

The Global Corporation and its Role as a Source of Innovation for Sustainable Development: Beyond Corporate Social Responsibility

An Experience of Innovating for Sustainability within the Royal Dutch Shell Group

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Declaration

Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature_  _____

Date: _November -2 2006_____

Abstract

This thesis explores how to bring about change through innovation by using current power structures to move towards a more sustainable society. The type of change we are concerned with is the transformation from social structures, economic systems and institutions which diminish natural resources; to systems of production, institutions and social structures which affirm and interact productively with living systems, assuring their own sustainability. This change cannot be limited to address the social, environmental and economic consequences of the current system but should redefine the basic principles of society's design and operation.

One of the key actors in the current system are Multinational Corporations (MNCs) which have the capacity to mobilize natural resources, labour, and financial capital at a global scale. It is defined that to contribute proactively towards sustainability, the role of the corporation is to innovate in its core business, creating products and services that help to solve the current un-sustainability patterns of society.

However, how effective are targeted innovation platforms within MNC's in designing and implementing meaningful innovations for sustainability? How meaningful are these innovation efforts in terms of the broader CSR strategy of the company and its sustainability performance? What can we learn from business innovation platforms in terms of organization and entrepreneurship for sustainability?

In order to answer these questions an action research method was used in which I reflect on my own experience of using the innovation platform from the Royal Dutch Shell Group (Shell) to develop sustainability innovations. Within this perspective, the notion of Corporate Social Responsibility (CSR) is re-visited to highlight its potential to hinder or facilitate this process.

Opsomming

Hierdie tesis ondersoek hoe verandering met innovasie te weeg gebring kan word deur gebruikmaking van huidige magstrukture om sodoende te beweeg na 'n meer volhoubare gemeenskap. Die verandering waarmee ons gemoeid is, is die transformasie van sosiale strukture, ekonomiese stelsels en instansies - wat natuurlike hulpbronne verminder - na stelsels van produksie, asook instellings en sosiale strukture wat regstel en produktief wisselwerk met lewenskragtige stelsels om sodoende hulle eie volhoubaarheid te verseker. Hierdie verandering kan geensins beperk word om die sosiale, omgewings en ekonomiese gevolge van die huidige stelsel aan te spreek nie, maar behoort die basiese beginsels van die gemeenskap se ontwerp en optrede te herdefinieer.

Een van die sleutelspelers in die huidige stelsel is die Multinasionale Korporasies ('MNCs') wat oor die vermoë beskik om natuurlike hulpbronne, arbeid en geldelike kapitaal op globale skaal te mobiliseer. Om pro-aktief tot volhoubaarheid by te dra, moet die rol van die korporasie – volgens definisie – van so 'n aard wees dat hy in sy kern-sakebedrywighede innoverend optree om produkte en dienste te skep wat sal bydra om die huidige nie-volhoubare patrone binne die gemeenskap uit te skakel.

Maar hoe doeltreffend is geteikende innovasie-platforms binne die Multinasionale Korporasies egter vir soverre dit die ontwerp en toepassing van betekenisvolle innovasies betref wat op volhoubaarheid gerig is? Hoe betekenisvol is dié pogings rondom innovasie gemeet teen die breër strategie van korporatiewe sosiale verantwoordelikheid van die maatskappy en sy volhoubaarheidsprestasie? Wat kan ons van innovasie-platforms van sakeondernemings met betrekking tot organisasie en entrepreneurskap - gerig op volhoubaarheid - wys word?

Met die oog op die beantwoording van hierdie vrae, is 'n aksie-navorsingsmetode gebruik, waarin ek besin oor my eie ondervinding met die gebruik van innovasie-platforms van die Royal Dutch Shell Group (Shell) om volhoubaarheidsinnovasies te ontwikkel. Binne hierdie perspektief word weer gekyk na die konsep van korporatiewe sosiale verantwoordelikheid om sodoende sy potensiaal om dié proses te kortwiek of te fasiliteer, uit te lig.

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1. Introduction

In order to be able to achieve the transformation from unsustainable patterns of development to sustainable ones a combination of technological and social innovation is necessary, as well as more inclusive governance systems. This change cannot be limited to address the social, environmental and economic consequences of the current system but should redefine the basic principles of society's design and operation to interact productively with living systems. The change does not happen from one moment to the other due to its complexity, it is not a matter of a *revolution* but a process of *co-evolution* between different actors and sectors of society. This supposes the need to use some of the mechanisms and resources of the current power structures.

One of the key actors in the current system are Multinational Corporations (MNCs) which have the capacity to mobilize natural resources, labor, and financial capital at a global scale. They are at the same time an abundant source of innovation and resources but are also at the core of the current system of exploitation and inequality. The core theme of this thesis is to consider how to use their power proactively towards the system's transformation and to establish their role in the co-evolution process towards sustainable development. Within this perspective, the notion of Corporate Social Responsibility (CSR) is re-visited to highlight its potential to hinder or facilitate this process.

In order to explore this theme the concrete innovation process and CSR framework of a global energy company (Royal Dutch Shell) is analyzed vs. its potential to generate systemic change towards sustainability. The analysis is made using an action research method, since the experience of the author in innovating within Shell for sustainability is incorporated explicitly in the research.

This thesis has six chapters. In chapter one the thesis is introduced including the research methodology. Subsequently the genesis of multinational corporations as a phenomenon of the process of economic globalization is presented. As a consequence of this process the emergence of the CSR movement is identified. The CSR concept is examined within the broader understanding of the MNC's capacity to contribute towards the transformation to a sustainable society. It is discussed how one of the key roles of MNC's is to innovate in the direction of higher sustainability. The chapter introduces the research questions:

- How effective are targeted innovation platforms within MNCs in designing and implementing meaningful innovations for sustainability?
- How meaningful are these innovation efforts in terms of the broader CSR strategy of the company and its sustainability performance?
- What can we learn from business innovation platforms in terms of organization and entrepreneurship for sustainability?

The second chapter defines the concepts of sustainability and characterizes the current society system vis a vis potential characteristics of the future sustainable society. This is done by using an evolutionary perspective in the context of humankind usage of energy as critical factor for the survival of civilization. In this way the current energy

regime is identified, guiding the understanding of how to classify, in terms of its impact, the innovation initiatives from Shell.

The third chapter defines the role that MNC's should play as part of the co-evolutionary process of societal transformation towards sustainability. Organizational characteristics that will support this role are identified, based on the context explored in chapter two.

Chapter four uses the theoretical framework developed in chapter one, two and three to analyze the concrete case study of Shell in a historical perspective. The case is studied from the point of view of Shell's main business strategy, its CSR framework, the configuration of the innovation platform GameChanger and my own experience in developing a project using the innovation platform.

The case intends to understand if: the company is in a position to contribute to sustainable development, how the innovation platform supports its sustainability strategy and CSR position and what are the obstacles and opportunities it faces to fulfill its role.

Chapter five summarizes the learning's from the case study and based on them, a method to evaluate CSR initiatives in their innovative potential to create systemic change solutions for a sustainable society is proposed. The linkages between CSR strategy, innovation platforms, main business strategy and the role of the company in contributing to the creation of sustainable societies become evident.

The study concludes with an answer to the research questions based on the case study and from there, a definition of what will be the role of MNC's in a sustainable society emerges. Finally, the intent of this research was to understand how to accelerate change for sustainability by using the current power structures effectively. It draws lessons that could be transcended from a multinational context to any organizational or societal context.

1.1 A Brief Background on the genesis of Multinational Corporations and the Corporate Social Responsibility movement

During the 90's, the fast expansion of the global economy combined with the information technology revolution allowed for the consolidation of global corporations as powerful actors in the international context. These firms have grown under the logic of increased productivity and efficiency in the use of resources in order to generate higher returns for shareholder investment. The economic logic of globalization has become the main political drive behind government efforts to attract foreign investment, open their economies to the international market and specialize in selling national resources globally. (Cletus, *et.al* 2000).

Some consequences of such a model have been the relaxation of labor rights, the increased use of environmental capital and the increased gap between the rich and the poor. The quotation "that of the world's 100 largest economic entities, 51 are now

corporations and 49 countries” (Andersen & Cavanagh, 2000:2) shows how much power these organizations have while also pointing towards the responsibility this power should entail.

Civil society has not followed these developments passively, as an international social movement against globalization has emerged in response. Multiple local, national and international organizations have come together around fundamental issues such as human rights, environmental concerns, social justice, alternative economic systems and the defense of local identities, among others. Mechanisms such as protest, consumer boycotts, legal claims and international campaigns (using mass media), have allowed global Non-Governmental Organizations (NGOs) and civil society organizations to denounce the environmental and social practices of multinationals.

As a result of public pressure, new environmental legislation at the national level, and the Rio summit political agenda, big business has started to take into account social and environmental considerations in their decision-making and production processes. This has given birth to a movement around Corporate Social Responsibility (CSR) organized in institutions such as the World Business Council on Sustainable Development (WBCSD), independent NGOs and consultancies (Hamann et al. 2003); (MacIntosh et al, 2003). The CSR agenda has focused on the following.

- Determining minimum global standards and increased methods of accountability.
- Establishing internal quality systems and procedures to assure implementation of standards.
- Establishing partnerships among different sectors. (Covey and Brown, 2001; Hamann and Acutt, 2003; Business Partners for Development, 2002; Fox et al. 2002).
- Defining acceptable formats and content of corporate public reporting on social and environmental issues (Global Reporting initiative, 2002).
- Defining the boundaries of responsibility of the corporation vis-à-vis the government and civil society (MacIntosh et al, 2003).
- Creating methodologies to engage with stakeholders (Clarkson, 1995).

After more than a decade, the debate has come to focus on how effective have all of these initiatives been to solve the environmental and social consequences of the prevailing economic model? Two types of criticism have been voiced about the record of CSR initiatives, the first one being the lack of tangible proof of CSR’s impact. (Christian Aid, 2004). The second form of criticism is more fundamental and comes from the paradigm of sustainability. In the last 30 years, in connection with the environmental movement. (Naess, 1973), society has started to realize the massive scale of change produced in ecosystems. (Millennium Ecosystem Assessment, 2005), and the physical limits of economic growth (Dresner, 2002; Ayres et al. 1996). In this thesis sustainability is understood from the ecological, socio-cultural and economic perspective. Development is sustainable when human activities create systematically a higher quality of life for all, and in the process nature is not diminished but the diversity of ecosystems is sustained, in order for it to be able to provide for future generations.

Sustainability then, is not only on the environmental agenda; but more fundamentally the redefinition of the social, political, cultural and economic structures. So as to take into consideration a world reality, in which natural resources have been diminished to the point of questioning the survival of the human species in the planet. This broad transformation requires high levels of innovation since for the first time in the history of evolution, human kind has reach the capacity to affect the ecosystems it lives from, at a global scale (Niele, 2005); (Meacher, 2003); (Millennium Ecosystem Assessment, 2005) (Wackernagle, and Rees, 1996). Innovation is a key pre-requisite for sustainability and the responsibility of business is to be proactive within its role to contribute to the creation of that new society. A sustainability perspective broadens the role of corporations, not by making social and environmental initiatives an additional activity of the corporation, a “nice thing to do”, but by increasing the sphere of responsibility in terms of making the corporation an actor in creating sustainable futures.

Different categories of analysis need to be developed to understand how effective CSR measures are from a sustainability point of view, for this thesis three main categories have been identified.

- (1) React & Fix: An initiative from the corporation can be motivated as a reaction to external concerns and thus the response will be to “fix” the problem, for example compensating a community after land is been taken away for development or cleaning up a contaminated site.
- (2) Product Development: The development of a product through innovation that may serve as a new technology or possibility to facilitate more sustainable societies, for example the shift from fossil fuel cars to electric ones.
- (3) Systemic Change: The Corporation plays a proactive role in the development of sustainable systems, for example questioning the overall concept of cars as a sustainable model of transportation and co-creating with other stakeholders mobility alternatives within an overall framework of sustainable livelihoods, for example starting a business around car sharing for a particular city.¹

If large corporations are one of the most powerful actors in the current system, there is an opportunity to use their widespread networks, financial, human and technology capital for the sustainability cause. It is by understanding their potential for innovation with its limitations, opportunities and possibilities that the role of multinationals in the creation of this sustainable future is defined and thus a new way of understanding CSR emerges.

If innovation and entrepreneurship are critical for sustainability and multinational actors are in a privileged position to innovate due to their financial capacity, skills, networks and diversity, then:

- How effective are targeted innovation platforms within MNCs in designing and implementing meaningful innovations for sustainability?
- How meaningful are these innovation efforts in terms of the broader CSR strategy of the company and its sustainability performance?

