Empirically, this thesis is significant to the extent that it contributes to the 'situational intelligence' required to make informed decisions about the design and implementation of policies that enable the rapid deployment of RE. Based on the findings in this research, if these decisions are to be made in support of the favourable vision of energy democracy, then a social logic of RE development needs to be strengthened, diluting the dominance of the corporate logic of RE development.

It is here that the core knowledge contribution of this thesis (for South Africa specifically, and for energy transitions in general) is evident, namely the identification of two prevailing logics of RE development and a clarification of their implications for the (global and South African) energy transition into the future.

To emphasise the core argument and the substantive knowledge contribution stemming from it, I have constructed the following schematic to visualise the interplay between the two prevailing logics of RE development and their positioning within the window of opportunity that is presented in the unfolding global energy transition.

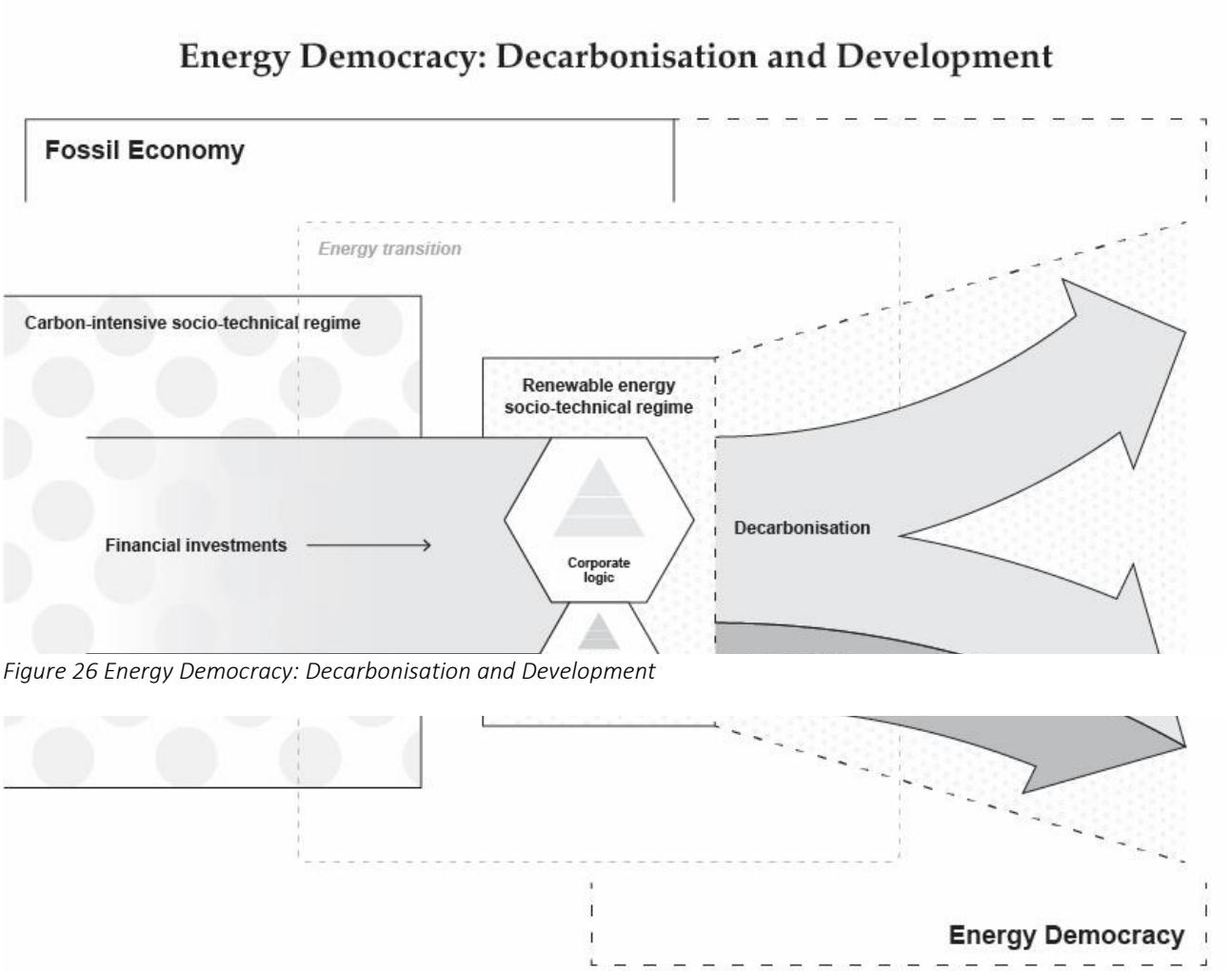


Figure 26 Energy Democracy: Decarbonisation and Development

In sum, Figure 26 captures the essential knowledge contribution and demonstrates the argument developed in this thesis. As reflected stylistically in the diagram, two logics of RE development have driven particular phases of the shift from fossil fuels to renewable energy. They were the result of various financial and social investments that occurred in particular spaces at particular times in response to specific local and global

conditions. To realise the ambitions of energy democracy, while the corporate logic played out in ways that led to price reductions and global proliferation, the social logic of RE development needs to be amplified by enabling policy frameworks and governance practices in context specific ways to drive both decarbonisation and development. The advancement of the social logic of RE development is made possible by the materiality of RE infrastructures which are inherently spatially and have the propensity enable modes of democratic development that achieve both decarbonisation and development. Indeed, without decarbonisation in a resource- and carbon-constrained world, development is largely unachievable. However, without development the benefits of decarbonisation will not be fully realised in a highly unequal world that is also, therefore, potentially socially unstable and conflictual.

8.7 Recommendations for policy and practice

Following on from the key findings and the main knowledge contribution of this thesis, I now summarise the recommendations for policy and practice. For policy, the fundamental point is this: in facing the electricity crisis, and more importantly, South Africa's development imperatives, more of the same will not be sustainable. There is both a socio-technical opportunity and an ethical-ecological imperative to be creative and ambitious enough to imagine and configure strategies to advance energy democracy. To this end, the recommendations for policy and practice from this thesis are twofold.

Firstly, I summarise some recommendations for future bid windows of the REIPPPP, which would amount to tweaking the rules of the game informed by lessons from the Forum's effort to better coordinate and collaborate.

Secondly, I argue that that any RE policy assemblage that amplifies the social logic of RE development in support of the transition to energy democracy, will need to deepen conception of the social logic that has been operationalised in the REIPPPP thus far and in doing so, unleash it from the constrains imposed by the dominance of the corporate logic. Evolving the social logic of RE development in ways that contribute meaningfully towards energy democracy outcomes in South Africa will necessitate a greater role for public sector institutions to support and reinforce such a social logic. From the perspective on the REIPPPP articulated in this thesis through the theory of socio-technical change, leveraging the social logic of RE development will entail the re-imagining and re-arranging RE policy assemblages such as the REIPPPP. This may include the reconfiguration of the REIPPPP itself to better align the corporate and social logics, but it may also be accompanied by the design and implementation of parallel and complementary procurement modalities, that together, more fruitfully direct the South African energy transition towards the goal of energy democracy.

8.7.1 Enhancing the developmental impact of future bid windows of the REIPPPP

South Africa's electricity roadmap, the Integrated Resource Plan (IRP) 2019, stipulates definitive targets for RE procurement in the coming decade. Through the REIPPPP, the country has cultivated significant capacity to

orchestrate such procurement processes. In light of the REIPPPP's efficacy as a procurement strategy, it is likely this mechanism for RE development will continue into the near future as the preferred framework.

In the event that future rounds of the REIPPPP are announced, insights from this thesis point to numerous tweaks in the procurement framework to enhance, in particular, the developmental contribution of the REIPPPP, as per its social logic. The tweaks in the rules of the game recommended below are derived directly from the empirical case study of the ZF Mgcawu District Development Coordinating Forum described in this thesis. Recalling the proposed framework for organising collective impact in the ZF Mgcawu District Municipality (detailed in section 6.5.5), the following recommendations are made with respect to collaboration and coordination, communication and capacity building.

These recommendations are rooted in the empirical and theoretical argument developed in this thesis that suggests that for particular desired outcomes to be realised, appropriate and enabling policy frameworks and governance practices need to be in place. Therefore, if the REIPPPP is to continue in its current configuration but including a more robust and coherent social logic into the REIPPPP policy assemblage, then clear rules to incentivise collaboration, coordination, communication and capacity building need to be incorporated. Importantly, these tweaks must be underpinned with an improved developmental ambition clarified by the IPP Office on behalf of the REIPPPP. This thesis demonstrated that while the social logic of RE development was constrained by the dominance of the corporate logic, on its own terms, the social logic articulated through the construction of the ED requirements falls short in creating the enabling framework for meaningful development practice. I substantiated a perspective on development in section 3.2, explaining development as the self-defined social processes of facilitating resourcefulness and cultivating individual and collective capabilities to advance social-ecological wellbeing while also sustaining the structural conditions to enable the process of development itself (Evans, 2002; Westoby & Kaplan, 2013; Castells & Himanen, 2014). In contrast, I explored in section the problematic framing and operationalisation of development in the ED scorecard. This turn, is further undermined by the dominance of the corporate logic of RE development. For the REIPPPP, within is current configuration (as per the 70:30 split explained in section 1.2.2), the following tweaks have the potential to ameliorate the tensions resulting from the dynamic reiterated here.

Below I briefly note some tentative recommendations building on the findings from this research. However, this is by no means an exhaustive list of recommendations but rather an offering about the tweaks that could be made to the existing procurement framework. Any eventual reforms should be the outcome of a facilitated learning process, led by the IPP Office, perhaps with the support of industry associations, government departments and independent research organisations, to gather and summarise insights from the first decade of the REIPPPP's existence, and for these to form the basis of responsive reforms to the ED requirements. Such efforts to leverage learning and reflexivity within the REIPPPP should be further enhanced by the IPP Office. This could be achieved through the formalisation of knowledge partnerships between industry, research and

practice stakeholders which are in turn, resourced by a small portion of the revenue generated for the IPP Office in its function as custodian of the REIPPPP.

8.7.7.1 Collaboration and coordination

The case study of ZF Mgcawu District Development Coordinating Forum in the context of the wider governance and development challenges faced by the REIPPPP, present a strong justification for the widespread establishment of similar governance entities in other parts of the country. For meaningful collaboration and coordination to be unlocked in the context of place-based investments by IPPs and the myriad interconnections they ignite, requirements to this effect must be written into the ED requirements of the REIPPPP. Insights from the ZF Mgcawu District Development Coordinating Forum culminate in a strong case for these hybrid institutional structures to be located at the scale of District Municipalities thus serving as the interface between local municipalities, district authorities and IPPs established in these jurisdictions.

Further stipulations could include a requirement for a target of SED and EnD expenditure (for example, 10% of the annual budget) to be committed to collaborative projects conceptualised and executed under the auspices of these district coordination forums. RE industry associations could have a supportive role in ensuring more effective collaboration and coordination, providing guidance about good practice across the sector. DFIs such as the Development Bank of Southern Africa, should play a critical role in configuring the financial and institutional arrangements underwriting the co-investment in long term high impact projects. These forums instigated in district municipalities across the country would thus enable the kinds of coordination and collaboration imagined by the ZF Mgcawu District Development Coordinating Forum. Moreover, such structures could institutionalise the requisite structural and relational capacities for both functional and thematic collaboration.

8.7.7.2 Communication and capacity building

Effective communication and regular information sharing will necessarily underscore efforts to coordinate and collaborate within the district forums proposed above. The ED requirements in REIPPPP should thus have detailed specifications that standardise communication between IPPs, between IPPs and local municipalities, and between IPPs and wider stakeholders. This could take the form of basic templates populated by IPPs and disseminated amongst coordination forum stakeholders. Additionally, requirements for participation within the formal municipal processes, such as IDP, LED and SDF consultations could ensure channels of communication between local municipalities and IPPs and opened up.

All of these suggestions rest on the capacity of stakeholders (both directly and indirectly) implicated in the implementation and oversight of the REIPPPP to be sufficiently equipped for such coordination, collaboration and communication. Therefore, capacity building will be a vital component of any reforms to the REIPPPP. Strengthening the social performance capabilities across the RE sector is one such avenue through which to

build the relational capacity necessary to unlock the developmental potential of the REIPPPP. Industry associations and various communities of practice in the RE sector could play an enabling role in this regard.

8.7.2 Evolving the REIPPPP as a policy assemblage to amplify the social logic of RE development

The previous recommendation suggested tweaks to reform the REIPPPP as the current, and preferred RE procurement framework in South Africa. To more fully achieve energy transition that realises decarbonisation and development, the social logic of RE development needs to be operationalised as the driving modality of the policy assemblage that shapes the directionality of the energy transition. This is true for South Africa, but indeed also, the global energy transition. However, this does not mean to say that the corporate logic will, or should be eliminated (its utility with respect to decarbonisation was captured in 7.4.1). Rather, a more generative alignment between the two modalities needs to be achieved.

In order for South Africa to achieve the developmental and decarbonisation ambitions of energy democracy, a radical departure from the current electricity policy regime will have to be advanced by a coalition of policy actors; for example, development finance institutions that have had a major role to play in the country's energy transition thus far. A policy assemblage perspective (core to the conceptual framework employed throughout this thesis) is enabling in that is assists in assessing current policies, but also "provides a foundation for *designing* policies that are adequate and appropriate for the task they address" (Fox & Alldred, 2020b).

Such a reorientation towards energy democracy would entail the strategic re-arrangement of the country's RE policy assemblage, including the reconfiguration of the REIPPPP as the primary mechanism to procure utility-scale RE and enable private sector participation in RE electricity generation, but also, the introduction of additional and complementary procurement mechanisms to widen participation in the RE sector. These additional modalities for RE procurement would need to span private and public generation, off-grid to utility-scale, and large-scale to small-scale configurations. Any combination of infrastructure configurations, policy frameworks and governance practices to advance energy democracy in South Africa will need to be rooted in sound development theory and practice. That is, an orientation to development that prioritises the self-defined social processes of facilitating resourcefulness and cultivating individual and collective capabilities to advance social-ecological wellbeing while also sustaining the structural conditions to enable the process of development itself (Evans, 2002; Westoby & Kaplan, 2013; Castells & Himanen, 2014). Much like what was recommended above in section 8.7, embedding this perspective on development into the policy frameworks and governance practices to advance energy democracy, will necessitate ongoing knowledge and practice partnerships.

Deepening the social logic of RE development would thus see public institutions, such as state-owned enterprise, utilities, community cooperatives or municipalities, fulfilling a multiplicity of roles in the energy transition, in support of the deployment of RE infrastructures. In short, a driving role for the social logic of RE

development would trigger the cultivation of a new generation of hybrid institutional and ownership entities to advance the energy transition. Such hybrids could involve local governments, community trusts, social enterprises, cooperatives and many more. The result of which would be a much more diverse institutional eco-system advancing the energy transition in line with the vision of energy democracy. A further implication of an appropriate policy assemblage to advance this logic of RE development would be the clarified role of Eskom and local municipalities in the generation of electricity from RE sources.

8.8 Recommendations for future research

This thesis opens fertile ground for further research, especially in light of the recommendations introduced in the previous section. I will first consider avenues for further research with reference to the transdisciplinary research methodology as well as the conceptual framework.

This thesis presented a novel framing of transdisciplinary research. Further engagement with the guiding principles that informed my methodological praxis could strengthen this perspective and demonstrate the usefulness of this approach for other research processes that share the ambition to practise social 'science that matters' in the context of sustainability science. Such engagement might address possible shortcomings and deepen the approach's attunement to intersectional considerations.

To make sense of the dynamics of South Africa's energy transition and its grounded realities, I developed a conceptual framework through an abduction approach to empirical and theoretical development. This theory of socio-technical change was useful although there are clear areas for improvement and refinement. Further research could entail the enrichment of this theory of socio-technical change with the stronger consideration of the literature of institutional theory and social innovation. Additionally, literature relating to development policy, political economy, ecological economics and the economics of energy, has the potential to deepen the theoretical orientation.