¹ These categories were first developed in the unpublished article: Understanding Corporate Social Responsibility from a Sustainability point of View: Systemic Change or only Mitigation of Effects? Presented as assignment to the Corporate Social Responsibility module, July 2004,

- What can we learn from business innovation platforms in terms of organization and entrepreneurship for sustainability?

The questions aim to understand *how* in practice multinationals can co-create innovative sustainability solutions and the *significance* of these innovation efforts in the broader context.

1.2 Methodology

In the process of selecting the methodology I considered two possibilities. The first one was case study methodology defined as “an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident”(Yin, 2003:4) Although this research complies with both preconditions, strict case study methodology was discarded because the nature of this research takes as main methodological tool an active and purposeful *intervention* in the context and not the study of a specific phenomenon per se.

In order to answer the research questions I selected an action research method as more appropriate since action research is “inquiry that is done *by* or *with* insiders to an organization or community, but never *to* or *on them*. It is a reflective process, but is different from isolated, spontaneous reflection in that it is deliberately and systematically undertaken and generally requires that some more evidence be presented to support assertions” (Reason & Bradbury, 2001:3). Thus in this research the unique position of the researcher, which gives a unique point of view to understand the context, is what has been regarded as more important.

The context to be explored is Shell’s innovation platform GameChanger, which is a methodology developed within the company to guide innovation efforts and aligned them to strategic objectives of the business. One of the new innovation areas is called the Energy Ladder Domain; its aim is to identify opportunities for the development of services and products that can serve the poorest people in the world, providing a future platform for growth to the business.

Within the Energy Ladder Domain I am developing an innovation project to transform the residential infrastructure built in Shell’s capital projects from conventional oil camps into sustainable settlements (eco-villages). The eco-villages project is undertaken in order to open a window of opportunity to use resources from Shell to develop solutions towards sustainability. Other entrepreneurs also develop projects within the domain. In order to complement the author’s own experience, interviews were conducted with these entrepreneurs, with the aim to avoid one of the key difficulties in undertaking an action research study, which is the bias that the author will have in studying the context he/she interacts with. Critical to the undertaking of an action research process is to locate the position of the researcher in reference to the context. “Our obligation as researchers is to interrogate our multiple positions in relationship to the question under study. In making explicit the tensions the researcher experiences in varying roles and statuses, we have the possibility of crafting uniquely complex understandings of the research question. In addition, we hope to avoid the blind spots that come with unexamined beliefs,” (Reason & Bradbury, 2001:44).

The position of the researcher against the context in this thesis is of an insider, because I am a Shell employee. However, the work I have been conducting through the Shell’s Game Changer innovation platform sets me also as an outsider with

regards to the main business of the company. Game Changer is a space of innovation that has been deliberately set outside the mainstream business in order to allow internal entrepreneurs the freedom to develop something new. However in order for the innovation to be successful they require acceptance from the mainstream business. From this point of view, Game changer innovators are insiders to Shell as a company, insiders within the Game Changer platform but outsiders in terms of their innovations with regards to the mainstream business.

Additionally I found myself in a paradoxical position by being a sustainability advocate working for an oil company. This is because oil is the critical variable of the reproduction of our current unsustainable society. I feel an outsider in the sense of not sharing the current values and worldview of the company but at the same time an insider in understanding the potential of transformation it has. “We may occupy positions where we are included as insiders while simultaneously, in some dimensions, we identify as outsiders. These dimensions extend into the worldview that one brings to the institution, both in terms of political or ideological beliefs as well as cultural assumptions” (Reason & Bradbury, 2001:44).

This position has influenced the selected methodology of analysis that sets three different contextual levels for answering the research questions: the context of the Shell Group in the global economic system, the context of the Game Changer Platform and Shell’s CSR policy within Shell and the context of the specific domain and project I am developing within the innovation platform. The tier-up structure of these three settings has allowed me to reflect about my own practice from different perspectives, consult with different levels of the system and get feedback in order to understand the impact that localized actions have or may have throughout a broader system.

Consequentially, three different levels of analysis will be tackled. The first one is about the context, policies, processes and methods in Shell emerging from the implementation of the sustainable development concept as a guiding business principle. This will reveal the mindset and circumstances that produced the particular type of sustainable development understanding in the company, the role that the company is defining for itself and how this has translated into different initiatives. This initial landscape will be compared with the recently launched innovation business platform.

The second level will be the documentation and analysis of the Energy Ladder Domain within the GameChanger platform and the participation experience of the author and other entrepreneurs in implementing projects through the domain. This level illustrates an experience of how the sustainability framework and innovation platform work in practice, providing clues about how effective targeted innovation platforms are within MNCs in designing and implementing meaningful innovations for sustainability.

The last level is a reflection about the Shell innovation system and the role that is opening for the company in the society of the future. Is it really responding to the need for systemic change towards sustainability; or is it just reproducing the larger current system? This allows us to understand how meaningful these innovation efforts are in terms of the broader CSR strategy of the company and its sustainability performance.

The output of the thesis is not intended to be the potential solution of a practice problem, as traditionally action research is designed for (Whyte, 1989) The research is about evaluating an already proposed action path and methodology (GameChanger Innovation research method) in terms of its potential to contribute to Shell's position as a proactive player in the development of sustainable futures. The relevance of studying the potential of a global energy company to innovate towards sustainability comes from the role energy plays in the development of civilization. Energy is a key variable in the capacity of humanity to evolve towards a more sustainable livelihood, so analyzing a gas and oil company can give us inference about one of the critical aspects of a future sustainable society.

In this regard, the development of this thesis is part of an overall personal learning journey about how to transform society towards sustainability which has included formal studies, such as the coursework in the Mphil in Sustainable Development Management and Planning program, combined with practical implementation, such as my current work in Shell. It is because of this personal situation that action research contributes the most to a continuous acting-reflecting-learning cycle towards increasing my capacity as an entrepreneur. At the same time I consider fundamental for theory to be enriched with the insights of practical experience. I identify personally with an active research method to transform the world in which the context, the practitioner and the systematic reflection of experience increases our overall learning about what is possible and transforms, in the process, the context and the researcher.

2. The Current System and a Vision of Sustainability

This chapter intends to give evidence on the social, environmental and economic effects of the massive global extraction and trade of resources, identify the current system as an energy carbocultural regime (Niele, 2005) and set an ecologically based view of sustainability. This chapter also aims to clarify what the sustainability concept means theoretically and in practice for this thesis, as a base to understand and evaluate Shell's role in a sustainable future.

2.1 Consequences of the Fossil Fuel Economy

The paradigm of a modern society, with its faith in science, technology, and progress, has acquired its current form due to the use and exploitation of fossil fuels. It has been a remarkable achievement for the human society. In the last 200 years, thanks to the industrial revolution fuelled by oil, we have been able to double the population of the earth. Thanks to the advances in science we have been able to harness electricity, multiply the production of food, achieve the dream of flying, expand our mobility by the use of cars, airplanes, mass-transport systems, connect the world to networks of production, open global markets to be able to sell and buy products at a planetary scale. The economy has reached the capacity to mobilize and produce materials globally and connect cities to large networks of utilities enabling the human species to have the perception of a separation from nature for its every day needs. The effects of the overexploitation of the world's resources is being felt in our current time:

- Water withdrawal and impoundment

Water withdrawals from rivers and lakes for irrigation, household, and industrial use doubled in the last 40 years. Humans now use between 40% and 50% of the fresh water running off land to which the majority of the population has access. In some regions, such as the Middle East and North Africa, humans use 120% of renewable supplies (due to the reliance on groundwater that is not recharged). Between 1960 and 2000, reservoir storage capacity quadrupled and, as a result, the amount of water stored behind large dams is estimated to be three to six times the amount held by natural river channels (this excludes natural lakes) (Millennium Ecosystem Assessment, 2005:10).

- Land Conversion and degradation

More land was converted to cropland in the 30 years after 1950 than in the 150 years between 1700 and 1850, and now approximately one quarter (24%) of Earth's terrestrial surface has been transformed to cultivated systems. Since about 1980, approximately 35% of mangroves have been lost, while 20% of the world's coral reefs have been destroyed and a further 20% badly degraded or destroyed (Millennium Ecosystem Assessment, 2005:10).

“About 11% of the Earth's vegetated land has been moderately or severely degraded since 1945. The misery of environmental refugees in developing countries, suffering starvation, disease and disability, alerts us to the ultimate effects of land loss” (Bartelmus, 1994 :9-25).

- Nutrient use and levels

Human activities now produce more biologically usable nitrogen than is produced by all natural processes combined, and more than half of all the manufactured nitrogen fertilizer ever used on the planet has been applied since 1985. The use of phosphorus fertilizers and the rate of phosphorus accumulation in agricultural soils both increased nearly threefold between 1960 and 1990. Although the rate has declined somewhat since then, phosphorus can remain in soils for decades before entering the wider environment (Millennium Ecosystem Assessment, 2005:10).

- Fisheries

At least one quarter of marine fish stocks are over-harvested. The quantity of fish caught by humans increased until the 1980s but is now declining because of the shortage of stocks. In many sea areas, the total weight of available to be captured is less than a tenth of that available before the onset of industrial fishing. Inland fisheries, especially important for providing high-quality diets for the poor, have also declined due to over-fishing, changes to habitats, and withdrawal of fresh water (Millennium Ecosystem Assessment, 2005:10).

The major drivers of change, degradation, or loss of marine and coastal ecosystems and services are mainly anthropogenic. Important drivers of marine and coastal ecosystems include: population growth, land use change and habitat loss, overfishing and destructive fishing methods, illegal fishing, invasive species, climate change, subsidies, eutrophication, pollution, technology change, globalization, increased demand for food, and a shift in food preferences (UNEP, 2006: viii).

- Deforestation

Deforestation rates of 17 million hectares (ha) annually in tropical areas. As these areas contain more than half of the world's biota, deforestation in these forests may cause the extinction of 15,000 to 50,000 species per annum between 1990 and 2020 (UNEP 1992:54).

- Climate change

Induced through accumulation of anthropogenic CO₂ in the atmosphere has become the most imminent threat to the current equilibrium of ecosystems globally and the survival of the human species (Millennium Ecosystem Assessment, 2005:10).

With all exploitation of world resources and at least 50 years of focus in development, the paradox is that over 1 billion people live in poverty” (Bartelmus, 1994:9-25).

Dresner identifies two types of capital that we depend on for living; ecospheric and non-ecospheric. The former consists essentially of mineral reserves and the latter consists of the ecosphere (Dresner, 2002).

“Natural capital is multi-functional. A forest ecosystem produces a range of energy and materials (wood, chemicals) and services (habitat for biodiversity, climate regulation, flood protection). Some functions may be substitutable by manufactured capital, eg wood as raw material, while others are non-substitutable, e.g, climate regulation. In the latter case, no amount or type of human capital can replace natural capital. Ecosystems which provide

critical life support services that have no human equivalent cannot be reduced below a minimum threshold levels” (Ayres et al 1996).

This has been profiled by the Millennium Ecosystem Assessment (2005), an intergovernmental effort to understand the current status of global ecosystems and the relationship with the livelihood of communities that depend on them: “The cost is already being felt, but often by people far away from those enjoying the benefits of natural services. Shrimp on the dinner plates of Europeans may well have started life in a South Asian pond built in place of mangrove swamps – weakening a natural barrier to the sea and making coastal communities more vulnerable” (Millennium Ecosystem Assessment, 2005).

It is by using the world’s resources that humankind has been able to create the type of industrialized societies we live in today. The paradox is that in the journey we are depleting the resources to a point where that same society cannot be sustained in the long run. The question that this generation needs to address is how to be able to provide *a high quality of life for all*, within the limits of nature, or “whether remaining species, populations, ecosystems and related biophysical processes and the waste assimilation capacity of the ecosphere are adequate to sustain the anticipated load of the human economy into the next century while simultaneously maintaining the general life-support functions of the ecosphere” (Wackernagle, and Rees 1996:34).

2.2 A Definition of Sustainability

The term sustainable development has been one of the most used in the last decade starting from the classical definition: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Commission, 1987). The definition becomes more much complex when there is a need to make it operational, when the discussion starts to be centered on the means. Sustainable development has been represented by the intersection of economic, social and environmental agendas. This however, reflects a fragmented view of reality and in practice different actors have highlighted any of the aspects according to their own interest. “The best solutions are based not on tradeoffs or *balance* between (social, environmental, economic) objectives but on design integration achieving all of them together – at every level, from technical devices to production systems to companies to economic sectors to entire cities and societies” (Hawken et al., 1999).