Looking beyond the theoretical and conceptual development of this research, further research is required into how the insights generated in this inquiry, together with the recommendations surveyed above, might be translated into practical and explicit policy rules. This would entail robust and sustained engagement with policy makers in the energy policy landscape, for example, with the IPP Office, the Department of Mineral Resources and Energy, and the Development Bank of Southern Africa. Furthermore, these could be complemented by a comparative analysis between various collaborative governance responses in different parts of the country, where industry associations are best positioned to collate such insights.

8.9 Concluding thoughts

This thesis exemplifies a deeply personal and transformative process of knowledge production. Earlier in Chapter 2, I reflected on transdisciplinary research as a process of becoming, part of a shared undertaking about finding ways forward into a more just and generative future, and indeed one in which I played an

animating role. Through the framing of 'practising social science that matters' I set out to contribute towards social and scientific commentary and action about how things might be done differently. This played out with reference to the design and implementation of RE procurement frameworks in South Africa. As the primary outcome of such a process of becoming, I have come to see the thesis a living document, testament to the complex, exploratory, and emergent process of learning that this PhD signifies, and one that is part of a larger research community and societal context. As a living document, this thesis has evolved during the course of an inquiry that has spanned five years: from my very first conversations about the RE programme in 2016, through phases of intensive involvement with the Forum, and even more challenging periods of reflection, sensemaking, synthesis, and writing. As a living document, it also falls short in capturing the immense insight and experience that I gained along the way. Nonetheless, I have endeavoured to emulate the richness of this inquiry in how I assembled this 'final' iteration of the thesis. It is my hope that these insights are of service to the ongoing research efforts to inform the pace and directionality of South Africa's energy transition, and in saying so, I recognise the importance of a committed and sustained inquiry into the transition potentials manifested in South Africa's political economy of energy.

References

Abraham, J. 2017. Just Transitions for the Miners: Labor Environmentalism in the Ruhr and Appalachian Coalfields. *New Political Science,* 39(2):218–240.

Achiba, G.A. 2019. Navigating Contested Winds: Development Visions and Anti-Politics of Wind Energy in Northern Kenya. *Land*, 8(7):1-29.

Agnew, J. 2017. The tragedy of the nation-state. *Territory, Politics, Governance*, 5(4):347–350.

Ahmed, N.M. 2017. *Failing States, Collapsing Systems: BioPhysical Triggers of Political Violence.* Springer.

AMCU. 2018. *AMCU Press Statement on renewable energy and jobs.* [Online], Available: https://amcu.co.za/2018/03/23/pess-statement-amcu-statement-on-renewable-energy-and-jobs-23-march-2018/.

Anderson, B. & McFarlane, C. 2011. Assemblage and geography. *Area*, 43(2):124–127.

Andrews, N. & Nwapi, C. 2018. Bringing the state back in again? The emerging developmental state in Africa's energy sector. *Energy Research & Social Science*, 41:48-58, July.

Angel, J. 2016. Towards an Energy Politics In-Against-and-Beyond the State: Berlin's Struggle for Energy Democracy. *Antipode*, 49(3):557–576.

Anon. 2017b. *Personal email correspondence RE: ZF Mgcawu Development Coordinating Forum - Strategy Document*. Monday, 05 March 2018 2:34 PM. [Online].

Anon. 2018a. *Personal email correspondence RE: ZF Mgcawu Development Coordinating Forum - Strategy Document*. Monday, 26 March 2018 11:05 PM. [Online].

Ansell, C. & Gash, A. 2007. Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory,* 18(4):543–571.

Ansell, C. & Gash, A. 2018. Collaborative platforms as a governance strategy. *Journal of Public Administration Research and Theory,* 28(1):16–32.

Araújo, K. 2014. The emerging field of energy transitions: Progress, challenges, and opportunities. *Energy Research & Social Science,* 1:112–121, March.

Atkinson, D. 2016. Renewable energy and boomtown conditions: How to maximise potential benefits for local and regional development. WindAC conference proceedings. 31 October – 1 November. Cape Town, South Africa.

Auerbach, C. 2020. Why is democracy desirable? Neo-Aristotelian, critical realist, and psychodynamic approaches. *Journal of Critical Realism,* 19(4):362-379.

Augsburg, T. 2014. Becoming transdisciplinary: The emergence of the transdisciplinary individual. World *Futures*, 70(3–4):233–247.

Avelino, F. & Rotmans, J. 2009. Power in transition: an interdisciplinary framework to study power in relation to structural change. *European Journal of Social Theory,* 12(4):543–569.

Avelino, F. 2017. Power in Sustainability Transitions: Analysing power and (dis)empowerment in transformative change towards sustainability. *Environmental Policy and Governance,* 27(6):505-520.

Avelino, F., Grin, J., Pel, B. & Jhagroe, S. 2016. The politics of sustainability transitions. *Journal of Environmental Policy & Planning,* 18(5):557-567.

Avila, S. 2018. Environmental justice and the expanding geography of wind power conflicts. *Sustainability Science,* 13(3):599–616.

Avila-Calero, S. 2017. Contesting energy transitions: wind power and conflicts in the Isthmus of Tehuantepec. *Journal of Political Ecology,* 24(1):992–1012.

Ayala-Orozco, B., Rosell, J., Merçon, J., Bueno, I., Alatorre-Frenk, G., Langle-Flores, A. & Lobato, A. 2018. Challenges and Strategies in Place-Based Multi-Stakeholder Collaboration for Sustainability: Learning from Experiences in the Global South. *Sustainability,* 10(9):1-22.

Bäckstrand, K. 2006. Multi-Stakeholder Partnerships for Sustainable Development: Rethinking and Effectiveness. *European Environment,* 16(5):290–306.

Baker, L. & Burton, J. 2018. The politics of procurement and the low carbon transition in South Africa. In Goldthau, A., M.F. Keating, M.F. & C. Kuzemko, C. (eds). *Handbook of the International Political Economy of Energy and Natural Resources.* Cheltenham: Edward Elgar Publishing. 91–106.

Baker, L. & Phillips, J. 2019. Tensions in the transition: the politics of electricity distribution in South Africa. *Environment and Planning C: Politics and Space,* 37(1):177-196.

Baker, L. 2015a. Renewable energy in South Africa's minerals-energy complex: a 'low carbon' transition? *Review of African Political Economy,* 42(144):245–261.

Baker, L. 2015b. The evolving role of finance in South Africa's renewable energy sector. *Geoforum*, 64:146–156, August.

Baker, L., Newell, P. & Phillips, J. 2014. The Political Economy of Energy Transitions: The Case of South Africa. *New Political Economy,* 19(6):791–818.

Baker, S.H. 2016. Unmasking project finance: risk mitigation, risk inducement and an invitation to development disaster? *Texas Journal of Oil, Gas and Energy Law,* 6:273.

Baker, T. & McGuirk, P. 2017. Assemblage thinking as methodology: commitments and practices for critical policy research. *Territory, Politics, Governance,* 5(4):425–442.

Ballo, I.F. 2015. Imagining energy futures: Sociotechnical imaginaries of the future Smart Grid in Norway. *Energy Research & Social Science,* 9:9–20, September.

Balta-ozkan, N., Watson, T. & Mocca, E. 2015. Spatially uneven development and low carbon transitions: Insights from urban and regional planning. *Energy Policy,* 85:500–510, October.

Baptista, I. 2018. Space and energy transitions in sub-Saharan Africa: Understated historical connections. *Energy Research & Social Science,* 36:30–35, February.

Barnosky, A.D., Ehrlich, P.R. & Hadly, E.A. 2016. Avoiding collapse: Grand challenges for science and society to solve by 2050. *Elementa Science of the Anthropocene,* 4:000094.

Bauman, Z. 2012. Times of interregnum. *Ethics and Global Politics,* 5(1):49–56.

Baumgartner, F. & Jones, B. 1993. *Agendas and instability in American politics*. University of Chicago Press

Bauwens, T. & Devine-Wright, P. 2018. Positive energies? An empirical study of community energy participation and attitudes to renewable energy. *Energy Policy,* 118:612–625, July.

Bauwens, T. 2016. Explaining the diversity of motivations behind community renewable energy. *Energy Policy,* 93:278–290, June.

Bauwens, T., Gotchev, B. & Holstenkamp, L. 2016. What drives the development of community energy in Europe? the case of wind power cooperatives. *Energy Research & Social Science,* 13:136–147, March.

Bayer, B., Schäuble, D. & Ferrari, M. 2018. International experiences with tender procedures for renewable energy – A comparison of current developments in Brazil, France, Italy and South Africa. *Renewable and Sustainable Energy Reviews,* 95: 305–327, November.

Becker, S. & Naumann, M. 2017. Energy democracy: Mapping the debate on energy alternatives. *Geography Compass,* 11(8):1-13.

Becker, S., Beveridge, R. & Naumann, M. 2015. Remunicipalization in German cities: contesting neo-liberalism and reimagining urban governance? *Space and Polity,* 19(1):76–90.

Becker, S., Blanchet, T. & Kunze, C. 2016. Social movements and urban energy policy: Assessing contexts, agency and outcomes of remunicipalisation processes in Hamburg and Berlin. *Utilities Policy,* 41:228–236.

Bellamy, B.R. & Diamanti, J. 2018. *Materialism and the Critique of Energy*. Chicago: MCM.

Beltran, A. 2018. Introduction: Energy in History, the History of Energy. *Journal of Energy History, Revue d'Histoire de l'Énergie*, 1:1-25.

Berger, R. 2015. Now I see it, now I don't: researcher's position and reflexivity in qualitative research. *Qualitative Research*, 15(2):219-234.

Bernstein, S. & Hoffmann, M. 2018. Decarbonisation: The Politics of Transformation. In Jordan, A., Huitema, D., Van Asselt, H. & Forster, J. (eds). *Governing Climate Change: Polycentricity in Action?* Cambridge: Cambridge University Press. 248–265.

Bernstein, S. & Hoffmann, M. 2018. The politics of decarbonization and the catalytic impact of subnational climate experiments. *Policy Sciences,* 51(2):189–211.

Bhamidipati, P.L., Elmer Hansen, U. & Haselip, J. 2019. Agency in transition: The role of transnational actors in the development of the off-grid solar PV regime in Uganda. *Environmental Innovation and Societal Transitions,* 33:30–44, February.

Bhamidipati, P.L., Haselip, J. & Hansen, U.E. 2019. How do energy policies accelerate sustainable transitions? Unpacking the policy transfer process in the case of GETFiT Uganda. *Energy Policy,* 132:1320–1332, May.

Bhorat, H., Buthelezi, M., Chipkin, I., Duma, S., Mondi, L., Peter, L., Qobo, L., Swilling, M., et al. 2017. Betrayal of the Promise: How South Africa is being Stolen. Cape Town. [Online], Available: http://markswilling.co.za/wp-content/uploads/2017/05/25052017-Betrayal-of-the-Promise.pdf.

Bhorat, H., Cassim, A. & Hirsch, A. 2014. Policy co-ordination and growth traps in a middle-income country setting: The case of South Africa. WIDER Working Paper. [Online]. Available: https://www.wider.unu.edu/publication/policy-co-ordination-and-growth-traps-middle-income-country-setting.

Binz, C., Coenen, L., Murphy, J.T. & Truffer, B. 2020. Geographies of transition—From topical concerns to theoretical engagement: A commentary on the transitions research agenda. *Environmental Innovation and Societal Transitions,* 34:1–3, March.

Bischof-Niemz, T. & Creamer, T. 2019. *South Africa's Energy Transition: A Roadmap to a Decarbonised, Low-cost and Job-rich Future.* Oxon: Routledge.

Blimpo, M.P. & Cosgrove-Davies, M. 2019. *Electricity Access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact*. The World Bank.

Bolton, R. & Foxon, T.J. 2015. Infrastructure transformation as a socio-technical process - Implications for the governance of energy distribution networks in the UK. *Technological Forecasting and Social Change*, 90b:538–550, January.

Borgström, S. 2019. Balancing diversity and connectivity in multi-level governance settings for urban transformative capacity. Urban Transformative Capacity, 48:463-477, February.

Bouzarovski, S., Bradshaw, M. & Wochnik, A. 2015. Making territory through infrastructure: The governance of natural gas transit in Europe. *Geoforum*, 64:217–228, August.

Boyer, D. 2011. Energopolitics and the Anthropology of Energy. *Anthropology News,* 52(5):5–7.

Boyer, D. 2014. Energopower: an introduction. *Anthropological Quarterly,* 2: 309-333.

Bradshaw, M.J. 2010. Global energy dilemmas: A geographical perspective. *Geographical Journal,* 176(4):275–290.

Braidotti, R. 2018. A Theoretical Framework for the Critical Posthumanities. *Theory, Culture & Society,* 36(6):31-61.

Brenner, N., Madden, D.J. & Wachsmuth, D. 2011. Assemblage urbanism and the challenges of critical urban theory. *City*, 15(2):225–240.

Briassoulis, H. 2017. Why I fell for assemblages: A response to comments. *Dialogues in Human Geography*, 7(2):212–220.

Briassoulis, H. 2019. Governance as multiplicity: the Assemblage Thinking perspective. *Policy Sciences*, 52:419-450, January.

Bridge, G., Bouzarovski, S., Bradshaw, M. & Eyre, N. 2013. Geographies of energy transition: Space, place and the low-carbon economy. *Energy Policy*, 53:331–340, February.

Bridge, G., Özkaynak, B. & Turhan, E. 2018. Energy infrastructure and the fate of the nation: Introduction to special issue. *Energy Research & Social Science*, 41:1–11, July.

Brisbois, M.C. 2020. Decentralised energy, centralised accountability: lessons on how to govern decentralised energy transitions from multi-level natural resource governance. *Global Transitions*, 2:16–25.

Broto, V.C., Baptista, I., Kirshner, J., Smith, S. & Alves, S.N. 2018. Energy justice and sustainability transitions in Mozambique. *Applied Energy*, 228:645–655, October.

Bueger, C. 2013. Thinking Assemblages Methodologically: Some Rule of Thumb. In Acuto, M. & S. Curtis, S. (eds). *Reassembling International Theory: Assemblage Thinking and International Relations*. Basingstoke: Palgrave Macmillan. 58-66.

Bulkeley, H. & Castán Broto, V. 2013. Government by experiment? Global cities and the governing of climate change. *Transactions of the Institute of British Geographers*, 38(3):361-375.

Bulkeley, H., Castán Broto, V. & Maassen, A. 2014. Low-carbon Transitions and the Reconfiguration of Urban Infrastructure. *Urban Studies*, 51(7):1471–1486.

Bulkeley, H., Marvin, S., Palgan, Y.V., McCormick, K., Breitfuss-Loidl, M., Mai, L., von Wirth, T. and Frantzeskaki, N. 2018. Urban living laboratories: conducting the experimental city? *European Urban and Regional Studies*, 26(4):317-335.

Burke, M.J. & Stephens, J.C. 2017. Energy democracy: Goals and policy instruments for sociotechnical transitions. *Energy Research & Social Science,* 33:35-48, November.

Burke, M.J. & Stephens, J.C. 2018. Political power and renewable energy futures: a critical review. *Energy Research & Social Science,* 35:78–93, January.

Burke, M.J. 2018. Shared yet Contested: Energy Democracy Counter-narratives. *Frontiers in Communication*, 3:1-15, June.