The understanding of sustainability in this research is of an integrated concept, meaning that the human systems will be connected back to nature and organized in a way that every human activity creates systematically a higher quality of life for all at the same time that the diversity of ecosystems is sustained. This perspective of sustainability is taking a strong approach in the sense that sees natural capital as something that should be maintained and fostered (Hatting; 2001). It is at the same time an egalitarian approach, since it promotes equality as a core value, and privileges quality over growth (Hatting; 2001).

A strong sense of sustainability is justified since “Degradation of ecosystems, and hence the services they provide, often is irreversible. These characteristics imply that ecosystems are of limited predictability” (Ayres. et al 1996).

On the other side, inequality is one of the key threats to maintaining natural capital, for two reasons. The first one is that communities without access to proper services

for survival will abuse resources. The second is that those with the access to resources are using more than what is environmentally viable. Thus a strong sense of sustainability has to stay inevitably linked to achieve the goal of equality.

“An average person in North America consumes almost 20 times as much as a person in India or China, and 60 times more than a person in Bangladesh. It is simply impossible for the world as a whole to sustain a Western level of consumption for all. In fact, if 7 billion people were to consume as much energy and resources as we do in the West today we would need 10 worlds, not one, to satisfy our needs” (Dresner, 2002:88).

The third component of the definition has to do with human systems. The sustainability quest is about how to define systems of production, consumption, social organization, human settlements, institutions and values that will allow us to sustain nature and ourselves for the long term. Any further understanding of how those systems may be configured requires an evolutionary understanding of the planet's living systems and the evolution of the human species and its culture in the natural environment.

Since its development as a species, humanity has been on a constant path of evolution on which it has used the resources from the environment under different energy regimes (meaning dominant energy forms), from the mastery of fire, passing through the agricultural regime and lately to the domination of hydrocarbons (Niele, 2005). The difference in this age is that “anthropogenic flows of economic inputs and rejected outputs have reached global dimensions” (Niele, 2005:29). Frank Niele (2005) explores that relationship from an energy point of view, complementing the above definition of sustainability and providing clues to define the future system in more concrete terms. This is relevant for this essay since the case that will be explored further relates to an energy company.

The Staircase of energy regimes (Niele, 2005:90) explains the type of dominant energy form that has moved the planet throughout its history. It relates those stages with key triggering factors, which have transformed the energy regime from one era to the other. Each dominant form of energy has allowed for different natural forms to evolve in the planet. Approximately 0.5 million years ago the domestication of fire by humankind allowed the human species to start becoming dominant above other species and develop forms of organization, communication and technology that differentiated humankind from the rest of nature. Some of these forms include language and the capacity to symbolize, the use of tools, and the emergence of social organization. What is interesting about Niele's model is that it places a specific form of energy as the key variable that allows a type of civilization to emerge. In summary social and cultural organization are emergent forms of a specific energy regime.

“All biological and cultural revolutions have at their core an enhancement of the supply of energy, because this feeds and changes all aspects of ecological and human activity. The staircase of Socio-Technological Development suggests that behind the scenes of a socio-technological revolution in effect six revolutions operate in concert. A socio-technological revolution, such as the Carbocultural Revolution, is driven by an energy revolution at its core, and shaped by the co-evolution, in human knowing, human capacity, human

acting and human living, induced by a revolution in consciousness” (Niele, 2005:103, 114).

This form of social organization becomes at the same time an energy dissipation structure, meaning the mechanism by which energy is transformed from one state to another to allow the reproduction systems of society to work. The Carbo-cultural regime has created the largest societal energy-dissipating structures (cities, means for transportation, industry, etc).

“The stream of fossil fuels unearthed has yielded an unprecedented energy flow of heat through unprecedented societal energy-dissipating structures, with their associated unprecedented emergent properties (electricity, quantum mechanics, antibiotics, pop music, the world-wide web, man on the moon) and unprecedented growth rates of population and economies.” (Niele, 2005:96).

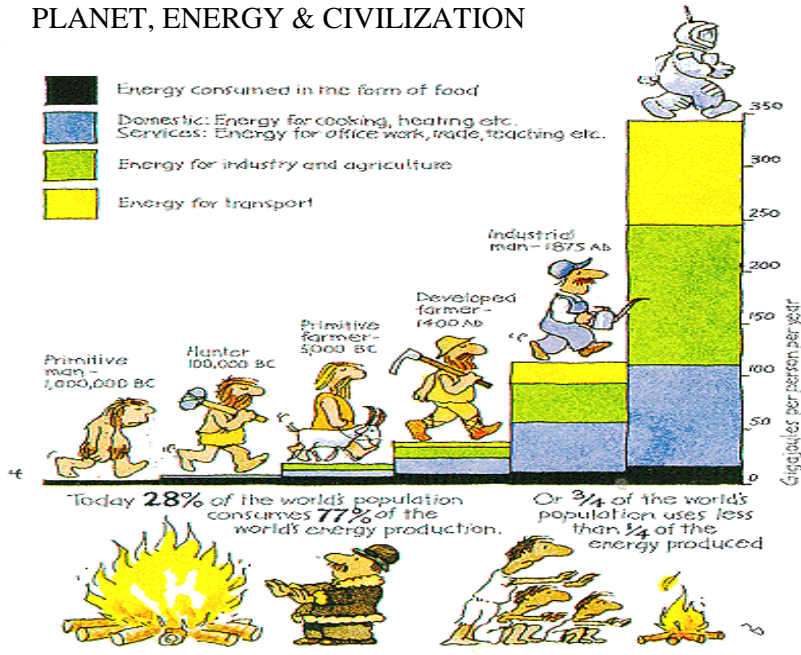
It has been our capacity to use fossil fuels effectively that has allowed technologies to emerge (e.g. cars) which at the same time have transformed forms of social and economic organization in a constant dialectic process of transformation between energy, technology and society.

Viewed from an energy perspective sustainable development is “socio-economic development that promotes the resilience of eco- and sociosystems through controlling anthropogenic forcing” (Niele, 2005:129).

A new energy evolutionary step can become the trigger for a new form of civilization, which hopefully can reduce the human footprint to the natural means of the earth. In this context, the potential role of a global energy multinational company in shaping the future is not to be underestimated.

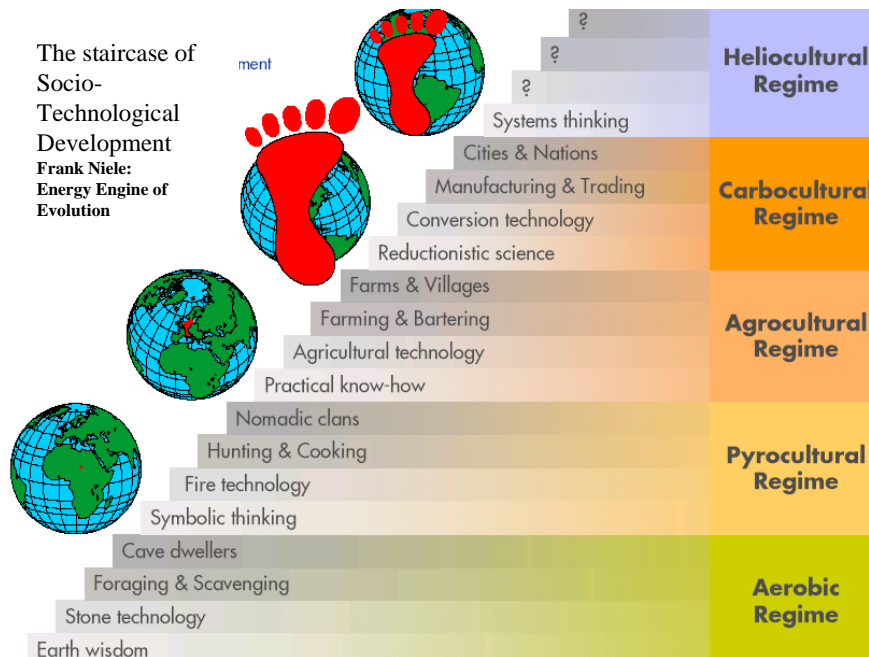
Figure 1 Evolution & Energy Consumption

PLANET, ENERGY & CIVILIZATION



Unesco Courier, 2002

Figure 2: Staircase of Socio-Technological Development



Niele, 2005

2.3 Characteristics, Principles, Categories and Praxis of Society Sustainable System

Throughout the last sections sustainability has been defined from a systemic perspective. It is by transforming the current economic, social and institutional systems that pattern of sustainability can be embedded in the functioning of society.

The logic behind the definitions of sustainability used in this thesis comes from deep ecology meaning “the right of all forms [of life] to live is a universal right which cannot be quantified. No single species of living being has more of this particular right to live and unfold than any other species” (Naess,1989); meaning we are all “aspects of a single unfolding reality” (Fox, 1990).

The interesting idea from deep ecology is that everything is connected to everything else. The scientific version of deep ecology comes from system dynamics defined as: “an approach to understanding the behaviour of complex systems over time. It deals with internal feedback loops and time delays that affect the behaviour of the entire system. What makes using System Dynamics different from other approaches to studying complex systems is the use of feedback loops and stocks and flows. These elements help describe how even seemingly simple systems display baffling nonlinearity” (Wikipedia ©, 2006).

System dynamics and deep ecology come into synthesis through Fritjof’s Capra theory of living systems and his proposal to reorganize society within the context and modus operandi of these systems in order to achieve sustainability (Capra, 2002).

Based on systems theory and deep ecological conceptions (Devall, 2001) of the world, I will attempt to spell out some characteristics, principles, conditions and praxis about the emergence of a future sustainable system. The purpose is to expand the conception of sustainability with elements that allows clear definition of the type of society transformation this thesis is referring to. This is an attempt to characterize and at the same time establish the broader definition of sustainability based on elements that can make the socio-cultural and ecological system more resilient.

The exercise is limited to this broad characterization, since a key element in developing concrete sustainable solutions can only emerge from a particular context, and thus a specific definition only makes sense in a concrete situation. The aim is to use this characterization as a point of reference for the evaluation of the innovation space opened through GameChanger within Shell.

2.3.1 Principles

The following principles become conceptual tools to create different assumptions about the reproduction and existence of human society. These principles are a synthesis from the application of deep ecology to society systems and human-centered perspectives which privilege the development of the self as critical for the evolution of society as per (Capra (a), 1997); Hakwken et al (1999); Nicolescu (2002); Wilber (2000).

- Principle 1, Adequacy of scale: Society systems need to be organized in a scale in which a coherent integration between the ecology of a place and the human environment (political, social-economic and cultural structures) allow for the reproduction of society in economic, social, cultural and spiritual terms in a sustainable manner.
- Principle 2, A society based on being: The meaning of existence and fulfillment as recognized by a given human group should guide the organization and structures of society. “Life, our own life, is something else rather than an object that can be located in time and space” (Nicolescu, 2002:25).
- Principle 3, Self-Regenerating: A social group is at the same time a generator of the social and natural environment on which it relies and an integral part of that social and natural environment.
- Principle 4, Integrity of being: Systems provide for a constant evolution of being and not for the use of self as exclusively a part of the material and social reproduction of society.
- Principle 5, Diversity: The coexistence of biological and human diversity is fostered as a key principle for increasing resiliency.
- Principle 6, Design Integration: Understanding of reality as a complex system, allows for design that integrates social, economic, environmental, self and cultural aspects at the core.
- Principle 7, Constant Innovation: The system is based on constant innovation as the key mean to increase adaptability.

2.3.2 Conditions

The conditions are the key aspects for a sustainability process to emerge.

- Localize: Economic, social and environmental dimensions come together in place. The adequate scale to allow the self-regenerating principle should be found. Systems are created at the adequate scale for self-generation.
- Development is set into context: “Socio-metabolisms could differ regionally with ecological circumstances” (Niele, 2005:143) and energy regimes. Environmental possibilities determine cultural and social practices for development.
- Closed loop flow of energy and materials: Services become the form of exchange rather than products (Hawken, et al., 1999:10) reducing the amount of matter used and transfer in the reproduction function of society. “Resilient socio-metabolisms based on recyclable matter and renewable energy” (Niele, 2005:130). Materials and energy are constantly circulated and reused allowing for less waste and energy consumption.
- Energy Regime (Niele, 2005:143): Dramatically increased energy production is possible through an Helioculture regime, in which renewable energy is feasible through the harvesting of solar energy, which allows for the recycling of matter (closed loop economy) and through dramatically increasing energy efficiency. Key energy carriers are electricity, hydrogen and green biofuels.
- Radical resource productivity: Increase capacity to increase rate of activity with less use of materials and energy.
- Governance: From individuals to communities and larger aggregations, processes of self-governance allow for the adequate management of society.
- Consciousness: Self-governance is possible due to individual’s and communities’ understanding of the effects that actions (individual or community) have on the overall system at different scales. Feedback loops can be experienced in relatively short time frame. People take personal responsibility for their impact in the broader system.