Burton, J., Caetano, T. & McCall, B. 2018. *Coal transitions in South Africa: Understanding the implications of a 2C-compatible coal phase-out plan for South Africa.* IDDRI & Climate Strategies. [Online]. Available: https://www.iddri.org/sites/default/files/PDF/Publications/Catalogue%20Iddri/Rapport/20180609_ReportCoal_SouthAfrica.pdf

Burton, J., Lott, T. & Rennkamp, B. 2018. Sustaining carbon lock-in: fossil fuel subsidies in South Africa. In Skovgaard, J. & Van Asselt, H. (eds). *The Politics of Fossil Fuel Subsidies and Their Reform*. Cambridge: Cambridge University Press. 229–245.

Büscher, B. 2009. Connecting political economies of energy in South Africa. *Energy Policy*, 37(10):3951–3958.

Caetano, T. & Burton, J. 2015. South Africa's proposed nuclear build plan: an analysis of the socioeconomic risks. *Energy Research Centre, University of Cape Town.* [Online]. Available: http://www.erc.uct.ac.za/sites/default/files/image_tool/images/119/Papers-2015/15-ERC-Nuclear_build_plan_Technical_report.pdf

Calitz, J. & Wright, J. 2020. Statistics of utility-scale solar PV, wind and CSP in South Africa in 2019. CSIR. [Online]. Available: https://researchspace.csir.co.za/dspace/handle/10204/11464.

Calvert, K. 2016. From 'energy geography' to 'energy geographies': Perspectives on a fertile academic borderland. *Progress in Human Geography,* 40(1):105–125.

Caniglia, G., Schäpke, N., Lang, D.J., Abson, D.J., Luederitz, C., Wiek, A., Laubichler, M.D., Gralla, F., et al. 2017. Experiments and evidence in sustainability science: A typology. *Journal of Cleaner Production*, 169:39–47, December.

Castells, M. & Himanen, P. Eds. 2014. *Reconceptualizing Development in the Global Information* Age. Oxford, UK: Oxford University Press.

Cherp, A., Vinichenko, V., Jewell, J., Brutschin, E. & Sovacool, B. 2018. Integrating techno-economic, socio-technical and political perspectives on national energy transitions: A meta-theoretical framework. *Energy Research & Social Science*, 37:175–190, March.

Chettiar, M., Lakmeeharan, K. & Koch, R.G. 2009. Review of the January 2008 electricity crisis. *Cigré 6th Southern Africa Regional Conference.* Somerset West, South Africa.

Clark, N. & Yusoff, K. 2014. Combustion and Society: A Fire-Centred History of Energy Use. *Theory, Culture & Society*, 31(5):203–226.

Cloete, K. 2018. *Op-Ed: Numsa supports a transition from dirty energy to clean renewable energy.* Daily Maverick. 15 March. [Online], Available: https://www.dailymaverick.co.za/article/2018-03-15-op-ed-numsa-supports-a-transition-from-dirty-energy-to-clean-renewable-energy/.

Cock, J. 2019. Resistance to coal inequalities and the possibilities of a just transition in South Africa. *Development Southern Africa,* 36(6):860-873.

Cockburn, J. & Cundill, G. 2016. Ethics in Transdisciplinary Research: Reflections on the Implications of 'Science with Society'. In Macleod, C.I., Marx, J., Mnyaka, P., Treharne, G.J .(eds). *The Palgrave Handbook of Ethics in Critical Research.* Palgrave. 81–97.

Cooperrider, D.L. & Srivastva, S. 1987. Appreciative Inquiry in Organizational Life. *Research in Organizational Change and Development*, 25: 81-142.

Cotarelo, P., Llistar, D., Perez, A., Guillamon, A., Campuzano, M., & Berdie, L. 2014. *Defining Energy Sovereignty*. El Ecologista, Ecologistas en Acción Magazine n° 81, Summer 2014. [Online]. Available: https://www.odg.cat/sites/default/files/energy_sovereignty_0.pdf.

Cowell, R., Ellis, G., Sherry-Brennan, F., Strachan, P.A. & Toke, D. 2017. Sub-national government and pathways to sustainable energy. *Politics and Space C: Politics and Space,* 35(7): 1139-1155.

Creamer, E., Eadson, W., Pinker, A., Tingey, M., Markantoni, M., Foden, M., Speight, T.B. & Barnacle, M.L. 2018. Community energy: Entanglements of community, state, and private sector. *Geography Compass*, 12(7), June.

Creamer, E., Taylor, G., Veelen, B. Van, Walker, G. & Devine-Wright, P. 2019. Community renewable energy: What does it do? Walker and Devine-Wright (2008) ten years on. *Energy Research & Social Science*, 57:1-6, November.

Creswell, J.W. & Miller, D.L. 2016. Determining Validity in Qualitative Inquiry. *Theory into Practice*, 39(3):124-130.

CSIR. 2019. *CSIR presentation to the Portfolio Committee on Mineral Resources and Energy.* [Online]. Available: https://www.csir.co.za/sites/default/files/Documents/CSIR%20Portfolio%20Committee%20on%20Mineral%20resources%20and%20Energy2019.pdf.

Cumbers, A. 2016. Remunicipalization, the Low-Carbon Transition, and Energy Democracy. In Worldwatch Institute. *State of the World: Can a City Be Sustainable?* Washington: Island Press. 275–289.

Cunliffe, A.L. 2018. Wayfaring: A Scholarship of Possibilities or Let's not get drunk on abstraction. *Management,* 21(4):1429–1439.

Daggett, C.N. 2019. *The Birth of Energy: Fossil Fuels, Thermodynamics, and the Politics of Work*. Durham, NC: Duke University Press.

Danermark, B., Ekström, M., Jakobsen, L. & Karlsson, J.C. 2002. *Explaining Society: An Introduction to Critical Realism in the Social Sciences*. London: Routledge.

Darbellay, F. 2015. Rethinking inter- and transdisciplinarity: Undisciplined knowledge and the emergence of a new thought style. *Futures*, 65:163–174, January.

Davidson, D. & Gross, M. 2018. A time of change, a time for change: energy-society relations in the twenty-first century. In Davidson, D.J. & Gross, M. (eds). *The Oxford Handbook of Energy and Society.* New York: Oxford University Press. 1-14.

Davies, M. & Morar, J. 2016. *Northern Cape Explorations into the Renewable Energy Space*. The Sustainability Institute [Online]. Available: https://www.sustainabilityinstitute.net/5153-northern-cape-explorations-into-renewable-energy-space/.

Davies, M. & Swilling, M. 2018. Intermediation and learning in Stellenbosch's urban living lab. In S. Marvin, H. Bulkeley, L. Mai, K. McCormick, & Y. Voytenko Palgan (eds.). *Routledge Urban Living Labs: Experimenting with City Futures*. 105–119.

Davies, M., Swilling, M. & Wlokas, H.L., 2018. Towards new configurations of urban energy governance in South Africa's renewable energy procurement programme. *Energy Research & Social Science*, 36: 61-69, February.

de Haan, F.J. & Rotmans, J. 2018. A proposed theoretical framework for actors in transformative change. *Technological Forecasting and Social Change,* 128:275–286, March.

Debizet, G., Tabourdeau, A., Gauthier, C. & Menanteau, P. 2016. Spatial processes in urban energy transitions: considering an assemblage of Socio-Energetic Nodes. *Journal of Cleaner Production,* 134a:330–341, October.

Debor, S. 2018. *Multiplying Mighty Davids? The Influence of Energy Cooperatives on Germany's Energy Transition.* Springer.

Delina, L.L. 2018. Energy democracy in a continuum: Remaking public engagement on energy transitions in Thailand. *Energy Research & Social Science,* 42:53–60, August.

Delina, L.L. 2018. Whose and what futures? Navigating the contested coproduction of Thailand's energy sociotechnical imaginaries. *Energy Research & Social Science,* 35:48–56, January.

Della Bosca, H. & Gillespie, J. 2018. The coal story: Generational coal mining communities and strategies of energy transition in Australia. *Energy Policy,* 120:734–740.

Denzin, N.K. & Lincoln, Y.S. 2018. Introduction: The Discipline and Practice of Qualitative Research. In Denzin, N.K. & Lincoln, Y.S. (eds). *The Sage Handbook of Qualitative Research.* Thousand Oaks, CA: Sage Publications Inc. 29–70.

Denzin, N.K. 2016. Critical Qualitative Inquiry. *Qualitative Inquiry,* 23(1):8–16.

Department of Mineral Resources and Energy. 2019. *Integrated Resource Plan (IRP2019).* Pretoria. [Online]. Available: http://www.energy.gov.za/IRP/2019/IRP-2019.pdf.

Department of Public Enterprises. 2019. Roadmap for Eskom in a reformed electricity supply industry. Pretoria. [Online]. Available: https://www.gov.za/sites/default/files/gcis_document/201910/roadmap-eskom.pdf.

Di Muzio, T. 2015. *Carbon Capitalism: Energy, Social Reproduction and World Order.* London: Rowman & Littlefield International, Ltd.

Dlamini, B. & Reddy, P.S. 2018. Theory and Practice of Integrated Development Planning A case study of Umtshezi Local Municipality in the KwaZulu- Natal Province of South Africa. *African Journal of Public Affairs,* 10(1):1–24.

Drimie, S., Hamann, R., Manderson, A.P. & Mlondobozi, N. 2018. Creating transformative spaces for dialogue and action: reflecting on the experience of the Southern Africa Food Lab. *Ecology and Society,* 23(3):1-9.

Droege, P. 2011. *Urban energy transition: from fossil fuels to renewable power.* Elsevier.

Dubois, A. & Gadde, L. 2002. Systematic combining: an abductive approach to case research. *Journal of Business Research,* 55(7):553–560.

Dubois, A. & Gadde, L. 2014. "Systematic combining" — A decade later. *Journal of Business Research*, 67(6):1277–1284.

Dubresson, A. & Jaglin, S. 2016. *ESKOM: Electricity and Technopolitics in South Africa*. Cape Town: UCT Press.

Eberhard, A. & Naude, R. 2016. The South African Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) – Lessons Learned. *Journal of Energy in Southern Africa,* 27(4):1–14.

Eberhard, A., Gratwick, K., Morella, E. & Antmann, P. 2017. Independent Power Projects in Sub-Saharan Africa: Investment trends and policy lessons. *Energy Policy,* 108:390–424.

Edigheji, O. (ed). 2010. *Constructing a democratic developmental state in South Africa: potentials and challenges.* Human Sciences Research Council. [Online]. Available: http://www.hsrc.ac.za/en/research-data/view/4991.

Edmondson, D.L., Kern, F. & Rogge, K.S. 2019. The co-evolution of policy mixes and socio-technical systems: Towards a conceptual framework of policy mix feedback in sustainability transitions. *Research Policy*, 48(10):1–14.

Emerson, K., Nabatchi, T. & Balogh, S. 2012. An integrative framework for collaborative governance. *Journal of Public Administration Research and Theory,* 22(1):1–29.

EnergyDesk.africa 2020. *Utility-scale Renewable Energy Generation Sites - South Africa.* [Online]. Available: https://www.energy.org.za/map-south-african-generation-projects.

Erensü, S. 2018. Powering neoliberalization: Energy and politics in the making of a new Turkey. *Energy Research & Social Science*, 41:148–157, July.

Escobar, A. 2015. Degrowth, postdevelopment, and transitions: a preliminary conversation. *Sustainability Science,* 10:451–462, April.

Eskom. 2013. Eskom power stations. [Online], Available: http://www.eskom.co.za/Whatweredoing/ElectricityGeneration/PowerStations/Documents/EskomGenerationDivMapREV81.pdf.

Eskom. 2019. *Eskom Holdings Soc Ltd Integrated Report.* [Online]. Available: https://www.eskom.co.za/IR2019/Documents/Eskom_2019_integrated_report.pdf.

Eskom. 2020a. Power Alert 2: 16 February 2020. [Online]. Available: https://twitter.com/Eskom_SA/status/1229069416354197505.

Eskom. 2020b. *Eskom Key Strategic Priorities.* [Online]. Available: https://www.eskom.co.za/news/Documents/GCE_FivePrioritiesUpdateCOVIDnumber.pdf.

Essop, T. 2018. *Just transition to a low carbon, climate resilient economy & society: background and context*. [Online], Available: http://discovery.ucl.ac.uk/1315882/.

Evans, G. & Phelan, L. 2016. Transition to a post-carbon society: Linking environmental justice and just transition discourses. *Energy Policy,* 99:329–339, December.

Evans, P. 2002. Collective Capabilities, Culture, and Amartya Sen's Development as Freedom. *Studies in comparative international development,* 37(2):54–60.

Fam, D., Palmer, J., Riedy, C. & Mitchell, C. 2017. *Transdisciplinary Research and Practice for Sustainability Outcomes.* Routledge.

Farías, I. 2011. The politics of urban assemblages. *City*, 15(3–4):365–374.

Farrell, C. 2012. A Just Transition: Lessons Learned from The Environmental Justice Movement. *Duke Forum for Law & Social Change*, 4:45–63.

Fig, D. 2018. Capital, Climate and the Politics of Nuclear Procurement in South Africa. In Satgar, V. (ed). *The Climate Crisis: South African and global democratic eco-socialist alternatives*. Wits University Press. 252–271.

Fine, B. & Rustomjee, Z. 1996. *The political economy of South Africa: From minerals-energy complex to industrialisation.* Boulder, CO: Westview Press.

Fischer, L.B. & Newig, J. 2016. Importance of actors and agency in sustainability transitions: A systematic exploration of the literature. *Sustainability*, 8(5):1-21.

Fischer-Kowalski, M., Rovenskaya, E., Krausmann, F., Pallua, I. & McNeill, J.R. 2019. Energy Transitions and Social Revolutions. *Technological Forecasting & Social Change,* 138:69–77, January.

Fitch-Roy, O., Benson, D. & Woodman, B. 2019. Policy Instrument Supply and Demand: How the Renewable Electricity Auction Took over the World. *Politics and Governance*, 7(1):81–91.

Flyvbjerg, B. 2001. *Making Social Science Matter: Why social inquiry fails and how it can succeed again.* Cambridge: Cambridge University Press.

Foster, K.J.R. 2012. Policy regimes in South African Electricity Policy as a Barrier to Reform and Sustainability. Unpublished masters dissertation. Cape Town: University of Cape Town. [Online]. Available: https://open.uct.ac.za/handle/11427/12080.

Fouch, E. & Brent, A. 2019. Journey towards Renewable Energy for Sustainable Development at the Local Government Level: The Case of Hessequa Municipality in South Africa. *Sustainability*, 11(3):1-18.

Fouquet, R. & Pearson, P.J.G. 2012. Past and prospective energy transitions: Insights from history. *Energy Policy*, 50:1–7, November.

Fouquet, R. 2010. The slow search for solutions: Lessons from historical energy transitions by sector and service. *Energy Policy,* 38(11):6586–6596.

Fox, N.J. & Alldred, P. 2015. New materialist social inquiry: designs, methods and the research-assemblage. *International Journal of Social Research Methodology,* 18(4):399–414.

Fox, N.J. & Alldred, P. 2020a. Sustainability, feminist posthumanism and the unusual capacities of (post)humans. *Environmental Sociology,* 6(2):121–131.

Fox, N.J. & Alldred, P. 2020b. Re-assembling climate change policy: Materialism, posthumanism, and the policy assemblage. *British Journal of Sociology*, 71(2):269-283.

Fox, N.J. 2003. Practice-based Evidence: Towards Collaborative and Transgressive Research. *Sociology*, 37(1):81–102.

Foxon, T. 2017. *Energy and Economic Growth: Why we need a new pathway to prosperity.* Routledge.

Frankfurt School-UNEP Centre/BNEF. 2019. *Global Trends in Renewable Energy Investment*. [Online]. Available: https://www.fs-unep-centre.org/global-trends-in-renewable-energy-investment-2019/.

Frankfurt School-UNEP Centre/BNEF. 2020. *Global Trends in Renewable Energy Investment 2020.* [Online]. Available: https://www.fs-unep-centre.org/wp-content/uploads/2020/06/GTR_2020.pdf.