By using the principles and conditions the following are potential concrete forms of a socio-economic system that contributes to sustainability.

2.3.3 Bio-regional scale:

The scale that makes sense for applying Principle 2 and 3 (self-regeneration and no fragmentation) is the bioregional scale. A bioregion is “a geographically distinct area of land that is characterized by a distinctive climate, ecological features, and plant and animal communities” (WWF, 2006). From a socio-economic point of view it should be a territory in which natural boundaries change from one ecosystem to another and in which the basic elements to sustain life can be found: water, land, energy, and food. By adapting governance systems to the bioregions we avoid the fragmentation of ecosystems and can generate processes of self-sufficiency and lifestyles, which are based on the concrete characteristics of place; avoiding the use of far-away resources that in their extraction affect the overall system. This has become a planning practice for development. A second dichotomy created by the current development model is avoiding the fragmentation between rural and urban. A territorial model that will be able to understand the ecological conditions (soil, water, ecosystem, and biodiversity characteristics), the demographic dynamic, the economic flows, the cultural context and the social situation in a bioregion will be able to foresee a new order that will achieve a balance between ecological sustainability, use of resources (economy) and human development.

A fundamental step is to re-conceptualize the role of the rural areas, as spaces for multiple purposes and functions including the production of food through agriculture based on natural systems and use of biodiversity. This means to create strong local economies that can transform the vision of the rural as isolated land where products are exported to the city, to the vision of the rural as a generator of value in itself that can attract investment. Seen from this perspective, the rural area can play a definitive role in the development of the region.

2.3.4 Within the region consider the conservation of biodiversity in all activities

In order to change the paradigm, ecosystems need to be seen as assets instead of costs. These assets need to be used strategically and to the optimum levels of productivity: “natural ecosystems and their biodiversity (can be seen) as capital assets that, if properly managed, will yield a stream of life-support goods and services over time, these ecosystem services include the production of goods, regeneration processes, stabilizing processes, life fulfilling functions, and conservation of options” (Daily, 1999).

2.3.5 The sustainable city

Reconnecting urban centers to the bioregion is critical for sustainability. It is the most important means for citizens to realize again their interdependency with the environment; an interdependency, which is obscured by the secure networks of utilities provision. Critical steps towards the sustainable city include the decentralization and reduction in scale of utility services, the redevelopment of urban areas to allow the natural environment to flourish again within human society, and the management of waste by creating close loop systems. From the economic point of view a democratic, inclusive, educational, and cultural city will increase the capacity of its citizens (Pietersen, 2003).

2.3.6 Perception-Consciousness

“The more we study the major problems of our time, the more we come to realize that they cannot be understood in isolation. (...) Ultimately these problems must be seen as just different facets of one single crisis, which is largely a crisis of perception” (Capra, 1996: 4). The quantificational signal (Niele,2005:56), objective, deterministic, linear logic and progressed based perception of reality which characterizes the carbo-cultural regime needs to give space to a qualitative, transdisciplinary, complex perception of reality to allow a new logic to emerge. “It is therefore clear that a certain logic and even a certain vision of the world is hidden, often unconsciously, behind each action, whatever it is- whether it is the action of an individual, a collective, a nation, or a state. A certain logic is the implicit and hidden agenda that determines all social regulation” (Nicolescu, 2002:27). In this way the transformation of people requires a transformation in perception and an increased interaction and responsibility for those systems that allow human civilization to be reproduced. This is critical to allow new society forms to emerge in any context, from a multinational company to a rural community.

3. The Role of Global Business in the Sustainability Challenge

As profiled through the definition of sustainability and some of the principles and conditions required for the evolution of society, the world requires a step-change in its current social, economic, technical, cultural, and belief systems. This transformation can't be produced within the same paradigm that created the current industrial society system and not a single entity or actor in society could achieve this step-change alone. The transformation requires the participation of every level of the current system. "In pluri-centric societies (society in which control can't be identified in a single actor or manifested in an homogenous way) control cannot be exercised from the top. Control is distributed over various actors with different beliefs, interests and resources. Influence is exercised at different points, also within government, which consists of different layers and silos making unitary action impossible" (Kemp et al.2005:10).

With understanding that not a single actor can shift the society towards more sustainable patterns of development, but rather the co-evolution of different sectors is required, and that the root paradigm informing current world view has reached its limit, this chapter explores the current role of MNCs and the key characteristics required as organizations to shift the current patterns of production and consumption towards more sustainable ones.

3.1 Current Role of MNCs.

As explained in the first chapter, key actors in the current global economy with a relative concentration of power are multinational corporations. They are the manifestation of the neo-liberal ideology, which is a "political philosophy and movement beginning in the 1960s that de-emphasizes traditional liberal doctrines to achieve progress and social justice by more pragmatic methods, especially an emphasis on economic growth" (Wikipedia and fact-index.com).

The economic model emerging from neo-liberalism privileges economic growth as the key goal to achieve, from which countries will generate the resources necessary to create good conditions of living and material welfare for the population. The main strategy to achieve economic growth in the 90's has been the creation of export growth economies to supply the global market. This allowed for the expansion of firms by accessing a world market, declining per unit production costs and reducing the monopoly power of domestic firms (Cletus et al 2000). This global market is the playing field of MNCs.

The firms have been able to accumulate financial, human, and technology capital which allows them to act at a global scale, a key skill required to respond to the un-sustainability signs of the "macroscopical signal"² (Niele, 2005:119). To use that capability, the role of the corporation in contributing to a future sustainable society is two fold:

- To transform the business towards the creation of products and services which solve environmental and social issues and

² Macroscopical signal is the capacity of humankind to be able to observe its own impact at a planetary scale through instruments such as the stock exchange market, such as the UN human development index, WWF's Living planet Index or scientific data about the climate etc. (Niele, 2005:118)

- To become an active agent in the creation of systemic change through redefining key systems related to their core business. This is achieved by participating in wider social and political initiatives.

This external dimension is coupled with an internal dimension; the organization itself needs to work as a sustainable system by making extreme reductions in energy and materials use through closing production cycles and increasing energy efficiency use. This transformation requires high levels of innovation and the capacity to understand the world in a broader context than the global economic system in which multinationals interact.

The visionary corporation, understanding the requirements of a sustainable future, will be able to identify critical areas of innovation, set itself a role in the future society and have a consistent map to transform the business to fulfill that role. For this to happen the following are critical characteristics and competencies that the MNCs will need to acquire:

- Radical innovation and entrepreneurship needs to become part of the organizational culture (Druker, 1985),
- The corporation requires the capacity to navigate and design for complexity and context (Cilliers, 2000),
- Understand the areas of co-evolution with related stakeholders and (Kemp,2005);
- Be able to work in a transdisciplinary fashion, (Nicolescu, 2005).

3.2 Innovation and Entrepreneurship

The first characteristic is the creation of an innovation and entrepreneurship culture. As explained in previous chapters this is a critical requirement to create a transformation towards sustainability. This section intends to define and justify in more detail why innovation and entrepreneurship are critical for MNCs to fulfill a proactive role in the development of sustainable societies. Although entrepreneurship is widespread and studied phenomena in the field of economics, studies have mainly focused in identifying the role of the entrepreneur in economic development or the characteristics of individuals that are entrepreneurs. (Burnett, 2000) For this thesis the theme of entrepreneurship has an organizational connotation, the interesting point for our purpose is to understand the process of entrepreneurship within organizations. For this reason the main author studied is Peter Druker.

Innovation can be defined as the practical application of new knowledge to human work (Druker, 1985:11), the entrepreneurial process "involves all the functions, activities, and action associated with the perceiving of opportunities and the creation of organizations to pursue them" (Bygrave & Hofer, 1991: 14). For Druker, (1985:15) the 20th century industrialized society is the society of organizations and employees. Throughout the industrialization process "innovation in companies evolved from curiosity-driven to opportunity-driven and from a cascading approach – from science to technology to business to society- to a bridge building model centered around innovative combinations of technologies and markets" (Niele, 2005:113).

The development of science as a purposeful human activity coupled with the organization of the economy in private enterprises at the beginning of the industrial revolution made innovation the driving force to realize in practice the idea of progress.

If innovation is the application of new knowledge to human work, then entrepreneurship is the way by which change is exploited as an opportunity. Innovation becomes the specific tool of entrepreneurs, because it creates changing conditions and thus it opens new possibilities (Druker, 1985:20). For Druker (1985) entrepreneurship and innovation are not spontaneous activities but rather through the technique of management should become a purposeful, systematic activity within companies and organizations. *Entrepreneurial management is the key ability of an organization to survive in the market and society by sustaining its relevance.* Entrepreneurship consists in “drastically upgrading the yield from resources, creating new markets and new customers” (Druker, 1985:22) bringing “something new, something different and transmuting existing values” (Druker, 1985:22). “Systemic innovation therefore consists in the purposeful and organized search for changes, and in the systematic analysis of the opportunities such changes might offer for economic or social innovation” (Druker, 1985:35).

The exploitation of change to create new opportunities is not mainly a process of new technology “indeed the events that explain why entrepreneurship becomes effective are probably not in themselves economic events. The causes are likely to lie in changes in values, perception, and attitude, changes perhaps in demographics, in institutions, perhaps changes in education as well” Another source of innovation and entrepreneurship is the capacity to use already existing resources to create new ways of wealth creation (Druker, 1985:13,31).

In the 21st century the critical global change is the transformation and extinction of ecosystems at a global scale. This is a massive challenge for those companies that are able to grasp the transformation required and at the same time a critical opportunity for exploiting entrepreneurship as a tool to become relevant actors in building human civilization for the 21st century.

Opportunities for new business lie in the depletion of fundamental natural resources, the increased awareness in consumers of the environmental effects of industrialization, the unbalanced global distribution of resources, and emergent needs to provide in novel ways critical resources for society such as water, energy and food. Critical for the development of new products and services in the 21st century is to take into account the phenomenon of Climate Change.

3.3 Complexity and Context

The second characteristic is to embed the company’s operations in its societal context from an understanding of the context’s complexity. This is a critical part of creating a new logic as discussed in Chapter 1. Initiatives and ventures based on a different paradigm can start creating a new reality that may address the contradictions of the current system.

The Theory of Complexity intends to overcome the dichotomy presented between a modern way of thinking with its objective/fundamental search of the truth and a postmodern way of thinking with its anything-goes/subjective/relativist understanding. Complexity puts the emphasis on the network of interactions. Any organization, including MNC’s is formed by a series of relationships (customers, stakeholders, suppliers, political institutions, communities) which mutually influence each other. The critical characteristics of complex systems (Cilliers, 2000: 28-29)

become a guide to understand what is different in this way of understanding the world and the implications that this has in the process of innovation and entrepreneurship.

- “Complex systems consist of a large number of elements that in themselves can be simple.
- The elements interact dynamically by exchanging energy or information; these interactions are non-linear, meaning there is no direct causality.
- Non-linear interactions create many direct and indirect feedback loops.
- Complex systems are open systems, meaning they interact with the environment and have a history, which is of cardinal importance to the behavior of the system.
- The behavior of the system is determined by the nature of the interactions, not by what is contained within the components
- Finally, complex systems are adaptive, they can (re)organize their internal structure without the intervention of an external agent” (Cilliers, 2000: 28-29).

Innovating within a context means that the corporation is responsive to a network of interactions and takes into account in the process of entrepreneurship, the needs, reality, history and characteristics of the context. This has as a consequence the need to work with diverse stakeholders, and at the same time, the capacity to transform and be transformed through those relationships. This builds accountability and requires the justification of choices and actions within the context; this is in itself an ethical response because there is commitment with the well being of society. This commitment comes from being an integral part of the society where the company interacts, since it is a mutually interdependent relationship. It is positive to the business to operate in thriving societies for its own success and at the same time contribute through its core business to the viability and sustainability of those societies.