Frantzeskaki, N., Loorbach, D. & Meadowcroft, J. 2012. Governing transitions to sustainability: Transition management as a governance approach towards pursuing sustainability. *International Journal of Sustainable Development,* 15(1-2):19-36.

Fritz, L. & Binder, C.R. 2018. Participation as Relational Space: A Critical Approach to Analysing Participation in Sustainability Research. *Sustainability*, 10(8):1-29.

Furnaro, A. 2019. Neoliberal energy transitions: The renewable energy boom in the Chilean mining economy. *Environment and Planning E: Nature and Space,* 0(0):1–25.

Galvin, R. 2020. “Let justice roll down like waters”: Reconnecting energy justice to its roots in the civil rights movement. *Energy Research & Social Science,* 62:1-7, April.

Gaunt, C.T. 2008. Electricity distribution industry restructuring in South Africa: A case study. *Energy Policy,* 36(9):3448–3459.

Geels, F.W. 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy,* 31(8-9):1257–1274.

Geels, F.W. 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions,* 1(1):24–40.

Geels, F.W. 2014. Regime Resistance against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective. *Theory, Culture & Society,* 31(5):21-40.

Geels, F.W. 2018. Disruption and low-carbon system transformation: Progress and new challenges in socio-technical transitions research and the Multi-Level Perspective. *Energy Research & Social Science*, 37:224-231, March.

Geels, F.W., Kern, F., Fuchs, G., Hinderer, N., Kungl, G., Mylan, J., Neukirch, M. & Wassermann, S. 2016. The enactment of socio-technical transition pathways : A reformulated typology and a comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990 – 2014). *Research Policy,* 45:896–913.

Geels, F.W., Sovacool, B.K., Schwanen, T. & Sorrell, S. 2017. The Socio-Technical Dynamics of Low-Carbon Transitions. *Joule*, 1(3):463–479.

Gismondi, M. 2018. Historicizing transitions: The value of historical theory to energy transition research. *Energy Research & Social Science,* 38:193–198, February.

Glasbergen, P. 2008. Setting the scene: the partnership paradigm in the making. In Glasbergen,P., Biermann, F. & Mol, A. (eds*). Partnerships, Governance and Sustainable Development: Reflections on Theory and Practice*. Cheltenham: Edward Elgar Publishing.

Goldfischer, E., Rice, J.L. & Black, S.T. 2020. Obstinate curiosity and situated solidarity in urban political ecology. *Geography Compass*, 14(2):1–11.

Goldthau, A. & Sovacool, B.K. 2012. The uniqueness of the energy security, justice, and governance problem. *Energy Policy*, 41:232–240, February.

Goldthau, A. 2014. Rethinking the governance of energy infrastructure: Scale, decentralization and polycentrism. *Energy Research & Social Science*, 1:134–140, March.

Gorur, R. 2011. Policy as assemblage. *European Educational Research Journal, 10*(4):611–622.

Govender, J. & Dempster, E. 2019. *The Integrated Resource Plan 2019: A promising future roadmap for generation capacity in South Africa.* Cliff Dekker Hofmeyr. [Online]. Available: https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html.

Government of South Africa. 2013. *National Development Plan 2030*. Pretoria. [Online]. Available: https://www.gov.za/issues/national-development-plan-2030.

Graham, S. 2010. *Disrupted cities: When infrastructure fails*. Routledge.

Gray, B. & Stites, J. 2013. *Sustainability through partnerships: Capitalizing on Collaboration*. Network for Business Sustainability. [Online]. Available: http://www.wageningenportals.nl/sites/default/files/resource/nbs-systematic-review-partnerships.pdf.

GreenCape. 2020. *Utility-scale renewable energy sector: 2020 Market Intelligence Report.* Cape Town. [Online]. Available: https://www.greencape.co.za/assets/RENEWABLE_ENERGY_MIR_20200330_WEB.pdf.

Grubler, A., Wilson, C. & Nemet, G. 2016. Apples, oranges, and consistent comparisons of the temporal dynamics of energy transitions. *Energy Research & Social Science*, 22:18–25, December.

Gui, E.M. & MacGill, I. 2017. Typology of future clean energy communities: An exploratory structure, opportunities, and challenges. *Energy Research & Social Science,* 35:94–107, January.

Haapala, J. & White, P. 2018. Development through Bricoleurs Development through Bricoleurs: Portraying Local Personnels Role in Implementation of Water Resources Development in Rural Nepal. *Water Alternatives*, 11(3):979–998.

Haarstad, H. 2016. Where are urban energy transitions governed? Conceptualizing the complex governance arrangements for low-carbon mobility in Europe. *Cities*, 54:4–10, May.

Hadorn, G.H., Hoffmann-Riem, H., Biber-Klemm, S., Grossenbacher-Mansuy, W., Joye, D., Pohl, C., Wiesmann, U. & Zemp, E. 2008. *Handbook of transdisciplinary research*. Dordrecht: Springer.

Hafner, S., Jones, A., Anger-Kraavi, A. & Pohl, J. 2020. Closing the green finance gap – A systems perspective. *Environmental Innovation and Societal Transitions,* 34:26–60, March.

Haider, L.J., Matteo, J.H., Julie, G., Hamann, M., Masterson, V.A., Meacham, M., Merrie, A., Ospina, D., et al. 2017. The undisciplinary journey: early-career perspectives in sustainability science. *Sustainability Science,* 13(1):191–204.

Hajer, M. & Versteeg, W. 2018. Imagining the post-fossil city: why is it so difficult to think of new possible worlds? *Territory, Politics, Governance,* 7(2):122-134.

Hajer, M. & Pelzer, P. 2018. *2050 – An Energetic Odyssey:* Understanding 'Techniques of Futuring' in the transition towards renewable energy. *Energy Research & Social Science,* 44:222-231, October.

Hajer, M. 2003. Policy without Polity? Policy Analysis and the Institutional Void. *Policy Sciences,* 36:175–195, June.

Hall, S., Roelich, K.E., Davis, M.E. & Holstenkamp, L. 2018. Finance and justice in low-carbon energy transitions. *Applied Energy,* 222:772–780, July.

Hamilakis, Y. & Jones, A.M. 2017. Archaeology and assemblage. *Cambridge Archaeological Journal,* 27(1):77–84.

Hansen, T. & Coenen, L. 2015. The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field. *Environmental Innovation and Societal Transitions*, 17:92-109, December.

Hansen, U.E., Nygaard, I., Romijn, H., Wieczorek, A., Kamp, L.M. & Klerkx, L. 2018. Sustainability transitions in developing countries: Stocktaking, new contributions and a research agenda. *Environmental Science & Policy*, 84:198–203, June.

Hargreaves, T., Hielscher, S., Seyfang, G. & Smith, A. 2013. Grassroots innovations in community energy: The role of intermediaries in niche development. *Global Environmental Change,* 23(5):868–880.

Harney, L., McCurry, J., Scott, J. & Wills, J. 2015. Developing 'process pragmatism' to underpin engaged research in human geography. *Progress in Human Geography*, 40(3):316–333.

Harrahill, K. & Douglas, O. 2019. Framework development for 'just transition' in coal producing jurisdictions. *Energy Policy*, 134:110990, November.

Harrison, C. & Popke, E.J. 2018. Critical energy geographies. In Solomon, B.D. & Calvert, K.E. (eds). *Handbook on the Geographies of Energy*. Cheltenham: Edward Elgar Publishing Ltd. 490–501.

Harvey, B., Cochrane, L. & Van Epp, M. 2019. Charting knowledge co-production pathways in climate and development. *Environmental Policy and Governance*, 29(2):107-117.

Healy, N. & Barry, J. 2017. Politicizing energy justice and energy system transitions: Fossil fuel divestment and a "just transition". *Energy Policy,* 108:451–459, September.

Heffron, R.J. & McCauley, D. 2017. The concept of energy justice across the disciplines. *Energy Policy,* 105:658-667, June.

Heffron, R.J. & McCauley, D. 2018. What is the 'Just Transition'? *Geoforum*, 88:74–77, January.

Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlmann, S. & Smits, R. 2007. Functions of innovation systems: A new approach for analysing technological change. *Technological Forecasting and Social Change*, 74(4):413–432.

Hermanus, L. 2015. *Local Governments' Changing Power in South Africa's Energy System: Reshaping the regulatory space for renewable energy, from the bottom up*. Unpublished masters thesis. Cape Town: University of Cape Town. [Online]. Available: https://open.uct.ac.za/handle/11427/25323.

Hess, D.J. 2018. Energy democracy and social movements: A multi-coalition perspective on the politics of sustainability transitions. *Energy Research & Social Science*, 40:177–189, June.

Hess, D.J., Mai, Q.D., Skaggs, R. & Sudibjo, M. 2018. Local matters: Political opportunities, spatial scale, and support for green jobs policies. *Environmental Innovation and Societal Transitions,* 26:158–170, March.

Hickel, J. 2017. *The Divide: A Brief Guide to Global Inequality.* London: Penguin Random House Books.

Hicks, J. & Ison, N. 2018. An exploration of the boundaries of 'community' in community renewable energy projects: Navigating between motivations and context. *Energy Policy,* 113:523–534, February.

Hildén, M., Jordan, A. & Huitema, D. 2017. Special issue on experimentation for climate change solutions editorial: The search for climate change and sustainability solutions - The promise and the pitfalls of experimentation. *Journal of Cleaner Production*, 169:1–7, December.

Hirsh, R.F. & Jones, C.F. 2014. History's contributions to energy research and policy. *Energy Research & Social Science,* 1:106–111, March.

Hodson, M., Marvin, S., Robinson, B. & Swilling, M. 2012. Reshaping urban infrastructure. *Journal of Industrial Ecology,* 16(6):789–800.

Hoffman, J. 2013. Theorizing power in transition studies: The role of creativity and novel practices in structural change. *Policy Sciences,* 46(3):257–275.

Hoffman, J., Arifi, B., Bazaz, A., Davies, M., Hajer, M., Revi, A. & Swilling, M. Forthcoming. *Reconfiguring Energy Transitions: Can Social Equity and Investments in Renewable Energy be Re-aligned?* Utrecht University.

Hölscher, K., Frantzeskaki, N. & Loorbach, D.A. 2019. Steering transformations under climate change: capacities for transformative climate governance and the case of Rotterdam, the Netherlands. *Regional Environmental Change,* 19:791-805, April.

Hölscher, K., Wittmayer, J.M. & Loorbach, D. 2018. Transition versus transformation: what's the difference? *Environmental Innovation and Societal Transitions*, 27:1–3, June.

Hölscher, K., Wittmayer, J.M., Avelino, F. & Giezen, M. 2019. Opening up the transition arena: An analysis of (dis)empowerment of civil society actors in transition management in cities. *Technological Forecasting and Social Change*, 145:176-185, August.

Hoogendoorn, G. & Visser, G. 2016. South Africa's small towns: A review on recent research. *Local Economy*, 31(1-2):95-108.

Houghton, J. 2016. (Regional and) local economic development themes in contemporary South African Cities. *Local Economy: The Journal of the Local Economy Policy Unit,* 31(1-2):42-56.

Howe, C. & Boyer, D. 2016. Aeolian Extractivism and Community Wind in Southern Mexico. *Public Culture,* 28(2):215–235.

Huang, P., Castán Broto, V. & Liu, Y. 2018. From "transitions in cities" to "transitions of cities": The diffusion and adoption of solar hot water systems in urban China. *Energy Research & Social Science*, 36:156-164, February.

Huber, M. 2015. Theorizing Energy Geographies. *Geography Compass*, 9(6):327–338.

Huber, M.T. 2009. Energizing historical materialism: Fossil fuels, space and the capitalist mode of production. *Geoforum,* 40(1):105–115.

Hursthouse, R. 1999. *On virtue ethics.* Oxford.

IEA. 2019. *Africa Energy Outlook 2019 – Analysis Scenarios.* Africa Energy Outlook 2019. [Online], Available: https://www.iea.org/reports/africa-energy-outlook-2019#energy-access%0Ahttps://www.iea.org/reports/africa-energy-outlook-2019#africa-case.

Ingold, T. 2011. *Being Alive: Essays on Movement, Knowledge and Description*. London: Routledge.

IPP Office. 2016. *Independent Power Producers Procurement Programme: An Overview As at 31 December 2016.* Johannesburg. [Online]. Available: https://www.ipp-projects.co.za/Publications..

IPP Office. 2017. *Independent Power Producers Procurement Progamme: An Overview As at 31 March 2017*. Johannesburg. [Online], Available: https://www.ipp-projects.co.za/Publications.

IPP Office. 2019. *Independent Power Producers Procurement Programme: An Overview As at 31 March 2019.* [Online]. Available: https://www.ipp-projects.co.za/Publications.

IPPPP Office. 2018. *Remarks by the Head of the IPP Office*. [Online]. Available: http://www.energy.gov.za/files/media/speeches/2018/Remarks-by-the-Head-of-the-IPP-Office.pdf.

Ireland, G. & Burton, J. 2018. *An assessment of new coal plants in South Africa's electricity future: The cost, emissions and supply security implications of the coal IPP programme.* Africa Portal. [Online]. Available:

https://www.africaportal.org/publications/assessment-new-coal-plants-south-africas-electricity-future-cost-emissions-and-supply-security-implications-coal-ipp-programme/.

IRENA. 2013. *Renewable Energy Auctions in Developing Countries*. IRENA. [Online], Available: https://www.irena.org/documentdownloads/publications/irena_renewable_energy_auctions_in_developing_countries.pdf.

IRENA. 2016. *Renewable Energy Auctions: Analysing 2016.* IRENA. [Online]. Available: https://www.irena.org/publications/2017/Jun/Renewable-Energy-Auctions-Analysing-2016.

IRENA. 2017. *Renewable Energy Policies in a Time of Transition.* IRENA. [Online]. Available: https://www.irena.org/publications/2018/apr/renewable-energy-policies-in-a-time-of-transition.

IRENA. 2018. Renewable Energy Auctions: Cases from Sub-Saharan Africa. IRENA [Online]. Available: https://www.irena.org/publications/2018/Apr/Renewable-energy-auctions-Cases-from-sub-Saharan-Africa.

IRENA. 2019. A New World: The Geopolitics of the Energy Transformation. IRENA. [Online]. Available: https://www.irena.org/publications/2019/Jan/A-New-World-The-Geopolitics-of-the-Energy-Transformation.

IRENA. 2020. Renewable Power Generation Costs in 2019. IRENA. [Online]. Available: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Power_Generation_Costs_2019.pdf.

Jaglin, S. & Verdeil, É. 2017. Emerging countries, cities and energy Questioning transitions. In Bouzarovski, S., Pasqualetti, M.J. & Broto, V.C (eds). *The Routledge Research Companion to Energy Geographies.* Routledge.

Jahn, T. 2008. Transdisciplinarity in the practice of research. In Bergmann, M. & Schramm, E. (eds). *Transdisziplinäre Forschung: Integrative Forschungsprozesse verstehen und bewerten*. Frankfurt: Campus Verlag. 21–37.

Jahn, T., Bergmann, M. & Keil, F. 2012. Transdisciplinarity: Between mainstreaming and marginalization. *Ecological Economics*, 79:1–10, July.

Jasanoff, S. & Kim, S. 2013. Sociotechnical Imaginaries and National Energy Policies. *Science as Culture*, 22(2):189-196.

Jasanoff, S. & Kim, S. 2015. *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power.* Chicago: The University of Chicago Press.

Jasanoff, S. 2018. Just transitions: A humble approach to global energy futures. *Energy Research & Social Science,* 35:11-14, January.

Jenkins, K. 2018. Setting energy justice apart from the crowd: Lessons from environmental and climate justice. *Energy Research & Social Science*, 39:117–121, May.

Jenkins, K., McCauley, D. & Forman, A. 2016. Energy justice: A policy approach. *Energy Policy*, 105,631-634, June.

Jenkins, K., Mccauley, D., Heffron, R., Stephan, H. & Rehner, R. 2016. Energy justice: A conceptual review. *Energy Research & Social Science*, 11:174–182, January.

Jessop, B. 2016a. Territory, politics, governance and multispatial metagovernance. *Territory, Politics, Governance,* 4(1):8–32.

Jessop, B. 2016b. *The State: Past, Present, Future*. Cambridge: Policy Press.

Johnstone, P. & Newell, P. 2017. Sustainability transitions and the state. *Environmental Innovation and Societal Transitions*, 27:72-82, June.

Jørgensen, U. 2012. Mapping and navigating transitions—The multi-level perspective compared with arenas of development. *Research Policy,* 41(6):996–1010.

Judson, E., Fitch-Roy, O., Pownall, T., Bray, R., Poulter, H., Soutar, I., Lowes, R., Connor, P., et al. 2020. De-centralisation, The centre cannot (always) hold: examining pathways towards energy system. *Renewable and Sustainable Energy Reviews*, 118:1-10, February.

Jungk, R. 1979. *Nuclear State.* London: John Calder.

Kanger, L. & Schot, J. 2019. Deep transitions: Theorizing the long-term patterns of socio-technical change. *Environmental Innovation and Societal Transitions*, 32:7–21, September.

Kemp, R. 2011. The Dutch Energy Transition Approach. In Bleischwitz, R., Welfens, P. & Zhang, Z. (eds). *International Economics of Resource Efficiency: Eco-Innovation Policies for a Green Economy*. Heidelberg: Physica-Verlag. 187–214.

Kemp, R., Schot, J. & Hoogma, R. 1998. Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. *Technology Analysis & Strategic Management*, 10(2):175–198.

Kennedy, S. 2018a. Indonesia's energy transition and its contradictions: emerging geographies of energy, finance, and land use. *Energy Research & Social Science*, 41:230-237, July.

Kennedy, S. 2018b. *The global energy transition and its contradictions: emerging geographies of energy and finance in Indonesia and California.* Unpublished doctoral dissertation. Los Angeles: University of California. [Online]. Available: https://escholarship.org/uc/item/5tg2r3z2.

Kern, F. & Markard, J. 2016. Analysing Energy Transitions: Combining Insights from Transition Studies and International Political Economy. In Van de Graaf, Sovacool, B.K., Ghosh, A., Kern, F. & Klare, M.T. (eds). *The Palgrave Handbook of the International Political Economy of Energy*. Palgrave Macmillan. 291-318.

Kern, F. & Rogge, K.S. 2017. Harnessing theories of the policy process for analysing the politics of sustainability transitions: a critical survey. *Environmental Innovation and Societal Transitions,* 27:102-117, June.

Kinkaid, E. 2019. Assemblage as ethos: Conceptual genealogies and political problems. *Area*, 1-18, November.

Kirshner, J., Baker, L., Smith, A. & Bulkeley, H. 2019. A regime in the making? Examining the geographies of solar PV electricity in Southern Africa. *Geoforum*, 103:114-125, July.

Kivimaa, P., Hildén, M., Huitema, D., Jordan, A. & Newig, J. 2017. Experiments in climate governance – A systematic review of research on energy and built environment transitions. *Journal of Cleaner Production,* 169:17–29, December.

Klenk, N. 2018. From network to meshwork: Becoming attuned to difference in transdisciplinary environmental research encounters. *Environmental Science & Policy*, 89:315–321, November.

Klenk, N.L. & Meehan, K. 2017. Transdisciplinary sustainability research beyond engagement models: Toward adventures in relevance. *Environmental Science & Policy*, 78:27–35, September.

Knuth, S. 2018. "Breakthroughs" for a green economy? Financialization and clean energy transition. *Energy Research & Social Science,* 41:220-229, July.

Köhler, J., Geels, F.W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., et al. 2019. An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, 31:1–32, December.

Köhne, M. 2014. Multi-stakeholder initiative governance as assemblage: Roundtable on Sustainable Palm Oil as a political resource in land conflicts related to oil palm plantations. *Agriculture and Human Values*, 31(3):469–480.

Korsten, N., Brent, A.C., Sebitos, A.B. & Kritzinger, K. 2017. The impact of residential rooftop solar PV on municipal finances: An analysis of Stellenbosch. *Journal of Energy in Southern Africa,* 28(2):29–39.

Krebs, J.W. 2016. *Local Economic Benefits in the Renewable Energy Independent Power Producer Programme.* Pretoria. [Online]. Available: https://www.sagen.org.za/publications/54-local-economic-benefits-in-the-renewable-energy-independent-power-producers-programme-a-brochure-for-local-government.

Kronsell, A. & Mukhtar-Landgren, D. 2018. Experimental governance: the role of municipalities in urban living labs. *European Planning Studies,* 26(5):988-1007.

Kruger, W. & Eberhard, A. 2018. Renewable energy auctions in sub-Saharan Africa: Comparing the South African, Ugandan, and Zambian Programs. *Wiley Interdisciplinary Reviews: Energy and Environment*, 7(4):1–13.

Kruger, W., Nygaard, I. & Kitzing, L. 2020. Counteracting market concentration in renewable energy auctions: lessons learned from South Africa. Research report: TENTRANS. Graduate School of Business, University of Cape Town. Forthcoming.

Kruger, W., Stritzke, S. & Trotter, P.A. 2019. De-risking solar auctions in sub-Saharan Africa – A comparison of site selection strategies in South Africa and Zambia. *Renewable and Sustainable Energy Reviews,* 104:429–438, April.

Kumar, A., Ferdous, R., Luque-Ayala, A., McEwan, C., Power, M., Turner, B. & Bulkeley, H. 2019. Solar energy for all? Understanding the successes and shortfalls through a critical comparative assessment of Bangladesh, Brazil, India, Mozambique, Sri Lanka and South Africa. *Energy Research & Social Science*, 48:166–176, February.

Kunze, C. & Becker, S. 2015. Collective ownership in renewable energy and opportunities for sustainable degrowth. *Sustainability Science,* 10(3):425–437.

Kuzemko, C. 2019. Re-scaling IPE: local government, sustainable energy and change. Review of International *Political Economy,* 26(1):80–103.

Labanca, N. 2017. (ed). *Complex Systems and Social Practices in Energy Transitions: Framing Energy Sustainability in the Time of Renewables*. Springer.

Labussière, O. & Nadaï, A. (eds). 2018. *Energy Transitions: A Socio-technical Inquiry.* Palgrave Macmillan.

Lacey-Barnacle, M., Robison, R. & Foulds, C. 2020. Energy justice in the developing world: a review of theoretical frameworks, key research themes and policy implications. *Energy for Sustainable Development,* 55:122–138, April.

Lakhanpal, S. 2019. Contesting renewable energy in the global south: A case-study of local opposition to a wind power project in the Western Ghats of India. *Environmental Development*, 30:51–60, June.

Lang, D.J., Wiek, A., Bergmann, M., Stauffacher, M., Martens, P., Moll, P., Swilling, M. & Thomas, C.J. 2012. Transdisciplinary research in sustainability science: practice, principles, and challenges. *Sustainability Science,* 7:25–43, February.

Lange, P., Driessen, P.P.J., Sauer, A., Bornemann, B. & Burger, P. 2013. Governing Towards Sustainability — Conceptualizing Modes of Governance. *Journal of Environmental Policy & Planning,* 15(3):403–425.

Larkin, B. 2013. The Politics and Poetics of Infrastructure. *Annual Review of Anthropology*, 42(1):327–343.

Latour, B. 2017. *Facing Gaia: Eight Lectures on the New Climatic Regime*. Cambridge: Polity Press.

Latour, Bruno. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. OUP Oxford.

Lauber, V. & Jacobsson, S. 2016. The politics and economics of constructing, contesting and restricting socio-political space for renewables – The German Renewable Energy Act. *Environmental Innovation and Societal Transitions,* 18:147–163, March.

Lawrence, A. 2020. *South Africa's Energy Transition*. Palgrave Macmillan.

Leavy, P. 2014. Introduction. In Leavy, P. (ed). *The Oxford Handbook of Qualitative Research*. Oxford: Oxford University Press.

Leigland, J. & Eberhard, A. 2018. Localisation barriers to trade: The case of South Africa's renewable energy independent power program. *Development Southern Africa,* 35(4):569–588.

Leiren, M.D. & Reimer, I. 2018. Historical institutionalist perspective on the shift from feed-in tariffs towards auctioning in German renewable energy policy. *Energy Research & Social Science,* 43:33–40, September.

Li, T.M. 2005. Beyond "the State" and Failed Schemes. *American Anthropologist,* 107(3):383–394.

Li, T.M. 2007. Practices of assemblage and community forest management. *Economy and Society*, 36(2):263–293.

Longhurst, N. & Chilvers, J. 2019. Mapping diverse visions of energy transitions: co-producing sociotechnical imaginaries. *Sustainability Science,* 14(4):973–990.

Loorbach, D. 2007. *Transition management: new mode of governance for sustainable development.* Doctoral Dissertation. Dutch Research Institute for Transitions (DRIFT), the Netherlands. [Online]. Available: https://repub.eur.nl/pub/10200/.

Loorbach, D., Frantzeskaki, N. & Avelino, F. 2017. Sustainability Transitions Research: Transforming Science and Practice for Societal Change. *Annual Review of Environment and Resources,* 42(1):599–626.

Loorbach, D., Wittmayer, J., Avelino, F., von Wirth, T. & Frantzeskaki, N. 2020. Transformative innovation and translocal diffusion. *Environmental Innovation and Societal Transitions*, 35: 251-205, June.

Lotz-Sisitka, H., Ali, M.B., Mphepo, G., Chaves, M., Macintyre, T., Pesanayi, T., Wals, A., Mukute, M., *et al.* 2016. Co-designing research on transgressive learning in times of climate change. *Current Opinion in Environmental Sustainability,* 20:50–55, June.

Lotz-Sisitka, H., Wals, A.E.J., Kronlid, D. & McGarry, D. 2015. Transformative, transgressive social learning: Rethinking higher education pedagogy in times of systemic global dysfunction. *Current Opinion in Environmental Sustainability,* 16:73–80, October.

Lovins, A. & Eberhard, A. 2018. *South Africa's electricity choice*. Cape Town. [Online], Available: https://rmi.org/wp-content/uploads/2018/01/South_Africas_Electricity_Choice_2018.pdf.

Lubell, M. 2015. Collaborative partnerships in complex institutional systems. *Current Opinion in Environmental Sustainability*, 12:41–47, February.

Malm, A. & Hornborg, A. 2014. The geology of mankind? A critique of the Anthropocene narrative. *Anthropocene Review,* 1(1):62–69.

Malm, A. 2013. The origins of fossil capital: From water to steam in the British cotton industry. *Historical Materialism,* 21(1):15–68.

Malm, A. 2016. *Fossil Capitalism: The rise of steam power and the roots of global warming*. Verso Books.

Marais, L. 2016. Local economic development beyond the centre: Reflections on South Africa's secondary cities. *Local Economy,* 31(1–2):68–82.

Marais, L., McKenzie, F.H., Deacon, L., Nel, E., Rooyen, D. van & Cloete, J. 2018. The changing nature of mining towns: Reflections from Australia, Canada and South Africa. *Land Use Policy,* 76:779-788, July.

Marais, L., Wlokas, H., de Groot, J., Dube, N. & Scheba, A. 2017. Renewable energy and local development: Seven lessons from the mining industry. *Development Southern Africa,* 35(1):24–38.

Margerum, R.D. & Robinson, C.J. 2015. Collaborative partnerships and the challenges for sustainable water management. *Current Opinion in Environmental Sustainability*, 12:53–58, February.

Margerum, R.D. & Robinson, C.J. 2015. Collaborative partnerships and the challenges for sustainable water management. *Current Opinion in Environmental Sustainability,* 12:53–58, February.

Markard, J. 2018. The next phase of the energy transition and its implications for research and policy. *Nature Energy,* 3:628-633, May.

Markard, J., Raven, R. & Truffer, B. 2012. Sustainability transitions: An emerging field of research and its prospects. *Research Policy,* 41(6):955–967.

Marshall, F., Dolley, J. & Priya, R. 2018. Transdisciplinary research as transformative space making for sustainability : enhancing pro-poor transformative agency in peri-urban. *Ecology and Society*, 23(3):1–28.

Mason, K. 2015. Participatory Action Research: Coproduction, Governance and Care. *Geography Compass,* 9(9):497–507.

Mattes, J., Huber, A. & Koehrsen, J. 2015. Energy transitions in small-scale regions - What we can learn from a regional innovation systems perspective. *Energy Policy,* 78:255–264, March.

May, P.J. & Jochim, A.E. 2013. Policy Regime Perspectives: Policies, Politics, and Governing. *Policy Studies Journal*, 41(3):426–452.

Mayan, M. 2016. *Essentials of Qualitative Inquiry*. Oxon: Routledge.

Mazzucato, M. & Semieniuk, G. 2018. Financing renewable energy: Who is financing what and why it matters. *Technological Forecasting and Social Change*, 127:8–22, February.

McAllister, R.R.J. & Taylor, B.M. 2015. Partnerships for sustainability governance: a synthesis of key themes. *Current Opinion in Environmental Sustainability*, 12:86–90, February.

McCann, E. & Ward, K. 2012. Policy Assemblages, Mobilities and Mutations: Toward a Multidisciplinary Conversation. *Political Studies Review,* 10(3):325–332.

McCann, E. 2011. Veritable inventions: Cities, policies and assemblage. *Area*, 43(2):143–147.

McCauley, D., Ramasar, V., Heffron, R.J., Sovacool, B.K., Mebratu, D. & Mundaca, L. 2019. Energy justice in the transition to low carbon energy systems: Exploring key themes in interdisciplinary research. *Applied Energy*, 233-234:916–921, January.

McDaid, L. 2014. *Renewable Energy Independent Power Producer Procurement Programme Review. Electricity Governance Initiative South Africa.* [Online]. Available: http://thegreenconnection.org.za/doaction/wp-content/uploads/2018/04/EGI-REI4P-review-2014-final-pdf.pdf.

McEwan, C. 2017. Spatial processes and politics of renewable energy transition: Land, zones and frictions in South Africa. *Political Geography*, 56:1–12, January.

Mcewan, C., Mawdsley, E., Banks, G. & Scheyvens, R. 2017. Enrolling the Private Sector in Community Development: Magic Bullet or Sleight of Hand? *Development and Change,* 48(1):28–53.

McFarlane, C. & Anderson, B. 2011. Thinking with assemblage. *Area*, 43(2):162–164.

McFarlane, C. 2011a. *Learning the city: knowledge and translocal assemblage*. John Wiley & Sons.

McFarlane, C. 2011b. The city as assemblage: Dwelling and urban space. *Environment and Planning D: Society and Space, 29*(4):649–671.

Meadowcroft, J. 2009. What about the politics? Sustainable development, transition management, and long-term energy transitions. *Policy Sciences,* 42:323–340, July.

Meadowcroft, J. 2010. Who is in Charge here? Governance for Sustainable Development in a Complex World. *Journal of Environmental Policy & Planning,* 9(3-4):299-314.

Meadowcroft, J. 2011. Engaging with the politics of sustainability transitions. *Environmental Innovation and Societal Transitions*, 1(1):70–75.

Mellaard, A. & Van Meijl, T. 2017. Doing policy: Enacting a policy assemblage about domestic violence. *Critical Policy Studies,* 11(3):330–348.

Mendizabal, M., Heidrich, O., Feliu, E., García-Blanco, G. & Mendizabal, A. 2018. Stimulating urban transition and transformation to achieve sustainable and resilient cities. *Renewable and Sustainable Energy Reviews*, 94:410–418, October.