Currently multinational companies have local presence in many countries, however internally their own organizational culture is stronger than the potential loyalties that employees and managers will have for their own-(external to the corporation), context. This can be represented when the activity of the corporation is not giving the main benefits to the local context, but rather to foreign interests. In this case standardized processes, products and services are implemented worldwide and decisions that affect the local context may be taken from headquarters managing a global portfolio. For example when a company extracts a natural resource, leaving part of the economic value, taking away environmental and social capital to realize the economic value in another territory, in this case there is partial commitment with the context, the company is an instrument to fulfill its own business objectives and

uses society as a resource, (Roberts, 2003). This create a fundamental ethical dilemma:

“...By saying that profits and principles can be combined, and by implementing the measurement systems that can monitor principles as well as profits, there remains an indeterminate space in which the two collide and turn into a choice, a dilemma. But this dilemma has now been displaced from the boardroom to the shop floor and hence robbed of much of its decisional power. Moreover, the very form of such control at a distance depends upon *the restriction of local moral sensibility*, displacing it with incentives to conform with distant interests, even if these now claim to be ethical interests” (Roberts, 2003 : 260).

Complexity requires a deep understanding and commitment to the context and the real confrontation with the effect of a business operation, which deepens the sense of responsibility and ethics, currently diluted in the long global economic chain.

Complexity applied to organizations means that the company understands the limitations of its interactions, the unpredictability of operation’s effects in the social context, and is able to adapt to emerging properties of its own organization, in summary, is in constant process of adaptive transformation, increasing its resiliency. From an organizational point of view complex organization for sustainability will mean that

- Relationships are fundamental
- The history of the organization co-determines its nature
- Unpredictable and novel characteristics may emerge from an organization
- Due to non-linearity of interactions, small causes can have large effects
- Complex organizations work best with structures on all scales, and much interaction between different structural components” (Cilliers, 2000:25).

3.4 Co-Evolution & Transitions

The third characteristic is the capacity of the business to co-evolve with other sectors and stakeholders in the development of sustainable systems.

As mentioned before the challenge of sustainability requires systemic change. For example the evolution of sustainable fuels will require in parallel the transformation of the automotive industry and eventually the re-evaluation of transport systems in urban areas. Entrepreneurship and innovation will be more transformative as part of a broader cooperation with those stakeholders that require co-evolution within the system. This is not an easy transformation; it requires planning, cooperative frameworks and in some cases different systems of governance.

An interesting approach is the Dutch governance approach of transition management. “Transition management views social change as a result of the interaction between all relevant actors on different societal levels within the context of a changing societal landscape. It is thus concerned with the coordination of interaction and co-evolutionary processes” (KEMP et al 2005: 9).

The governance model is being created with broad societal transformation in mind. Although an interesting concept it has so far only been adopted in countries with a certain capacity at government level to start a public process of transition management; which is not necessarily the reality of the countries where MNCs operate. For example in the Netherlands it has been used to plan the energy future of the country. Shell's Netherlands president is chairing the task force. However the transitions management approach has interesting elements that could facilitate the structuring of the innovation initiatives within business.

What is interesting about transition management is the underlying concept of co-evolution, meaning the linkage of two or more evolutionary processes (Kemp et al 2005:9) and the element of experiments and innovation within a long-term vision or goal. This is the basis for a reflexive governance process designed to promote and stimulate reflection and learning through interaction, co-creation of visions and change-agenda's and innovation experiments.

“The focus should be more on the co-evolution between innovations and their context for it to have transformative power.” “From a co-evolutionary perspective, a continuous reflexive learning cycle between experiments and innovations and long-term strategic visions and goals should be at the heart of Sustainable Development” (Kemp et al 2005:9).

This perspective is important when analyzing Shell's innovation platform. What are the spheres of co-evolution? Which stakeholders are involved? How does the innovation platform respond to the need of constant cooperation and learning with external stakeholders and the context? More importantly, to which strategic vision is the Energy Ladder Domain contributing to and how does it relate to the overall strategy of the Shell Group? From a business point of view, transitions open a possibility to identify and understand co-evolutionary processes and long term visions as a framework to set innovation within a context.

3.5 Transdisciplinarity

A sustainable business can be defined as that one which contributes from the core of its mission, products and services to a more sustainable society through innovation and entrepreneurship taking into account the logic of complexity. In order to transform the business from un-sustainability to sustainability, it is critical to develop the capacity to learn, act and research with an approach that goes “at once between the disciplines, across the different disciplines and beyond all discipline” (Nicolescu, 2002:44). If one of the critical issues of lack of sustainability is the fragmentation in the understanding of reality, then it is critical to act within a unifying logic that can overcome the fragmentation of thought and knowledge to create a different perception. This is the reason why the fourth characteristic is transdisciplinarity.

The development of innovative products and services based on disciplinary knowledge will most probably bring solutions which may be technically suitable but not socially appropriate by ignoring the context of application. In order to create something new and meaningful that could solve a contradiction in a given society the innovation development process has to be broader than the separated technical knowledge of different disciplines.

To transcend disciplines the innovation approach needs to use complexity and context-based knowledge, and formulate the solution at a higher level to which the contradictions have been identified.

This is essential for sustainability, it has been proven many times already how the introduction of a new technology which has been designed to solve a particular problem, ends up causing multiple other conflicts and becoming a much larger issue. This happens because the solution intends to deal with the consequences of the problem it intends to solve and not with the root causes This is by definition not sustainable.

For example to solve the lack of potable water in a rural community the solution of providing a water pump to bring the water from a near-by underground aquifer can be appropriate from a technical point of view, but if other dimensions of the reality of that community are not taken into account, the solution may end up creating social disturbance.

The application of a simple technical solution in this case comes from a linear mindset of reality. Other dimensions are ignored, for example the emotional connection of the community with water, the current labor distribution and gender roles in the provision of water, the social interactions created around water and the environmental sustainability of the resource. Transcending disciplines requires the creation of a holistic intervention that connects at once with all these simultaneous dimensions and is inspired in a deep understanding of the context.

For that deep understanding to be achieved the product development process requires close interaction with the people that are part of the context. This means transcending the concept of stakeholder engagement as a consultation exercise, to create a space of connection between the employees of the corporation and their potential client in their humanity and complexity. This way of transcending the relationship among people may allow the creation of comprehensive solutions that can take into account multiple dimensions and in the process allows for the simultaneous transformation of all of those involved. Innovation becomes then, a learning process that simultaneously enhances the MNCs network of connection in a particular context.

For this to work in practice the role of the individual entrepreneur and his/her capacity to connect through his being with the context he/she interacts with is critical. What seems to be a matter of chance or individual capability needs to become a systematic way of working, understanding and being.

To develop innovation and entrepreneurial ventures for a sustainable society we need to comprehend the context and its people in a process of co-working, co-discovering, and co-learning about the solutions for our future world. “Between knowing and comprehension there is being” (Nicolescu, 2002:72). It is the capacity of people to connect with themselves, between themselves and the context they interact where sustainable solutions can emerge.

In this perspective, the individual reality of the entrepreneurs and innovators is as important as their product of creation and their beneficiaries. “The transdisciplinary attitude therefore presupposes both thought and interior experience, both science and consciousness; both effectivity and affectivity” (Nicolescu, 2005:87). Otherwise “in the absence of bridges between beings and things, technoscientific advances function only to intensify an increasingly incomprehensible complexity” (Nicolescu, 2005:89).

What could a transdisciplinary approach to innovation and entrepreneurship mean? How can complexity based innovation facilitate the sustainability of products and services? What are the challenges and obstacles to co-evolve and open opportunities of transitions in a specific field?

The next chapter explores the innovation platform of Shell and the implementation of the Energy Ladder Domain, including my personal experience and the experience of other entrepreneurs in implementing a complex sustainability innovation within the organization. This experience-based learning will draw key lessons from a particular context to intend to answer some of the above questions.

4.From Theory to Practice: Creating a Space of Innovation for Sustainability within a Global Energy Company

This chapter focuses on understanding how effective targeted innovation platforms are within MNCs in designing and implementing meaningful innovations for sustainability, based on the principles, conditions and characteristics explored in chapter 3 and 4.

In order to understand the implications of the innovation platform, the context of Shell's sustainability agenda and current business strategy will be given in a historical perspective.

GameChanger's methodology will be explained and within it a concrete domain of innovation will be explored further, the Energy Ladder Domain; with its obstacles and opportunities, contextual drivers, stakeholder relationships and organizational arrangements. The exploration focuses on the practical challenges and opportunities myself and the other entrepreneurs faced in using the innovation platform. This will help us to answer to the question: What can we learn from business innovation platforms in terms of organization and entrepreneurship for sustainability? Figure three profiles the hierarchy of initiatives and the different contexts of analysis.

Figure 3: Relationship of initiatives.

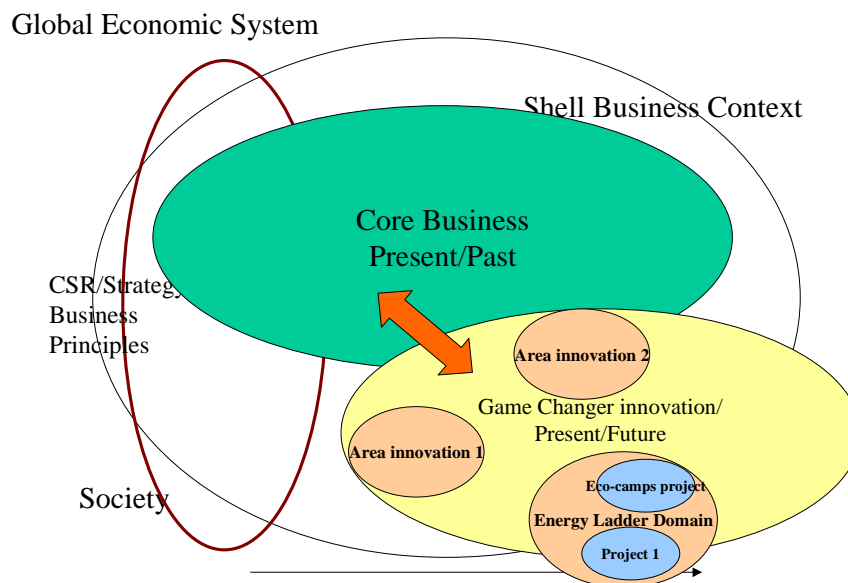


Diagram based on Manders & McCORMICK, 2005

4.1 Shell's Sustainability Agenda in a Historical Perspective

As a result of NGO's global campaigns and consumer boycotts due to Shell's involvement in several scandals including Brand Spar in the North Sea and the

execution of Ken Waro Siwa by the Nigerian government; Shell's business reputation; market share value and mainstream business were heavily affected in the mid 90's. As a consequence in 1997 Shell started an organizational transformation to incorporate sustainable development into its operations. The CSR framework includes the redefinition of business principles, which articulate responsibilities towards shareholders, customers, employees and society. The principles include aspects such as economic performance, competition, business integrity, political activities, health, safety, security and the environment, local communities and communication and engagement. From the principles a series of global policies and standards are derived in areas such as health, safety and environment (HSE), risk and internal control.

Each one of these standards is developed into procedures and guidelines implemented in the four global businesses (exploration & production, gas & power, downstream and renewables). The annual Shell Report is the key tool to communicate company performance externally and engage in dialogue with external stakeholders (Royal Dutch Shell Group, 2005).

In order to track the evolution of Shell's sustainability agenda in relation to changes in the environment, an analysis of the nine Shell Sustainability reports (1997-2005) was undertaken. The analysis looked for consistency from one report to another, identifying areas of innovation based on sustainability (as defined in this thesis) and classifying Shell initiatives as react & fix; new product development or systemic change.

There are two distinct levels of analysis; the first one is about the evolution of the sustainability concept within Shell. This is relevant to explore, since the way that sustainability is understood in the company's language reflects the effect of the interaction with different stakeholders. This evolution of the understanding does not translate necessarily into internal action and transformation of the system; in fact measurable results and action keep lying behind the evolution of Shell's understanding and conceptual development. This is one of the key issues of CSR critics.

The importance in mapping the evolution of what the company communicates regarding sustainable development comes from the fact that internal entrepreneurs can use the talk, the policies and company positions to justify their own initiatives. This is very powerful, since concepts that do not exist in the language of the corporation are much more difficult to introduce.

The second level of analysis focuses on concrete initiatives that the company has undertaken to backup its words with actions. The main conclusion is that in certain areas such as eco-efficiency there has been advances, but in general the initiatives tend to be dispersed across the Shell group and do not necessarily form a coherent whole with the capacity to transform the business. The attempt to concentrate innovation efforts through GameChanger is also an attempt of unification and coherence.

The analysis and classification of initiatives has as a point of reference the definition of sustainability from an energy point of view as defined in section 2.2. This means that as an alternative to the current Carbo-cultural regime a Helio-cultural regime will emerge in which society functions by using its capacity to harvest solar energy. This creates the tension between the current reality and the sustainable possibility.