Meridian Economics & CSIR. 2020. *A vital ambition: determining the cost of additional CO2 emission mitigation in the South African electricity system.* Technical report. [Online]. Available: https://meridianeconomics.co.za/wp-content/uploads/2020/07/Ambition.pdf.

MGuirk, P.M., Mee, K.J. & Ruming, K.J. 2016. Assembling Urban Regeneration? Resourcing Critical Generative Accounts of Urban Regeneration through Assemblage. *Geography Compass,* 10(3):128–141.

Mierlo, B. Van & Beers, P.J. 2018. Understanding and governing learning in sustainability transitions: A review. *Environmental Innovation and Societal Transitions*, 34:255-269, March.

Migone, A. 2018. Commissioning of public services: cooperation and strategic approaches. *Policy Design and Practice,* 1(4):298–309.

Miller, C.A. & Richter, J. 2014. Social Planning for Energy Transitions. *Current Sustainable/Renewable Energy Reports*, 1:77–84, June.

Miller, C.A., Iles, A. & Jones, C.F. 2013. The Social Dimensions of Energy Transitions. *Science as Culture*, 22(2): 135-148.

Mitchell, C., Cordell, D. & Fam, D. 2015. Beginning at the end: The outcome spaces framework to guide purposive transdisciplinary research. *Futures*, 65:86–96.

Mitchell, T. 2011. *Carbon Democracy: Political Power in the Age of Oil*. Verso Books.

Moezzi, M., Janda, K.B. & Rotmann, S. 2017. Using stories, narratives, and storytelling in energy and climate change research. *Energy Research & Social Science*, 31:1–10, September.

Mohamed, S. 2016. Financialization of the South African economy. *Development,* 59(1–2):137–142.

Montmasson-Clair, G. & Ryan, G. 2014. Lessons from South Africa's Renewable Energy Regulatory and Procurement Experience. *Journal of Economic and Financial Sciences*, 7(7):507–526.

Montmasson-Clair, G., Kritzinger, K., Scholtz, L. & Gulati, M. 2017. *New Roles for South African Municipalities in Renewable Energy. A Review of Business Models.* [Online], Available: file:///C:/Users/Amanda April/Downloads/NewZrolesZforZSAZmunicipalitiesZinZrenewableZenergyZDiscussionZPaper (1).pdf.

Moore, J.W. 2015. *Capitalism in the Web of Life: Ecology and the Accumulation of Capital.* New York: Verso Books.

Moore, J.W. 2019. *Capitalocene & Planetary Justice.* Maize.

Morar, J. 2019. The Development Impact of the Renewable Energy Independent Power Producer Procurement Programme on South Africa's Small Towns. Unpublished MPhil thesis. Stellenbosch: Stellenbosch University. [Online]. Available: http://scholar.sun.ac.za/handle/10019.1/106029.

Morris, M. & Martin, L. 2015. *Political Economy of Climate Relevant Policies: the Case of Renewable Energy in South Africa. IDS Evidence Report*. (128):1–81. [Online]. Available: http://mobile.opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/5986/ER128_PoliticalEconomyofClim

aterelevantChangePoliciestheCaseofRenewableEnergyinSouthAfrica.pdf?sequence=6%5Cnhttp://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/5986/ER128.

Mosdell, S.C. 2016. The role of municipalities in energy governance in South Africa. Unpublished masters thesis. Cape Town: University of Cape Town. [Online]. Available: https://open.uct.ac.za/handle/11427/20812 .

Moser, S.C. 2016. Can science on transformation transform science? Lessons from co-design. *Current Opinion in Environmental Sustainability,* 20:106–115, June.

Moss, T. 2009. Intermediaries and the governance of sociotechnical networks in transition. *Environment and Planning A; Economy and Space,* 41(6):1480-1495.

Mthembi, F. 2015. Lost in procurement: An assessment of the development impact of the renewable energy procurement programme. In F. Ting, M.B., Fakir, S., Gulati, M., Haysom, S., Mujakachi, L., Muzenda, E., Pilusa, T., Scholtz, L., Soumonni, O. and Mthembi (ed.). *Earth, Wind and Fire: Unpacking the political, economic and security implications of discourse on the green economy*. Real African Publishers.

Muhar, A., Visser, J. & Van Breda, J. 2013. Experiences from establishing structured inter-and transdisciplinary doctoral programs in sustainability: a comparison of two cases in South Africa and Austria. *Journal of Cleaner Production,* 61:122–129, December.

Müller, M. & Schurr, C. 2016. Assemblage thinking and actor-network theory: conjunctions, disjunctions, cross-fertilisations. *Transactions of the Institute of British Geographers*, 41(3):217–229.

Müller, M. 2015. Assemblages and actor-networks: Rethinking socio-material power, politics and space. *Geography Compass*, 9(1):27–41.

Munnik, V. 2019. *An analytical framework to support a move away from coal and towards a just transition*. Working Paper: 12. Johannesburg: Society, Work and Politics Institute, University of the Witwatersrand. [Online]. Available: https://www.swop.org.za/working-papers.

Murphy, J.T. 2015. Human geography and socio-technical transition studies: Promising intersections. *Environmental Innovation and Societal Transitions,* 17:73-91, December.

Nadaï, A. & Horst, D. Van Der. 2010. Introduction: Landscapes of Energies. *Landscape Research*, 35(2):143–155.

Nadaï, A. & Labussière, O. 2017. Landscape commons, following wind power fault lines. The case of Seine-et-Marne (France). *Energy Policy.* 109:807–816, October.

Naidoo, C.P. 2019. Transcending the interregnum: Exploring how financial systems relate to sustainability transition processes. Unpublished doctoral dissertation. University of Sussex, Brighton. [Online]. Available: http://sro.sussex.ac.uk/id/eprint/92245/.

National Planning Commission. 2011. *National Development Plan 2030. Our future - make it work*. Pretoria. [Online], Available: https://www.gov.za/documents/national-development-plan-2030-our-future-make-it-work.

National Planning Commission. 2018. *National Development Plan: Pathways for a Just Transition Western Cape Stakeholder Dialogue Meeting Report.* [Online], Available: https://oneworldgroup.co.za/wp-content/uploads/2019/04/Social_Partner_Dialogue_Report.pdf.

National Planning Commission. 2019. *Social Partner Dialogue for a Just Transition: 2050 Vision and Pathways for a Just Transition to a low carbon, climate resilient economy and society*. [Online], Available: https://oneworldgroup.co.za/oneworld-projects/pathways-to-a-just-transition-in-south-africa-2017-2019/.

Nel, E. & Rogerson, C.M. 2015. The contested trajectory of applied local economic development in South Africa. *Local Economy*, 31(1-2): 109–123.

Ness, B. & Harnesk, D. 2018. Finding an academic space: reflexivity among sustainability researchers. *Ecology and Society*, 23(4):20-31.

Newell, P. & Bulkeley, H. 2017. Landscape for change? International climate policy and energy transitions: evidence from sub-Saharan Africa. *Climate Policy,* 17(5):650–663.

Newell, P. & Johnstone, P. 2018. The Political Economy of Incumbency: Fossil Fuel Subsidies in Global and Historical Context. In J. Skovgaard & H. van Asselt (eds). *The Politics of Fossil Fuel Subsidies and their Reform.* Cambridge: Cambridge University Press.

Newell, P. & Mulvaney, D. 2013. The political economy of the "just transition". *The Geographical Journal*, 179(2):132-140.

Newell, P. & Phillips, J. 2016. Neoliberal energy transitions in the South: Kenyan experiences. *Geoforum*, 74:39–48, August.

Newell, P. 2018. Trasformismo or transformation? The global political economy of energy transitions economy of energy transitions. *Review of International Political Economy,* 26(1):25-48.

Nkoana, E.M. 2018. Community acceptance challenges of renewable energy transition: A tale of two solar parks in Limpopo, South Africa. *Journal of Energy in Southern Africa,* 29(1):34–40.

NUMSA. 2016. *Building a Socially-Owned Renewable Energy Sector in SA.* [Online]. Available: http://numsa.org.za/wp-content/uploads/2013/03/00123_1_building_a_socially-owned_re_sector_in_sa.pdf.

Ockwell, D., Byrne, R., Hansen, U.E., Haselip, J. & Nygaard, I. 2018. The uptake and diffusion of solar power in Africa: Socio-cultural and political insights on a rapidly emerging socio-technical transition. *Energy Research & Social Science*, 44:122–129, March.

Ohlhorst, D. 2020. Germany: from feed-in-tariffs to auctions and the question of diverse actors. In C. Burger, A. Froggatt, C. Mitchell, & J. Weinmann (eds). *Decentralised Energy - A Global Game Changer*. London: Ubiquity Press. 82–100.

Olsen, L. 2010. Supporting a just transition: The role of international labour standards. *International Journal of Labour Standards,* 2(2):293–319.

Ong, A. 2007. Neoliberalism as a mobile technology. *Transactions of the Institute of British Geographers*, 32(1):3–8.

Oyewo, A.S., Aghahosseini, A., Ram, M., Lohrmann, A. & Breyer, C. 2019. Pathways towards achieving 100% renewable energy powered electricity and seawater desalination sectors by 2050 for South Africa. *Solar Energy*, 191:549–565, October.

Padmanabhan, M. 2018. *Transdisciplinary Research and Sustainability: Collaboration, Innovation and Transformation.* Routledge.

Parnell, S., Elmqvist, T., McPhearson, T., Nagendra, H. & Sörlin, S. 2018. Introduction: Situating knowledge and action for an urban planet. In Elmqvist, T., McPheason, T., Bai, X., Parnell, S., Frantzeskaki, N. *et al*. (eds). *The Urban Planet: Knowledge towards sustainable cities.* Cambridge: Cambridge University Press. 1-17.

Parr, B., Swilling, M. & Henry, D. 2018. *The Paris Agreement and South Africa's Just Transition. Briefing* Paper No. 10. Melbourne Sustainable Society Institute, the University of Melbourne [Online]. Available: http://bit.ly/2GpB1RE.

Pathania, R. & Bose, A. 2014. An analysis of the role of finance in energy transitions. *Journal of Sustainable Finance & Investment*, 4(3):266–271.

Paul, F.C. 2018. Deep entanglements: History, space and (energy) struggle in the German Energiewende. *Geoforum*, 91:1–9, May.

Peck, J. 2011. Geographies of policy: From transfer-diffusion to mobility-mutation. *Progress in Human Geography, 35*(6):773–797.

Pel, B., Raven, R. & Est, R. Van. 2020. Transitions governance with a sense of direction: synchronization challenges in the case of the dutch 'Driverless Car' transition. *Technological Forecasting & Social Change,* 160:120244, November.

Pellegrini-Masini, G., Pirni, A. & Maran, S. 2020. Energy justice revisited: A critical review on the philosophical and political origins of equality. *Energy Research and Social Science*, 59:101310, January.

Pellegrini-Masini, G., Pirni, A., Maran, S. & Klöckner, C.A. 2020. Delivering a timely and Just Energy Transition: which policy research priorities? *Environmental Policy and Governance*, June.

Pellicer-Sifres, V., Belda-Miquel, S., Cuesta-Fernandez, I. & Boni, A. 2018. Learning, transformative action, and grassroots innovation: Insights from the Spanish energy cooperative Som Energia. *Energy Research & Social Science,* 42:100–111, August.

Pereira, L., Frantzeskaki, N., Hebinck, A., Charli-joseph, L., Drimie, S., Dyer, M., Eakin, H., Galafassi, D., *et al*. 2019. Transformative spaces in the making: key lessons from 9 cases in the Global South. *Sustainability Science,* 15:161-178, November.

Pesch, U., Spekkink, W. & Quist, J. 2019. Local sustainability initiatives: innovation and civic engagement in societal experiments. *European Planning Studies*, 27(2):300–317.

Phillips, E. & Pugh, D. 2000. *How to get a PhD*. Buckinghamshire: Open University Press.

Piggot, G., Boyland, M., Down, A. & Torre, A.R. 2019. *Realizing a just and equitable transition away from fossil fuels.* Stockholm Environment Institute. [Online]. Available: https://www.sei.org/publications/just-and-equitable-transition-fossil-fuels/.

Pinker, A. 2018. Tinkering with Turbines: Ethics and Energy Decentralization in Scotland. *Anthropological Quarterly,* 91(2):709–748.

Plooy, N.T. & Brent, A.C. 2017. *Fostering Sustainable Energy Transitions for South Africa's Electricity Sector: A set of Criteria*. 2017 IEEE Technology & Engineering Management Conference (TEMSCON). 8-10 June, Santa Clara. [Online]. Available: https://ieeexplore.ieee.org/abstract/document/7998366.

Pohl, C., Hadorn, G.H. & der Wissenschaften Schweiz, A. 2007. *Principles for designing transdisciplinary research.* Munich: Oekom.

Pohl, C., Rist, S., Zimmermann, A., Fry, P., Gurung, G.S., Schneider, F., Speranza, C.I., Kiteme, B., *et al*. 2010. Researchers' roles in knowledge co-production: experience from sustainability research in Kenya, Switzerland, Bolivia and Nepal. *Science and Public Policy,* 37(4):267–281.

Polk, M. 2015. Transdisciplinary co-production: Designing and testing a transdisciplinary research framework for societal problem solving. *Futures,* 65:110–122, January.

Polzin, F. 2017. Mobilizing private finance for low-carbon innovation – A systematic review of barriers and solutions. *Renewable and Sustainable Energy Reviews,* 77:525–535, September.

Polzin, F., Egli, F., Steffen, B. & Schmidt, T.S. 2019. How do policies mobilize private finance for renewable energy?— A systematic review with an investor perspective. *Applied Energy,* 236:1249–1268, February.

Porter, M., Franks, D.M. & Everingham, J. 2013. Cultivating collaboration: Lessons from initiatives to understand and manage cumulative impacts in Australian resource regions. *Resources Policy*, 38(4):657–669.

Pow, C.P. 2014. License to travel: Policy assemblage and the "Singapore model". *City*, 18(3):287–306.

Power Africa. 2017. *Understanding Power Project Procurement*. [Online], Available: https://www.usaid.gov/powerafrica/newsroom/resource-library.

Power, M. 2018. Powering the state: The political geographies of electrification in Mozambique. *Environment and Planning C: Politics and Space*, 37(3):498-518.

Power, M., Newell, P., Baker, L., Bulkeley, H., Kirshner, J. & Smith, A. 2016. The political economy of energy transitions in Mozambique and South Africa: The role of the Rising Powers. *Energy Research & Social Science,* 17:10-19, July.

Preiser, R. 2019. Identifying general trends and patterns in complex systems research: An overview of theoretical and practical implications. *Systems Research and Behavioural Science*, 36(5):706-714.

Preiser, R., Biggs, R., Vos, A. De & Folke, C. 2018. Social-ecological systems as complex adaptive systems: organizing principles for advancing research methods and approaches. *Ecology and Society*, 23(4):46–60.

Prince, R. 2010. Policy transfer as policy assemblage: Making policy for the creative industries in New Zealand. *Environment and Planning A: Economy and Space*, 42(1):169–186.

Prince, R. 2017. Local or global policy? Thinking about policy mobility with assemblage and topology. *Area*, 49(3):335–341.

Prinz, L. & Pegels, A. 2018. The role of labour power in sustainability transitions: Insights from comparative political economy on Germany's electricity transition. *Energy Research & Social Science*, 41:210-219, July.

Quitzow, L., Canzler, W., Grundmann, P., Leibenath, M., Moss, T. & Rave, T. 2016. The German Energiewende – What's happening? Introducing the special issue. *Utilities Policy*, 41:163–171.

Ramos-Mejía, M., Franco-Garcia, M.L. & Jauregui-Becker, J.M. 2018. Sustainability transitions in the developing world: Challenges of socio-technical transformations unfolding in contexts of poverty. *Environmental Science & Policy*, 84:217–223, March.

Räthzel, N., Cock, J. & Uzzell, D. 2018. Beyond the nature – labour divide: trade union responses to climate change in South Africa. *Globalizations,* 15(4):504-519.

Raven, R., Schot, J. & Berkhout, F. 2012. Space and scale in socio-technical transitions. *Environmental Innovation and Societal Transitions,* 4:63–78, September.

Raven, R., Sengers, F., Spaeth, P., Xie, L., Cheshmehzangi, A. & de Jong, M. 2019. Urban experimentation and institutional arrangements. *European Planning Studies,* 27(2): 258-281.

Regeer, B.J. & Bunders, J.F.G. 2009. *Knowledge co-creation: Interaction between science and society*. Advisory Council for Research on Spatial Planning, Nature and the Environment/Consultative Committee of Sector Councils in the Netherlands. Den Haag: RMNO. [Online]. Available: http://www.universidad.edu.uy/resources/2/2/9/6/6_d71262a79af9d6b/22966_cedd1a8fe26ef1a.pdf.

REN21. 2019. Renewables 2018 Global Status Report. Paris: REN21. [Online]. Available: https://www.ren21.net/gsr-2019/.

Rennkamp, B. 2019. Power, coalitions and institutional change in South African climate policy. *Climate Policy*, 19(6):756–770.

Rennkamp, B., Haunss, S., Wongsa, K., Ortega, A. & Casamadrid, E. 2017. Competing coalitions: The politics of renewable energy and fossil fuels in Mexico, South Africa and Thailand. *Energy Research & Social Science*, 34:214–223, December.

Republic of South Africa. 2011. *National Climate Change Response White* Paper. Pretoria. [Online]. Available: https://www.environment.gov.za/sites/default/files/legislations/national_climatechange_response_whitepaper.pdf.

Roberts, C., Geels, F.W., Lockwood, M., Newell, P., Schmitz, H., Turnheim, B. & Jordan, A. 2018. The politics of accelerating low-carbon transitions: Towards a new research agenda. *Energy Research & Social Science*, 44:304–311, October.

Rocher, L. & Verdeil, E. 2019. Dynamics, tensions, resistance in solar energy development in Tunisia. *Energy Research & Social Science*, 54:236–244, August.

Rogerson, C.M. 2010. In Search of Public Sector – Private Sector Partnerships for Local Economic Development in South Africa. *Urban Forum*, 21:441–456.

Rogerson, C.M. 2012. Mining-Dependent Localities in South Africa: The State of Partnerships for Small Town Local Development. *Urban Forum,* 23:107–132.

Rogge, K.S. & Reichardt, K. 2016. Policy mixes for sustainability transitions: An extended concept and framework for analysis. *Research Policy,* 45(8):1620–1635.

Rogge, K.S., Kern, F. & Howlett, M. 2017. Conceptual and empirical advances in analysing policy mixes for energy transitions. *Energy Research & Social Science*, 33:1–10, November.

Rosenbloom, D. 2018. Framing low-carbon pathways: A discursive analysis of contending storylines surrounding the phase-out of coal-fired power in Ontario. *Environmental Innovation and Societal Transitions,* 27:129-145, June.

Rotmans, J. & Loorbach, D. 2008. Transition management: reflexive governance of societal complexity through searching, learning and experimenting. In van den Bergh, J.C.J.M. & Bruinsma, F.R. (eds). *Managing the Transition to Renewable Energy: Theory and Practice from Local, Regional and Macro Perspectives.* Cheltenham: Edward Elgar. 14–46.

Rotmans, J. & Loorbach, D. 2009. Complexity and Transition Management. *Journal of Industrial Ecology*, 13(2):184–196.

Routledge, P., Cumbers, A. & Derickson, K.D. 2018. States of just transition: Realising climate justice through and against the state. *Geoforum*, 88:78–86, January.

Roux, D.J., Nel, J.L., Cundill, G., O'Farrell, P. & Fabricius, C. 2017. Transdisciplinary research for systemic change: who to learn with, what to learn about and how to learn. *Sustainability Science*, 12(5):711–726.

Rumpala, Y. 2018. Alternative Forms of Energy Production and Political Reconfigurations: Exploring Alternative Energies as Potentialities of Collective Reorganization. Bulletin of Science, *Technology & Society,* 37(2):85-96.

Russell, B., Pusey, A. & Chatterton, P. 2011. What can an assemblage do? Seven propositions for a more strategic and politicized assemblage thinking. *City*, 15(5): 577-583.

Rutherford, J. & Coutard, O. 2014. Urban Energy Transitions: Places, Processes and Politics of Socio-technical Change. *Urban Studies*, 51(7):1353–1377.

Rydin, Y., Guy, S., Goodier, C., Chmutina, K., Devine-Wright, P. & Wiersma, B. 2015. The financial entanglements of local energy projects. *Geoforum*. 59:1–11.

Saldaña, J. & Omasta, M. 2017. *Qualitative Research: Analyzing Life*. Thousand Oaks, CA: Sage Publications Inc.

Saldaña, J. 2015. *Thinking qualitatively: Methods of mind*. Thousand Oaks, CA: Sage Publications Inc.

SALGA. 2017. SALGA Small town regeneration programme. In Gariep Dam Karoo Small Town Regeneration and Regional Economic Development Initiative Stakeholder Meeting.

SALGA. 2018a. *Renewable Energy Scenarios for Municipalities in South Africa.* [Online]. Available: https://www.salga.org.za/SALGA%20Energy%20Summit%202018/Energy%20Summit%20Web/Document/Booklet%20Renewable%20Energy%20Scenarios%20for%20Municipalities%20in%20South%20Africa%20January%202018.pdf.

SALGA. 2018b. Status of Small Scale Embedded Generation (SSEG) in South African Municipalities. [Online[. Available: https://www.salga.org.za/SALGA%20Energy%20Summit%202018/Energy%20Summit%20Web/Document/Status%20of%20Small%20Scale%20Embedded%20Generation.pdf.

Sareen, S. & Kale, S.S. 2018. Solar 'power': Socio-political dynamics of infrastructural development in two Western Indian states. *Energy Research & Social Science*, 41:270-278, July.

Sareen, S. 2018. Energy distribution trajectories in two Western Indian states: Comparative politics and sectoral dynamics. *Energy Research & Social Science,* 35:17-27, January.

Savage, G.C. 2018. Policy assemblages and human devices: a reflection on 'Assembling Policy'. *Discourse*, 39(2):309–321.

Savage, G.C. 2019. What is policy assemblage? *Territory, Politics, Governance,* 8(3):319-335.

Schmidt, T.S., Matsuo, T. & Michaelowa, A. 2017. Renewable energy policy as an enabler of fossil fuel subsidy reform? Applying a socio-technical perspective to the cases of South Africa and Tunisia. *Global Environmental Change*, 45:99–110, April.

Scholtz, L., von Bormann, T., Mulaudzi, K., Davies, T. & Nicholls, S. 2019. *Deep Transition: Delving into social and economic justice in transitions to a climate-responsive economy.* The Lewis Foundation.

Scholz, R.W., Lang, D.J., Wiek, A., Walter, A.I. & Stauff. 2006. Transdisciplinary case studies as a means of sustainability learning: Historical framework and theory. *International Journal of Sustainability in Higher Education*, 7(3):226–251.

Schot, J. & Geels, F.W. 2008. Strategic niche management and sustainable innovation journeys: theory, findings, research agenda, and policy. *Technology Analysis & Strategic Management*, 20(5):537–554.

Schot, J. & Kanger, L. 2018. Deep transitions: Emergence, acceleration, stabilization and directionality. *Research Policy,* 47(6):1045–1059.

Schuttenberg, H.Z. & Guth, H.K. 2015. Seeking our shared wisdom: a framework for understanding knowledge coproduction and coproductive capacities. *Ecology and Society,* 20(1):15-26.

Scoones, I. 2016. The Politics of Sustainability and Development. *Annual Review of Environment and Resources*, 41(1):293–319.

Scoones, I., Stirling, A., Abrol, D., Atela, J., Charli-joseph, L., Eakin, H., Ely, A., Olsson, P., *et al*. 2018. *Transformations to Sustainability*. STEPS Working Paper 104, The Institute for Development Studies, University of Sussex. [Online]. Available: https://steps-centre.org/publication/transformations-to-sustainability-wp104/.

Sengers, F., Wieczorek, A.J. & Raven, R. 2019. Experimenting for sustainability transitions: A systematic literature review. *Technological Forecasting & Social Change,* 145:153-164, August.

Shaw, J. 2017. Assessing the sustainability of an independent power producer's social investment in a community: a case study of Scatec Solar. Unpublished MPhil thesis. Stellenbosch: Stellenbosch University. [Online]. Available: http://scholar.sun.ac.za/handle/10019.1/100948.

Shidore, S. & Busby, J.W. 2019. What explains India's embrace of solar? State-led energy transition in a developmental polity. *Energy Policy,* 129:1179–1189, June

Shore, C. & Wright, S. 1997. *Anthropology of Policy: Critical perspectives on governance and power.* London: Routledge.

Shore, C. & Wright, S. 2013. Conceptualising Policy: Technologies of Governance and the Politics of Visibility. In Shore, W., Wright, S. & Però, D. (eds). *Policy Worlds: Anthropology and the Analysis of Contemporary Power. New York: Berghahn Books. 1-26.*

Shore, C., Wright, S. & Però, D. (eds). 2013. Policy Worlds: Anthropology and the Analysis of Contemporary Power. New York: Berghahn Books.

Shove, E. & Walker, G. 2007. CAUTION! Transitions ahead: politics, practice, and sustainable transition management. *Environment and Planning A: Economy and Space,* 39(4):763–770.

Shumba, T., Radebe, H., Dippenaar, J. & Euston-Brown, M. 2019. The Impact of Small Scale Embedded Generation on Municipal Revenue. [Online]. Available: https://www.sseg.org.za/wp-content/uploads/2019/10/The-Impact-of-SSEG-on-Municipal-Revenue.pdf.

Simmet, H.R. 2018. "Lighting a dark continent": Imaginaries of energy transition in Senegal. *Energy Research & Social Science*, 40:71–81, June.

Smil, V. 2010. *Energy Transitions. History, Requirements, Prospects*. Santa Barbara: Praeger.

Smil, V. 2017. *Energy and Civilization: A History*. MIT Press.

Smink, M. 2015. *Incumbents and institutions in sustainability transitions.* Unpublished doctoral dissertation. Utrecht University: Utrecht, the Netherlands. [Online]. Available: https://dspace.library.uu.nl/handle/1874/322962.

Smink, M.M., Hekkert, M.P. & Negro, S.O. 2015. Keeping sustainable innovation on a leash? Exploring incumbents' institutional strategies. *Business Strategy and the Environment,* 24(2):86–101.

Smith, A., Stirling, A. & Berkhout, F. 2005. The governance of sustainable socio-technical transitions. *Research Policy,* 34(10):1491–1510.

Smith, A., Voß, J.P. & Grin, J. 2010. Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Research Policy,* 39(4):435–448.

Snell, D. 2018. 'Just transition'? Conceptual challenges meet stark reality in a 'transitioning' coal region in Australia. *Globalizations*, 15(4):550-546.

Solomon, B.D. & Krishna, K. 2011. The coming sustainable energy transition: History, strategies, and outlook. *Energy Policy*, 39(11):7422–7431.

Sovacool, B.K. & Blyth, P.L. 2015. Energy and environmental attitudes in the green state of Denmark: Implications for energy democracy, low carbon transitions, and energy literacy. *Environmental Science and Policy,* 54:304–315, December.

Sovacool, B.K. & Brisbois, M.C. 2019. Elite power in low-carbon transitions: A critical and interdisciplinary review. *Energy Research and Social Science*. 57:101242, November.

Sovacool, B.K. & Dworkin, M.H. 2015. Energy justice: Conceptual insights and practical applications. *Applied Energy,* 142:435–444, March.

Sovacool, B.K., Axsen, J. & Sorrell, S. 2018. Promoting novelty, rigor, and style in energy social science: Towards codes of practice for appropriate methods and research design. *Energy Research & Social Science*, 45:12-42, July.

Sovacool, B.K., Baker, L., Martiskainen, M. & Hook, A. 2019. Processes of elite power and low-carbon pathways: Experimentation, financialisation, and dispossession. *Global Environmental Change*, 59:101985, November.

Sovacool, B.K., Burke, M., Baker, L., Kotikalapudi, C.K. & Wlokas, H. 2017. New frontiers and conceptual frameworks for energy justice. *Energy Policy*, 105:677-691, June.

Sovacool, B.K., Martiskainen, M., Hook, A. & Baker, L. 2019. Decarbonization and its discontents: a critical energy justice perspective on four low-carbon transitions. *Climate Change*, 155:581-619, August.

Späth, P. & Rohracher, H. 2010. "Energy regions": The transformative power of regional discourses on socio-technical futures. *Research Policy*, 39(4):449–458.

Springgay, S. & Truman, S.E. 2018. On the Need for Methods Beyond Proceduralism: Speculative Middles, (In)Tensions, and Response-Ability in Research. *Qualitative Inquiry,* 24(3):203–214.

Stands, S.R. 2015. Utility-Scale Renewable Energy Job Creation: An investigation of the South African Renewable Energy Independent Power Producer Procurement Programme. Unpublished MPhil thesis. Stellenbosch: Stellenbosch University. [Online]. Available: http://scholar.sun.ac.za/handle/10019.1/96791

Statistics South Africa. 2019. *Inequality Trends in South Africa: a multidimensional diagnostic of inequality.* Pretoria. [Online]. Available: http://www.statssa.gov.za/?p=12744.

Steffen, B. 2018. The importance of project finance for renewable energy projects. *Energy Economics,* 69:280–294, January.

Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O. & Ludwig, C. 2015. The trajectory of the anthropocene: The great acceleration. *Anthropocene Review,* 2(1):81–98.

Steffen, W., Richardson, K., Rockstrom, J., Cornell, S.E., Fetzer, I., Bennett, E.M., Biggs, R., Carpenter, S.R., *et al*. 2015. Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223):736-746.

Stevis, D. & Felli, R. 2014. Global labour unions and just transition to a green economy. *International Environmental Agreements: Politics, Law and Economics,* 15(1):29–43.

Stevis, D. 2018. US labour unions and green transitions: depth breadth, and worker agency. *Globalizations,* 15(4):454-469.

Steyn, G., Burton, J. & Steenkamp, M. 2017. *Eskom's financial crisis and the viability of coal-fired power in South Africa*. (November). [Online]. Available: http://meridianeconomics.co.za/wp-content/uploads/2017/11/CoalGen-Report_FinalDoc_ForUpload-1.pdf.

Stoeglehner, G., Niemetz, N. & Kettl, K.-H. 2011. Spatial dimensions of sustainable energy systems: new visions for integrated spatial and energy planning. *Energy, Sustainability and Society*, 1(2):1–9.

Stone, D. 2012. Transfer and translation of policy. *Policy Studies,* 33(6):483–499.

Strambo, C., Burton, J. & Atteridge, A. 2019. The end of coal? Planning a "just transition" in South Africa. Stockholm Environment Institute. [Online]. Available: https://www.sei.org/publications/the-end-of-coal-planning-a-just-transition-in-south-africa/

Stuurman, F. 2018. Does the South African renewable energy programme exclude black woman owned businesses? Unpublished MPhil thesis. Stellenbosch: Stellenbosch University. [Online]. Available: http://scholar.sun.ac.za/handle/10019.1/103551.

Svensson, O. & Nikoleris, A. 2018. Structure reconsidered: Towards new foundations of explanatory transitions theory. *Research Policy,* 47(2):462–473.

Swartz, K. 2019. Addressing community energy challenges with utility scale renewables: A case study of Hopefield Wind Farm. Unpublished MPhil thesis. Stellenbosch: Stellenbosch University. [Online]. Available: http://scholar.sun.ac.za/handle/10019.1/106014.