The following are key conclusions of the sustainability concept evolution within Shell, and the type of sustainable development initiatives it has undertaken.

4.2 Shell's Evolution in its Sustainability Vision & Understanding

The early Shell Reports interpreted sustainable development from a business principles point of view, identifying environmental, social and economic issues in relationships with different stakeholders (community, customers, society at large, etc.) (1997-2000). This approach evolved to an understanding of sustainable development as the balance between economic, social and environmental performance (2000-2002). Within this framework the company created measurements and organizational initiatives to improve performance within the three spheres. These measures have been consistently reported. The last approach has been to unify and integrate environmental, social and economic aspects through the theme of "meeting the energy challenge" in which the company sets its vision of sustainability as meeting energy demand in environmental and socially responsible ways at the same time that alternative energy solutions are explored. However this latest interpretation demonstrates a subtle change in the direction the company has taken with regards to its understanding of sustainable development.

From 2003 onwards, Shell's conception of its role in sustainable development shifted from *exploring new possibilities in providing sustainable energy services*, to developing hydrocarbons as a main energy source in environmental and socially responsible ways. The main reason for this change was the overbooking of reserves scandal, in which the company recognized that its proven reserves were 20% less than what had been stated. As a consequence a dramatic reorganization process started and shareholders pressured the company for concrete plans to rebook hydrocarbon reserves and assure its value in the market. Let's explore how this transformation has happened in practice.

Sustainable development as a concept and guide for action has integrated into Shell through the opening of the company to dialogue with external parties and the constant interactions with stakeholders concerns. I will call this a "textual reality" in which the key is to define the issues and constantly interact with stakeholders to bring the company's vision into the public domain. This level creates a reality of perception and its main purpose is to build the reputation of the company and sustain the license to operate, at the same time that the Shell Group projects and initiatives are legitimized. This level creates an organizational field defined as: "the interrelation between different organizations and institutions around an issue that is important for them. The field becomes a center of debate where actors realigned their positions, try to influence others on the issue interpretation and meaning, in summary they are arenas of power relations" (Hoffman, 1999:351). Examples of these organizational fields for the Shell Group include biodiversity, human rights and climate change, among others.

In terms of the organizational fields in which the company has participated in the external debate there are two areas that have evolved consistently and have been predominant for the sustainability concept as understood in this essay. The first one is the development of renewable energy and secondly the issue of Climate Change.

A key planning and engagement tool of the company, Shell scenario planning, has been used as a way to create visions of the future to justify strategic decisions in the present and is relevant to explore both organizational fields. Within the scenarios there is the energy scenarios that are based on current trends and possibilities defined

as the “energy mix” meaning the distribution in supply and demand of different type of energy globally.

The main corporate message has been that in the next 50 years energy demand will increase exponentially as developing countries industrialize (especially China and India). The role of oil will decrease but the role of gas will become more important as a transition fuel to renewable energy. “The International Energy Agency (IEA) and our own scenarios expect energy use to grow by more than half over the next quarter century. Demand could double by 2050. The greatest part of the energy needed will continue to come from fossil fuels” (Shell Report, 2005 : 2).

With regards to renewable energy Shell’s scenarios in 1997 forecasted that in the year 2020 renewable energy was going to be meeting approximately 10% of global energy demand and maybe 50% by 2050 (Shell Report, 1997). Within this strategic view, the business started a renewable energy business in 1998 by investing 1 billion dollars since the year 2000. Key favorable conditions included the increase of subsidies by governments to renewable energy alternatives, stakeholder’s demands, reputation pressures and technical evolution increasing the feasibility of a successful new business.

Since the start-up of the renewable energy business it has achieved substantial growth, especially in wind energy. The decision was made to invest in Copper Indium Diselenide (CIS), the next generation of solar technology and divest its crystalline silicon solar business due to lack of global supply of silicon. A solar rural operations business is also part of the portfolio.

Contrary to the statement in the year 1997, the current position and forecast is that renewable energy will supply less than 10% of the energy mix by 2025. “Alternative energy such as wind, solar power and biofuels can provide some of the energy required. Today these sources meet less than 1% of the world’s energy needs, but with government support and the cost reductions others and we are working to achieve, their use could expand quickly. Our scenarios expect them to grow several times faster than fossil fuels and to become a larger part of the energy mix. Even so, with so much extra energy needed, these alternatives would still be supplying less than 10% of energy demand by 2025” (Van der Veer, 2005:4).

In the current overall strategy the aim is to develop at least one sustainable renewable energy business but as of 2005 in its strategic vision the company has returned to view itself as a predominantly hydrocarbon company. In fact, after the scandal for the overbooking of reserves in 2003 the Shell Group has faced the need to simplify its strategy and structure in order to be able to assure the market its capacity to book new hydrocarbon reserves and develop the capability to run simultaneously more mega capital projects, all concentrated in the further exploitation of hydrocarbons.

This pressure from the market after 2003 has changed the direction the company was taking with regards to sustainable development, from an exploration about creating future energy possibilities (as interpreted in the message the company was sending through the Shell report), to the creation of acceptable social and environmental conditions in large projects to allow the company access to the further exploitation of hydrocarbons.

With regards to renewables this means that the strategy is to develop in parallel different technologies to select the one that will offer better business value in the future through a convergence of market opportunity, policy frameworks and technology development.

Besides the market pressure after the reserves categorization issue, high oil prices since 2004 have opened other business opportunities not economically feasible before. Some of the factors affecting oil price include:

- Instability in the Middle East especially war in Iraq, confrontation of the west with Iran and fear of political disruption in Saudi Arabia.
- Instability in Venezuela and West Africa.
- Hurricane Katrina and its devastating effects on the refinery infrastructure in the Gulf.
- “Some experts feel the easily accessible sources of light sweet crude are almost exhausted and in the future the world will depend on more expensive sources of heavy oil and alternatives” (Wikipedia, 2006a).
- “A more fundamental problem that some believe is causing the price to rise is the probability of peak oil already or soon being reached. Not only is there a limited amount of fossil fuel which has been burnt as fuel, but the remaining accessible supply will be consumed more rapidly by a growing, industrializing Third World” (Wikipedia, 2006a).

The oil price above \$60/barrel has resulted in alternatives such as tar sands oil (unconventional oil) becoming economically feasible. The reserves of this resource, which is mainly tar mixed within sand in large fluvial regions, are estimated to be just in “Canada of about 35 billion barrels of surface mineable bitumen and 98 billion barrels of bitumen recoverable by in-situ methods. This volume places Canadian proven oil reserves second in the world behind those of Saudi Arabia.” (Wikipedia, 2006(b)) The main project in this area is located in the province of Alberta, Canada - the Athabasca Oil Sand project - where Shell has investment in the first integrated project with 60% of shareholding. This is a suitable solution from an economic point of view to meet increased demand in a financially viable way. However the main issue with the tar sands is their high negative environmental effects, due to the effect on the landscape of open-pit mining operation and especially the increased release of greenhouse gases to the atmosphere:

“The open-pit mining of the Athabasca oils sands destroys the boreal forest, the bogs, the rivers as well as the natural landscape. Furthermore, for every barrel of synthetic oil produced in Alberta, more than 80 kg of greenhouse gases are released into the atmosphere and between 2 and 4 barrels of waste water are dumped into tailing ponds that have flooded about 50 km² of forest and bogs” (Wikipedia, 2006b).

This brings us to the second key issue for Shell’s core business, the Climate Change effect. By 2006 it is undeniable by the majority of the scientific community that anthropogenic Carbon Dioxide releases and other green house gases in the atmosphere are affecting the climate stability.

In its 2001 report, the Intergovernmental Panel on Climate Change stated,

“There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities. Carbon dioxide from fossil fuel burning and land clearing has been accumulating in the atmosphere, where it acts like a blanket keeping Earth warm and heating up the surface, ocean, and atmosphere. As a result, current levels of carbon dioxide in the atmosphere are higher than at any time during the last 650,000 years” (IPCC, 2001).

According to some experts this is already having major environmental effects globally including the increased of strength and number of hurricanes. The Kyoto protocol has been established as the international mechanism to coordinate efforts in CO₂ reductions, including the development of a carbon market and the Clean Development Mechanism (CDM) to trade emissions targets across borders.

Shell acknowledged in 1997 the reality of climate change and established Group-wide emission reduction targets. The critical issue for Shell is two-fold. Firstly is the issue of producing fossil fuels, which in the process releases large amounts of CO₂. Secondly is the effect of burning those fuels by consumers especially in power generation, which is the primary source of emissions globally (IPCC, 2005). The first internal target of reducing emissions in production was achieved in 2002 where the company achieved 10% less emissions globally compared to a 1990 baseline, including business growth. The second *target* is scheduled for 2010 to get to 5% less emissions than in 1990, including additional business growth. These are the goals, however the developments of new unconventional oil as well as growth expectations make this target a challenge for the corporation. The future portfolio of the business has been set to develop further fossil fuels as the key way to match supply and demand globally and contribute to the development of industrializing countries. According to Jeroen Van Der Veer, current CEO of the Shell Group the reason for this is that:

“Most of the growth in demand will, inevitably, still be met with more fossil fuels, including more oil and especially more natural gas. Expect them to continue to be a central part of the energy mix for many decades to come. Why? Because they are convenient and cost-competitive and, above all, because I don’t believe any other sources can be brought to market on the massive scale needed in time to meet demand. I simply cannot see how continued prosperity and poverty reduction can happen without using much more of them” (Van Der Veer, 2005).

The critical obstacle for further fossil fuel development and exploitation is CO₂ emissions and climate change and this poses the greatest challenge, since the development of other alternatives such as tar-sands may well increase Green House Gases emissions, for Shell as a company and especially for its clients, the governments. “But this won’t be sustainable unless the environmental impacts from growing fossil fuel use can be managed” (Van der Veer, 2005).

“The forecast growth in synthetic oil production in Alberta also threatens Canada's international commitments. In ratifying the Kyoto Protocol, Canada agreed to reduce, by 2012, its greenhouse gas emissions by 6% with respect to the reference year (1990). In 2002, Canada's total greenhouse gas

emissions had increased by 24% since 1990. In 2006, Canada declared this target to be unattainable, a declaration likely related to historically unprecedented oil prices, the resulting development of the Athabasca resource and the huge impact of this move on total national emissions” (Wikipedia, 2006b).

The key area of innovation Shell is investing in is the development of Green Fossil Fuels, meaning the production of Fossil Fuels without net emissions of Greenhouse Gases (GHGs). This is being researched through the process of carbon sequestration and storage that can be done by several means:

- Reinjecting the CO₂ into geological formations;
- Reinjecting the CO₂ into the ocean;
- Reinjecting the CO₂ into aquifers; and
- CO₂ mineralization.

“These technologies still face several challenges: further reducing costs, finding suitable places to store CO₂ that are located near the sources, demonstrating that the CO₂ will remain safely underground and, in some cases, resolving technical uncertainties” (Shell Report, 2005).

Other critical mitigation measures for reduction of GHGs in the atmosphere include: “energy efficiency improvements, the switch to less carbon-intensive fuels, nuclear power, renewable energy sources, enhancement of biological sinks, and reduction of non-CO₂ greenhouse gas emissions” (IPCC, 2005).

From these alternatives Shell is mainly working on energy efficiency improvement in internal operations, investment in renewables and CO₂ sequestration and storage technology.

In summary the concept of sustainable development has evolved from an opportunity to broaden the possibilities of different energy sources, to the focus on meeting society’s energy demand within the current system (hydrocarbon exploitation). In this textual reality two critical organizational fields have dominated the capacity of Shell to influence the debate, the field around renewable energy and the field around climate change.

With the increased oil price, the company has found an opportunity to exploit new sources of hydrocarbons and will need to justify how its social and environmental commitments apply to those new sources. The response from the company lies in its believe that it will find technological solutions to manage the environmental effects of these new sources, and this is why the innovation and research agenda has focused on the themes of carbon sequestration and CO₂ reduction.

4.3 Shell Sustainable Development Initiatives & Actions

As part of the revision of the Shell Reports, the following is a review of the key initiatives the company has reported during the last 9 years as part of its sustainable development agenda. The initiatives have been classified as React & Fix, Product

Innovation & Systemic Change. A summary of key actions to incorporate sustainable development concepts in current operations is presented at the end of the section.

4.3.1 React and Fix

The initiatives within this category are those which improve the current operations but are part of the same paradigm of energy development defined as hydrocarbons, some examples include:

- Emission reduction targets in chemical plants and refineries;
- Local Social investment;
- Eco-efficiency approach: targets to reduce flaring, venting and emissions; and
- Cleaner fuels: The developments of fuels that are more efficient and at the same time produce fewer pollutants such as lead or sulfur.