Swilling, M. & Annecke, E. 2012. *Just transitions: Explorations of sustainability in an unfair world*. UCT Press.

Swilling, M. 2013. Economic crisis, long waves and the sustainability transition: An African perspective. *Environmental Innovation and Societal Transitions*, 6:96–115.

Swilling, M. 2014. Rethinking the science-policy interface in South Africa: experiments in knowledge co-production. *South African Journal of Science,* 110(5–6):1–7.

Swilling, M. 2020. *The Age of Sustainability: Just Transitions in a Complex World*. Routledge.

Swilling, M., Musango, J. & Wakeford, J. 2016. Developmental States and Sustainability Transitions: Prospects of a Just Transition in South Africa. *Journal of Environmental Policy & Planning,* 18(5):650-672.

Szulecki, K. & Overland, I. 2020. Energy democracy as a process, outcome and a goal: a conceptual review. *Energy Research & Social Science,* 69:101768, November.

Szulecki, K. 2018. Conceptualizing energy democracy. *Environmental Politics,* 27(1):21–41.

Tait, L. & Euston-Brown, M. 2017. What role can African cities play in low-carbon development? A multilevel governance perspective of Ghana, Uganda and South Africa. *Journal of Energy in Southern Africa,* 28(3):43–53.

Tait, L. 2012. The potential for local community benefits from wind farms in South Africa. Unpublished masters thesis. University of Cape Town, Cape Town. [Online]. Available: https://www.crses.sun.ac.za/files/research/completed-research/wind/l_tait.pdf.

Tait, L., Wlokas, H.L. & Garside, B. 2013. *Making communities count: maximising local benefit potential in South Africa's Renewable Energy Independent Power Producer Procurement Programme (RE IPPPP*). London: Institute for Environment and Development. [Online]. Available: https://pubs.iied.org/16043IIED/.

Taylor, B.M. & McAllister, R.R.J. 2015. Sustainability governance and transformation: Partnerships and sustainability governance: progress, prospects and pitfalls. *Current Opinion in Environmental Sustainability,* 12:iv-vi, February.

Temper, L., McGarry, D. & Weber, L. 2019. From academic to political rigour: Insights from the 'Tarot' of transgressive research. *Ecological Economics*, 164:1-14, October.

Thombs, R.P. 2019. When democracy meets energy transitions: A typology of social power and energy system scale. *Energy Research & Social Science*, 52:159–168, June.

Ting, M.B. & Byrne, R. 2020. Eskom and the rise of renewables: Regime-resistance, crisis and the strategy of incumbency in South Africa's electricity system. *Energy Research & Social Science,* 60:1-15, February.

Törnberg, A. 2018. Combining transition studies and social movement theory: towards a new research agenda. *Theory and Society*, 47:381-408, June.

Torrens, J., Johnstone, P. & Schot, J. 2018. Unpacking the Formation of Favourable Environments for Urban Experimentation: The Case of the Bristol Energy Scene. *Sustainability*, 10(3): 1-28.

Tozer, L. & Klenk, N. 2018. Discourses of carbon neutrality and imaginaries of urban futures. *Energy Research & Social Science,* 35:174-181, January.

Turnhout, E., Metze, T., Wyborn, C., Klenk, N. & Louder, E. 2020. The politics of co-production: participation, power, and transformation. *Current Opinion in Environmental Sustainability*, 42:15–21, February.

Tyler, E. & Steyn, G. 2018. *An overview of the Employment Implications of the South African Power Sector Transition.* Cape Town: South African Wind Energy Association. [Online]. Available: https://sawea.org.za/wp-content/uploads/2018/07/Employment-implications-SA-power-sector-transition_final.pdf.

Tyler, E. 2010. Aligning South African energy and climate change mitigation policy. *Climate Policy*, 10(5):575–588.

Unruh, G.C. 2002. Escaping carbon lock-in. *Energy Policy,* 30(4):317–325.

Ureta, S. 2014a. Policy assemblages: proposing an alternative conceptual framework to study public action. *Policy Studies,* 35(3):303–318.

Ureta, S. 2014b. The Shelter that Wasn't There: On the Politics of Co-ordinating Multiple Urban Assemblages in Santiago, Chile. *Urban Studies*, 51(2):231–246.

Urry, J. 2014. The Problem of Energy. *Theory, Culture & Society,* 31(5):3–20.

van Breda, J. & Swilling, M. 2019. The guiding logics and principles for designing emergent transdisciplinary research processes: learning experiences and reflections from a transdisciplinary urban case study in Enkanini informal settlement, South Africa. *Sustainability Science,* 14:823–841, July.

van Breda, J. 2019. Methodological Agility in the Anthropocene. Unpublished doctoral dissertation. Stellenbosch University: Stellenbosch, South Africa. [Online]. Available: https://scholar.sun.ac.za/bitstream/handle/10019.1/106959/vanbreda_methodological_2019.pdf?sequence=1&isAllowed=y.

Van den Bergh, J.C.J.M., Truffer, B. & Kallis, G. 2011. Environmental innovation and societal transitions: Introduction and overview. *Environmental Innovation and Societal Transitions*, 1(1):1–23.

Van der Merwe, M. 2017. *Energy Transitions: The Case of South African Electric Security*. Unpublished doctoral dissertation. Cape Town: University of Cape Town. [Online]. Available: https://open.uct.ac.za/handle/11427/27906.

Van der Merwe, S.E. 2019. *Advancing resilience assessments: the social dimensions of electricity supply in South Africa.* Unpublished doctoral dissertation. Stellenbosch: Stellenbosch University. [Online]. Available: https://scholar.sun.ac.za/handle/10019.1/106160.

Van Der Schoor, T., Van Lente, H., Scholtens, B. & Peine, A. 2016. Challenging obduracy: How local communities transform the energy system. *Energy Research & Social Science,* 13:94–105, March.

van Rooyen, D. 2013. *Civic Culture and Local Economic Development in a Small Town*. Unpublished doctoral dissertation. Bloemfontein: University of the Free State. [Online]. Available: http://scholar.ufs.ac.za:8080/bitstream/handle/11660/2057/VanRooyenDeidre.pdf?sequence=1&isAllowed=y.

van Veelen, B. & van der Horst, D. 2018. What is energy democracy? Connecting social science energy research and political theory. *Energy Research & Social Science,* 46:19–28, December.

Van Veelen, B. 2018. Negotiating energy democracy in practice: governance processes in community energy projects. *Environmental Politics,* 27(4):644-665.

Vargas Roncancio, I., Temper, L., Sterlin, J., Smolyar, N.L., Sellers, S., Moore, M., Melgar-Melgar, R., Larson, J., et al. 2019. From the Anthropocene to Mutual Thriving: An Agenda for Higher Education in the Ecozoic. *Sustainability*, 11(12):3312.

Verkade, N. & Hö, J. 2019. Collective Energy Practices: A Practice-Based Approach to Civic Energy Communities and the Energy System. *Sustainability*, 11(11):1-15.

Vogler, J. 2020. Energy, Climate Change, and Global Governance: The 2015 Paris Agreement in Perspective. In Davidson, D.J. & Gross, M. (eds). *The Oxford Handbook of Energy and Society*. Oxford: Oxford University Press. 15-30.

von Wirth, T., Fuenfschilling, L., Frantzeskaki, N. & Coenen, L. 2019. Impacts of urban living labs on sustainability transitions: mechanisms and strategies for systemic change through experimentation. *European Planning Studies*, 27(2):229-257.

Vona, F. 2019. Job losses and political acceptability of climate policies: why the 'job-killing' argument is so persistent and how to overturn it. *Climate Policy*, 19(4):524–532.

Voß, J.-P. & Simons, A. 2018. A novel understanding of experimentation in governance: co-producing innovations between "lab" and "field". *Policy Sciences,* 51:213-229, March.

Voß, J.-P., Smith, A. & Grin, J. 2009. Designing long-term policy: rethinking transition management. *Policy Sciences,* 42(4):275–302.

Voytenko, Y., McCormick, K., Evans, J. & Schliwa, G. 2016. Urban living labs for sustainability and low carbon cities in Europe: towards a research agenda. *Journal of Cleaner Production*, 123(1):45-54.

Walker, G. & Devine-wright, P. 2008. Community renewable energy: What should it mean? *Energy Policy*, 36(2):497–500.

Walker, G. 2009. Beyond distribution and proximity: Exploring the multiple spatialities of environmental justice. *Antipode*, 41(4):614–636.

Watts, J. 2018. *Goldman prize awarded to South African women who stopped an international nuclear deal.* The Guardian. [Online]. Available: https://www.theguardian.com/world/2018/apr/23/goldman-prize-awarded-to-south-african-women-who-stopped-an-international-nuclear-deal.

WEF. 2020. This is BP's plan to become a renewable energy powerhouse. World Economic Forum. [Online]. Available: https://www.weforum.org/agenda/2020/08/bp-green-renewable-energy-investment/.

Weiland, S., Bleicher, A., Polzin, C., Rauschmayer, F. & Rode, J. 2017. The nature of experiments for sustainability transformations: A search for common ground. *Journal of Cleaner Production*, 169:30–38, December.

Wellington, J. 2013. Searching for 'doctorateness'. *Studies in Higher Education*, 38(10):1490–1503.

Westoby, P. & Kaplan, A. 2013. Foregrounding practice – reaching for a responsive and ecological approach to community development: a conversational inquiry into the dialogical and developmental frameworks of community development. *Community Development Journal*, 49(2):214–227.

Wickson, F., Carew, A.L. & Russell, A.W. 2006. Transdisciplinary research: characteristics, quandaries and quality. *Futures*, 38(9):1046–1059.

Wieczorek, A.J. 2018. Sustainability transitions in developing countries: Major insights and their implications for research and policy. Environmental Science & Policy, 84:204-216, June.

Wierling, A., Schwanitz, V.J., Zeiß, J.P., Bout, C., Candelise, C., Gilcrease, W. & Gregg, J.S. 2018. Statistical Evidence on the Role of Energy Cooperatives for the Energy Transition in European Countries. *Sustainability*, 10(9):3339.

Williams, S. & Doyon, A. 2019. Justice in energy transitions. *Environmental Innovation and Societal Transitions*, 31:144-153, June.

Wilson, S. 2017. Energy Imaginaries: Feminist and Decolonial Futures. In Bellamy, B.R. & Diamanti, J. (eds). *Materialism and the Critique of Energy*. Chicago: MCM. [Online]. Available: http://www.mcmprime.com/files/Materialism_Energy.pdf. 337-412.

Winkler, H. 2005. Renewable energy policy in South Africa: Policy options for renewable electricity. *Energy Policy,* 33(1):27–38.

Winkler, H., Keen, S. & Marquard, A. 2020a. *Climate finance to transform energy infrastructure as part of a just transition in South Africa*. Research report for SNAPFI project. Cape Town: University of Cape Town. [Online]. Available: http://hdl.handle.net/11427/32176 .

Winkler, H., Keen, S. & Marquard, A. 2020b. *Funding to set up the Renewable Energy In- dependent Power Producer Procurement Funding to set up the Renewable Energy Independent Power Producer Procurement Programme in South Africa development*. Research report. Cape Town: University of Cape Town. [Online]. Available: https://www.diw.de/documents/dokumentenarchiv/17/diw_01.c.794589.de/background_report_south_africa_funding.pdf.

Wirth, S. 2014. Communities matter: Institutional preconditions for community renewable energy. *Energy Policy,* 70:236–246, July.

Wise, J. 2005. Assemblage. In Stivale, C.J. (ed). *Gilles Deleuze: Key Concepts*. McGill-Queen's University Press. 77–87.

Wittmayer, J.M. & Schäpke, N. 2014. Action, research and participation: roles of researchers in sustainability transitions. *Sustainability Science,* 9(4):483–496.

Wlokas, H.L. 2015. *A review of the local community development requirements in South Africa's renewable energy procurement programme*. WWF. Cape Town, South Africa. [Online]. Available: http://www.wwf.org.za/?14322/A-review-of-the-local-community-development-requirements-in-South-Africas-renewable-energy-procurement-programme.

Wlokas, H.L., Boyd, A. & Andolfi, M. 2012. Challenges for local community development in private sector-led renewable energy pro- jects in South Africa: an evolving approach. *Journal of Energy in Southern Africa*, 23(4):46–52.

Wlokas, H.L., Westoby, P. & Soal, S. 2017. Learning from the literature on community development for the implementation of community renewables in South Africa. *Journal of Energy in Southern Africa*, 28(1):35–44.

Wolff, M., Cockburn, J., De Wet, C., Carlos Bezerra, J., Weaver, M., Finca, A., De Vos, A., Ralekhetla, M., Libala, N., Mkabile, Q. and Odume, O. 2019. Exploring and expanding transdisciplinary research for sustainable and just natural resource management. *Ecology and Society*, 24(4):14-30.

Wolfram, M. & Frantzeskaki, N. 2016. Cities and systemic change for sustainability: Prevailing epistemologies and an emerging research agenda. *Sustainability*, 8(2):1-18.

Wolfram, M. 2018. Cities shaping grassroots niches for sustainability transitions: Conceptual reflections and an exploratory case study. *Journal of Cleaner Production*, 173:11–23, February.

Wood, D. & Gray, B. 1991. Towards a comprehensive theory of collaboration. *Journal of Applied Behavioural Science,* 27(2):139-162.

World Bank. 2019. *The World's Cities in 2018.* [Online]. Available: https://www.un.org/en/events/citiesday/assets/pdf/the_worlds_cities_in_2018_data_booklet.pdf.

Wright, C., Nyberg, D., Rickards, L. & Freund, J. 2018. Organizing in the Anthropocene. *Organization,* 25(4):455–471.

Wright, S. 2013. Studying Policy: Methods, Paradigms, Perspectives. In Shore, C., Wright, S. & Però, D. (eds). *Policy Worlds: Anthropology and the Analysis of Contemporary Power*. New York: Berghahn Books. 27-31.

WWF. 2017. *Renewable Energy: Facts and Futures*. Cape Town. [Online]. Available: https://www.wwf.org.za/our_research/publications/?21841/Renewable-Energy-Facts-and-Futures.

Wyborn, C., Datta, A., Montana, J., Ryan, M., Leith, P., Chaffin, B., Miller, C. & van Kerkhoff, L. 2019. Co-Producing Sustainability: Reordering the Governance of Science, Policy, and Practice. *Annual Review of Environment and Resources*, 44:319-346, October.

Yelland, C. 2020. *A 2020 vision: How to end generation capacity constraints and load shedding in SA.* The Daily Maverick. [Online]. Available: https://www.dailymaverick.co.za/article/2020-01-13-a-2020-vision-how-to-end-generation-capacity-constraints-and-load-shedding-in-sa/.

Yenneti, K. & Day, R. 2016. Distributional justice in solar energy implementation in India: The case of Charanka solar park. *Journal of Rural Studies*, 46:35–46, August.

Yenneti, K., Day, R. & Golubchikov, O. 2016. Spatial justice and the land politics of renewables: Dispossessing vulnerable communities through solar energy mega-projects. *Geoforum*, 76:90–99, November.

Yildiz, Ö., Rommel, J., Debor, S., Holstenkamp, L., Mey, F., Müller, J.R., Radtke, J. & Rognli, J. 2015. Renewable energy cooperatives as gatekeepers or facilitators? Recent developments in Germany and a multidisciplinary research agenda. *Energy Research & Social Science*, 6:59–73, March.

Ziervogel, G., New, M., Archer van Garderen, E., Midgley, G., Taylor, A., Hamann, R., Stuart-Hill, S., Myers, J., *et al*. 2014. Climate change impacts and adaptation in South Africa. *Wiley Interdisciplinary Reviews: Climate Change,* 5(5):605–620.

Zolfagharian, M., Walrave, B., Raven, R. & Romme, A.G.L. 2019. Studying transitions: Past, present, and future. *Research Policy,* 48(9):1-16.