4.3.2 Product Innovation

This category profiles the development of new products that reduce environmental and social impact significantly. However, they will still be part of the carbo-energy regime as explained in Chapter 2. Some of these options may become part of systemic change if they could be produced with renewable energy. Additionally, although some of these options increase the life-span of fossil fuel potentially for more than a century they are still based on finite resources and many uncertainties remain on their environmental effects.

- Transport Fuels: A key area of innovation has been the development of biofuels and specifically the partnership with Canadian company Logen Energy to lower the cost of converting plant waste into ethanol for blending with gasoline to reduce greenhouse emissions and not interfering with the food chain.
- Gas-fired power generation: replaces the uses of coal to generate electricity with gas reducing CO₂ emissions by half. Power generation is the largest source of CO₂ globally.
- Including CO₂ costing in capital projects and developing an internal emissions trading scheme.
- Gas-to-liquids (GTL): “Shell GTL products comprise primarily of clean GTL fuel (gasoil) and naphtha. An external study concluded that, on a life-cycle analysis basis, a ‘Shell GTL system’, compared to a ‘crude oil refinery system’, has no greater impact on global warming and has a significantly lower impact on air acidification and smog formation, and lower emissions of particulate matter. Compared to European Diesel, GTL presents lower concentrations of fuel particles by (26%), lower concentration of nitrogen oxides by (6%), lower concentration of hydrocarbons by (63%) and lower concentration of carbon monoxide by (91%). fuel particles 26% lower.
- Clean Coal: In alliance with Anglo American (South African mining company) the group will get involve in projects to extract, gasify and then convert coal into chemicals, hydrogen, power, liquid hydrocarbons and other uses, including potential carbon sequestration (Anglo American, 2006). However the remains of the overall process and the effects of coal mining can be highly polluting (e.g. mercury waste).
- Fuel cells for hydrogen infrastructure: Shell has invested in research and development of infrastructure to convert hydrogen in the future energy transport source. This innovation does not constitute so far systemic change, because the

production of hydrogen is highly energy intensive and still requires fossil fuels. There is the potential to produce hydrogen from renewable resources.

- Carbon sequestration and storage: It will reduce the CO₂ emissions of fossil fuels, is an important mitigation against global change but it needs to be part of other measures such as energy efficiency improvements, the switch to less carbon-intensive fuels, nuclear power, renewable energy sources, reduction of non-CO₂ greenhouse gas emissions and enhancement of biological sinks. The contradiction is that in the process of fossil fuel production, transport and consumption of natural carbon sinks are systematically depleted, such as forests and rich-humus land.

4.3.3 Systemic Change

These innovations and initiatives are able to foster a new paradigm of development and are opening paths towards larger sustainability of society. There are three areas in which Shell has been particularly proactive.

Shell Foundation: Shell started an independent foundation that has developed innovative programs in partnerships with other organizations around the critical issues of energy and development. There are four programs that are based on multi-sector partnerships creating the possibility of various actors to coordinate efforts and achieve high impact results in a short period of time. The programs themes include sustainable transport in developing cities, entrepreneurship development through and for renewable energy and tackling the health problem of inside pollution due to cooking fuels.

Renewable Energy Business: As explained earlier, working on different technology possibilities to open avenues to renewable energy including wind, solar and biofuels.

Rural Solar Operations: Use of solar energy to fuel development in rural communities without access to the electricity grid. The business model took into account social and livelihood aspects of the customers.

It is important to note that many of these initiatives have been local pilots and projects, which have not necessarily influenced the main strategic choices of the company as a whole. Specifically referring to the systemic change innovations they are intended to open possibilities for the future as they develop but currently they constitute an appendix to the mainstream business and serve it in legitimizing the group as a whole.

Besides concrete initiatives the incorporation of sustainability principles in the business has had some practical implications for everyday operations. The importance of social and environmental requirements in the development of new capital projects has increased in comparison to the mid 90's. This has been done via an internal evaluation system that allows projects to evolve from one phase to the other before reaching the point of Final Investment Decision (FID). This evaluation system includes economic, technical and political risk-taking as well as taking into consideration environmental and social risks in a more systematic fashion.

As a consequence, projects have had to research the environmental and social consequences of the future project identifying potential risks early on in project life cycle. As part of this process environmental, social and health impact assessments have become critical in order to justify internally and externally the viability of the project from an environmental and social point of view. These impact assessment

studies have to be performed following World Bank/IFC Standards (Shell Exploration and Production, 2006) so that projects are able to apply for international finance and are able to comply with the requirements of banks that have committed to the Equator Principles. By incorporating these requirements more projects are taking into account social and environmental risks.

Additionally the pressure of NGO's in particular locations in which the communities have complained about the effects of Shell's operations have prompted the company to establish a centralized Social Performance Unit, which has developed guidelines and training for the installations which have neighbor communities. Additionally social performance plans have been mandatory for critical locations and independent social impact assessments have been performed. A similar structure has been developed for the theme of biodiversity, in which sensible locations have been identified and special biodiversity action plans need to be set in order to have central control of these locations. All of these initiatives reflect concrete means by which Shell has incorporated its understanding of sustainability into its current operations.

In conclusion, the incorporation of sustainable development in Shell business emerged as a need to reestablish Shell's reputation after social and environmental scandals that affected the business in the 90's. The opening of the company to stakeholder engagement and the creation of different organizational fields to proactively influence public debate allowed the company to refined its understanding of sustainability. As a follow up to the results of those debates the company has inserted internal policies and procedures that have affected the way the organization operates in certain areas (evaluation of capital projects, impact assessment procedures to WB standards, measurement of emissions, eco-efficiency measures, social performance plans, biodiversity action plans in critical locations etc). Some actions have been taken and these initiatives have been classified as react & fix, product development and systemic change; taking as a reference an Heliocultural regime as the future reference of a sustainable energy system.

However after the 2003 scandal in terms of the re-categorization of reserves the company has focused in streamline the organization, and simplify the business strategy. The need and pressure to survive in the market has been the main driving force in Shell's position towards sustainability and innovation. In this sense the role of a future renewable business has been diminished, the position of meeting the energy challenge with hydrocarbon options has strengthen and the now feasible opportunity of unconventional oil (tar sands) has been embraced due to the increase in oil prices and its potential to provide large amounts of reserves.

Sustainability and innovation has become mainly an agenda of creating a strong system to gain the license to operate by being able to exploit fossil fuels in a way that the environmental and social effects can be accepted by society; even if the consequences can be destructive. Critical to this business strategy is the theme of Climate Change, which has been simplified in the sense of focusing on the CO₂ emissions aspect. This is the most important single obstacle to fully roll out the Green fossil fuels vision. As a consequence large portion of the innovation and research agenda has focused on the strategies of CO₂ sequestration and diminishing emissions and the creation of cleaner technologies such as gas to liquids and coal to liquids.

The sustainability strategy is not essentially a search for new products and services to transform society to a new energy system, but mainly the emphasis is put into the development of technology and alternatives that allow the carbo-cultural regime and the predominance of hydrocarbons to extend their lifespan in human civilization.

4.4 Evaluation of Shell's Sustainable Development Approach

Through the exploration of Shell's understanding of sustainable development and its subsequent actions we have learnt the company assumes that energy demand will double in the next 40 years. This is explained mainly as a function of the industrialization of developing countries as they overcome poverty. As a result this energy demand is better supplied by utilizing efficiently current sources of energy and improving their environmental performance through technology such as carbon sequestration, energy efficiency and fewer pollutants in the fuels.

This has as a consequence that larger energy projects will need to be built in the next 30 years to assure supply, these ones may be located in globally sensitive ecosystems, but the company will be able to "manage" the environmental effects through mainly technological solutions.

As explained in Chapter 2 of this essay, sustainability goes beyond managing the environment and it includes fundamentally a transformation of the logic by which humanity acts and understands the world. "...in the very term environmental management is the assumption that the natural environment can be managed (Levy, 1997:137)...[T]he assumption that science can and should be applied to the understanding and control of complex ecosystems has deep roots in the modernist paradigm founded on notions of anthropocentric positivist science (Egri & Pinfield, 1996). The optimistic confidence in scientific progress carries the reassuring message that the environmental side effects of industrial capitalism can be managed, enabling economic growth to continue indefinitely" (Levy, 1997:138).

Shell's current position is reproducing industrialization based on fossil fuels as the model for development. As shown in Chapters 1 and 2 a significant step change is required to transform current society systems into sustainability; there is a need to move towards more sustainable sources of energy. Secondly the assumption that developing countries should follow a similar patten of industrialization and economic development as a way to overcome poverty is part of the ideology itself. A fundamental step to achieve sustainability globally is to overcome poverty in developing countries through low energy and low resource intensive models of economic and social organization. This is closer to the organization of ecologically feasible bioregions rather than current trends of urbanization and modernization, thus the institutions that forecast larger demand of energy from a traditional perspective may be missing the point that there is an option to create larger demand of energy from renewable sources if a political project of sustainability is embraced to overcome poverty and a feasible market for renewable energy is to emerge fast enough.

Finally the sustainability vision of Shell ignores equality in the sense that it continues to develop energy resources for those markets where the demand is; meaning the already industrialized countries or those that can pay for the technology and resources. Shell is a company traditionally separated from development since it is government that develops the energy infrastructure for business and society. Shell's role is to provide economically viable energy to this infrastructure and in that sense it

is deeply connected to the co-evolution of other industries; for example auto-motor industry or power generation. However it is the existence of a particular source of energy that allows a certain type of industry and technology to emerge; this shows the closed systemic interdependency. Similar argument can be applied to the development model and the need to overcome poverty; the provision of energy solutions can create a totally different type of social organization and possibilities.

In the meantime through engaging with stakeholders the business legitimizes its agenda through the creation of a textual reality “Power becomes managing the means of simulation, dominating the codes of representation and managing the signs of meaning that constitute what hyper-reality is taken as being at any particular time” (Levy, 1997:92).

It is difficult to innovate for systemic change when presently the core business is fundamental for society, thus the current business becomes an obstacle for entrepreneurship. “[I]t is the existing operation itself and especially the existing successful operation, which is a challenge to innovation. The problem is precisely that the enterprise is so successful, that the temptation in the existing business is always to feed yesterday and to starve tomorrow” (Druker, 1985:148-149).

In the case of Shell, current high oil prices, market pressure and society’s need to continue sustaining the current infrastructure increases the pressure to continue playing the same game for the future. This translates practically in the focus of innovation and research to enhance the current business and an organization where it is difficult to bring new ideas that are not related to current operations due to the skepticism of managers and senior leaders with anything that doesn’t translate in immediate benefits for the current business strategy as it will be exemplified in the eco-villages project history.

A fundamental tension exists between the current consequences of the operation at a global scale of the fossil fuel business and the speed required for overall society change to more sustainable energy resources. By furthering investment and resources in increasing the life-span of the carbo-energy regime, the global risk to overpass ecological thresholds may be too large. It is something no one can predict or understand with certainty and is this lack of clarity that makes this tension significant.

However, from a complexity point of view, small actions can have large effects and the potential for systemic change innovation from the multinational can be significant even if small compared to the large mainstream operation, not only in the internal boundaries of the corporation, but more significantly in the opportunities it opens to utilize resources and technology that can be applied externally. Multinationals count with robust resources and organizational skills difficult to find in other sectors. This can be channeled to create hard-core sustainability initiatives opening a door of opportunity to create something new that increases the chances of society to find sustainability solutions, independently of their success in affecting the core business.

The following chapter analyzes GameChanger within Shell’s context to understand the type of innovation domain opened in relation to a sustainability framework. The organization of innovation in a centralized platform allows for the trial of radically different ideas, which have the potential to open change avenues in the company and become relevant once market conditions and internal realities converge. This means that the more these ideas are developed, even in a small scale, the more tools the company will have in the future when the need for sustainability becomes critical or

there is a breaking point in the energy game. It is key to understand this innovation's capacity to reach the core strategy of the business and create further contribution to sustainable development. Does the Energy Ladder Domain have the potential to create change within a different logic and framework? What are the obstacles and opportunities that may allow this to happen? And what are the contextual drivers internal and external that facilitates its potential success?

4.5 GameChanger: The innovation Platform and Its Relationship to Sustainability

The GameChanger platform is less than 10 years old. It constitutes an organizational arrangement within the company, by which a portfolio of innovation initiatives are managed across the Group. GameChanger is managed by the innovation coalition; a group of professionals in each part of the business dedicated to foster innovation and linked with the global business strategy.

The innovation portfolio consists of a group of domains, defined as: "a unifying and motivating vision of a significant value growth space for Shell that stimulates the creation of actionable ideas/projects within that growth space" (Manders & McCormick, 2005:5). The domains can be located specifically in a business (eg. Exploration & Production or Gas & Power) or there may be Group wide domains, meaning those that transcend a specific business but can make a radical difference at Group level. Within each domain there is a group of projects, which are concrete initiatives. These projects create pathways of innovation and constitute practical learning opportunities to understand at a strategic level how to move forward the area of innovation. The projects are ideas that can emerge from any employee across the Shell Group.

In order to identify domains a "Big Wall" image has been created. The Big Wall constitutes a map of all the current future businesses across the Shell Group.

"It provides a snapshot of the Group architecture, the center shows the core of the group, the strategic planning units, relationships and interconnections. Surrounding this ring are the significant planned businesses unit growth projects and the key business and technology developments supported by existing businesses. This ring is attached to, and driven by, the core. The businesses are responsible for resource allocation, business model selection and execution; the next ring represents the strategic innovation domains. These are areas that are potential new value spaces for Shell. These are mainly managed and developed by Strategic Innovation Groups. This ring orbits, looking for pull and ultimate ownership from the core" (Manders & McCormick, 2005:5).

Figure 4: Illustrative example of Shell's Group Big Wall

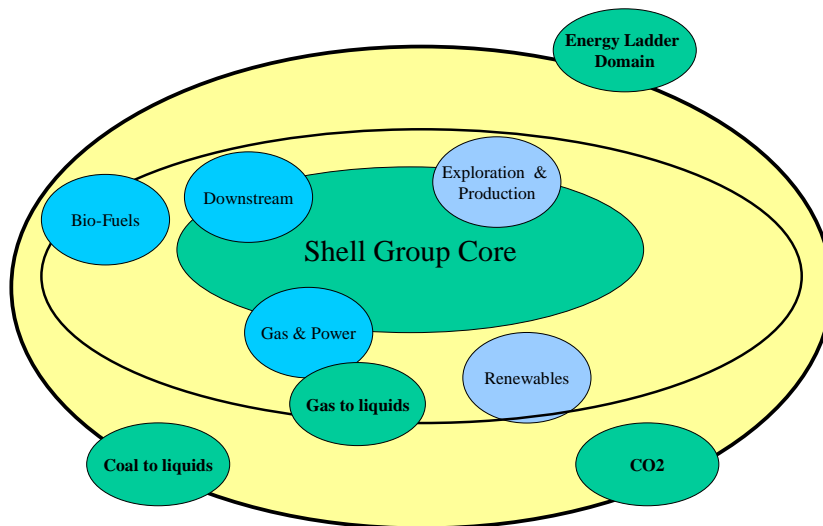


Diagram based on Manders & McCORMICK, 2005

The Big Wall is reviewed from time-to-time, applying different lenses. Lenses are a way of seeing the world. By applying different lenses the Group can understand if it is missing an opportunity, see the connections and get insights of potential issues that may become innovation opportunities. Key lenses applied to the Big Wall include: technology, DNA (Shell's history), industry dynamics, energy systems, time, uncertainty, disruption, geography and sustainable development. Although the domains are managed by the innovation coalition, senior management approves the official inclusion of a domain within the innovation portfolio through the Future Energy Forum, composed by senior leaders from across the businesses.

In order for a project or initiative to get into the GameChanger portfolio it requires to fit within an existing or planned domain. The employee who has the idea presents it to GameChanger and through a scanning by the innovation coalition it will be accepted and allocated to any of the domains. The idea will receive initial funding from GameChanger to be developed until proof of concept. This is done through a panel that approves the move of the idea from one stage to the other. The second step is a piloting initiative and finally the ownership of the idea by a business to become operational. Ideas can be technology or business innovations. In the domain the idea opens a pathway for learning about the domain.

One of the potential domains is the Energy Ladder. Currently the Energy Ladder Domain is in formation process. It has defined key projects, conducted initial research and presented the business case to the Future Energy Panel, the next step will be to get substantial funding to develop the domain fully.

The Energy Ladder Domain is about understanding and learning how to serve the "Base of the Pyramid" defined as, "those 4 billion people who live on less than \$2 a day" (Prahalad, 2006), through the creation of products and services that facilitate the

reduction of poverty and create at the same time a sizeable market. The concept of serving the base of the pyramid means “stop thinking of the poor as victims or as a burden and start recognizing them as resilient and creative entrepreneurs and value-conscious consumers (...) developing an approach to help the poor, involving partnering with them to innovate and achieve sustainable win-win scenarios where the poor are actively engaged and, at the same time, the companies providing products and services to them are profitable” (Prahalad, 2006:4-5).

The Energy Ladder concept maps how as countries increase their Gross Domestic Product (GDP) people change their use of energy from biomass to increasingly efficient energy carriers (Manders, 2005:10). Energy is not like any other consumer good; it is an enabler for activity rather than a product itself. The increased efficiency in the use of energy increases productivity and opportunity for people. Even if citizens at the base of the pyramid have little to spend it is estimated that energy may consume 20% of their total budget. People “switch out of biomass to use modern fuels, kerosene, paraffin, LPG, diesel, batteries, grid electricity and petrol later. It is important to bear in mind that modern fuels are not simply consumption goods that people can afford thanks to the income they have. It adds value to their lives, and they are therefore ready to spend their first money on it, as it allows them to work more efficiently, create more income, to grow” (Manders, 2005:10).

However, accessing this market is not easy. Key obstacles include “reliability and quality of the service, local corruption in distribution, power relationships within the household” (Manders, 2005:20). Additionally the path that developing countries will follow in climbing the energy ladder depends on multiple variables including: “rural-urban differences in fuel choices, technology solutions that allow for leapfrogging, fuel switching that takes place within each block, government policies to support cleaner and more efficient energy solutions, relative prices of different fuels” (Manders, 2005:20).

Seen from this perspective, the basic assumption of Shell that developing countries will increase hydrocarbons demand in their process of lifting their populations out of poverty may have different stages in diverse territories. This will depend on multiple political decisions, the future of oil price itself, and the technology solutions that other industries may create to leapfrog the need for fossil fuels in the development of infrastructure. For example a country like India may decide that at its large scale and with more than 50% of the population still living in rural areas, decentralized energy provision is more feasible to increase coverage than increasing the reach of the central electrical grid. This type of scenario opens a different possibility of innovation than the one established in the main business, with its assumption that energy supply in the future will be continue through large-scale capital projects and centralized utility production and distribution infrastructure.

Shell’s drivers in investing in this domain as presented to the Future Energy Forum include:

- Transactional: Creation of products and services that can build a profitable and sustainable business in this segment of the market.
- Strategic: learning about how to intervene in this market by understanding what is required to develop a successful business. Since one of the main customers of Shell is the government, being able to develop solutions for energy provision at the base of the pyramid can enhance Shell’s license to operate in critical countries,

becoming a competitive advantage and differentiator with regards to the competition for the mainstream operation.

There is already some experience with base of the pyramid consumers coming from social investment projects in capital projects, the work of the Shell Foundation with its enterprise approach to poverty and some of the projects of the Energy Ladder Domain. Examples includes an initiative within Shell Solar South Africa to develop mini-grid in a rural community; the work of EasyGas (Subsidiary of Shell Gas in South Africa) to develop a retail market of Liquefied Petroleum Gas (LPG) to base of the pyramid citizens by adapting the LPG cylinder to be refillable at different quantities according to what the customer can pay.

The Energy Ladder Domain is constituted by the following initiatives and projects (Manders, 2005):

- DME as cooking fuel: “DME is an alternative for LPG, with similar properties. Shell operates a Natural Gas fed plant in Germany to manufacture DME for commercial use. Field tests have been done with DME as cooking fuel in China, demonstrating clean combustion”
- Bio-Fuels from Jatropha: “Development of a small-scale bio-fuel production as component of capacity building in rural communities.” The communities will be able to produce bio-diesel from un-utilized farmland through technology that can be community managed and is benign. The business model will allow the development of cooperatives and a business relationship with Shell and other companies to supply the biodiesel to market. Closed loop technology provides for minimal waste and full utilization of by-products. The process includes community organization and sustainable livelihood creation.
- Eco-villages: Developing sustainable settlements for Shell residential infrastructure in capital projects giving consideration to sustainable design, materials, energy efficiency, cultural context, water and waste management. The projects intends to involve the local community and stakeholders in the process of design and construction as a way to transmit the learning and impact the development of sustainable cities in the countries where Shell operates.
- Affordable Detergents (Shell Chemicals): Poor households in West China wash themselves, clothes and kitchen utensils with just water or bar soap. Greasy soils are difficult to remove. Low cost detergents are available in a variety of retail outlets, but quality varies dramatically and is usually very poor. The affordable dish wash product offers excellent soil removal at modest costs (around 50% of regular grades). It can also be used for body and cloth cleaning and meets environmental standards.
- Waterbox: Shell has many operations in rural areas and often there are no safe drinking water sources nearby. The objective of the project is to provide a cost-effective and robust solution for safe drinking water. A water purification unit was developed which can be easily transported, is maintenance free, vandalism proof and does not use chemicals to process the water.
- Five other potential projects are part of the domain, but they are currently on ‘idea’ stage.

The challenge of developing a base of the pyramid sustainable business for Shell includes identifying what would be Shell’s core business in this segment, which products and services are suitable for a specific local context and how the global Shell

network can create a competitive edge. This poses a challenge in itself for a large-scale organization like Shell, which is designed to take advantage of the economies of scale it can create with its global presence. This market requires a deep understanding of a specific segment of the local context and the creation of partnerships.

An additional challenge is to be the first mover in the market, since the community will require the development of social, financial and infrastructure capabilities so they can enter the formal economy. “Consumers at the base of the pyramid would need support that those in developed markets do not need. This support extends beyond the individual consumer to the community where they live” (Manders, 2005:40). The importance of partnerships is even more critical in this aspect.

In January 2006 the entrepreneurs of the Energy Ladder Domain met with external organizations and GameChanger representatives to explore the opportunities and challenges for Shell to get into this innovation area. The Energy Ladder Domain report was the output of this meeting. From the report and interviews with the entrepreneurs that work in the domain the following have been identified as critical capabilities required as an organization to act in this potential new market.

In the first place is the capacity to identify and connect current Group capabilities that are dispersed in non-connected activities such as social investment projects, Shell Foundation initiatives and the current Energy Ladder Domain projects.

In the second place the initiative requires the skill of entrepreneurship at different levels and the capacity to connect these different entrepreneurs to work together in a network of relationships as part of the organizational model.

The first type of entrepreneurs required are *innovators*. Their role is to develop technical innovations that satisfy the needs of this market. Within Shell these can be found in the Energy Ladder Domain and in research and innovation labs.

The second type of entrepreneur required is a *business entrepreneur*. This refers to internal entrepreneurs able to create business models that can effectively bring the innovation to market. This includes the creation and coordination of partnerships, the development and design of supply chains and the creation of financial models to achieve profitability. Additionally it requires a passion and desire to work with these consumers with the capability to understand the local context where the solutions will be implemented and connect with people from diverse economic and cultural backgrounds.

This may be a challenge in an organization where the core business and tradition has been the design of engineering solutions, with an engineering culture: “Shell’s culture may have an aversion to manage people” (Fontini, 2006). According to the opinion of some internal entrepreneurs, Shell’s culture does not enforce entrepreneurship but rather compliance and management of established processes (Groeneveld, 2006). The current Shell culture is risk averse and creates organizational barriers to try new ideas (Barry Fontini). There is a need to attract talent that can create opportunities at the base of the pyramid.

Finally the third type of entrepreneurs required is *local entrepreneurs*. These are the people at the base of the pyramid themselves. For this market to work, the capacity of people to create local businesses and social organization to manage infrastructure and services is critical. This is currently the approach of the Shell Foundation, which constitutes a valuable opportunity.

The third capability required is the capacity to work in partnerships. According to the RAPS organization, a venture founded by the Shell Foundation in South Africa to develop renewable energy companies: “I will encourage Shell to find the right kind of partners, which are going to be relatively small companies. But this raises some key decisions: how does Shell value those partners? How does it work with them so it does not totally swamp them, but works and learns with them?” (Manders, 2005:54). Partners are critical at all levels: to create supply chains within a close loop system, to create local capability and entrepreneurship, to implement the projects on the ground.

As explained in section 4.2 and 4.3 Shell has currently a conventional business strategy to sustain itself in the market. This keeps the company focused on increasing its current business and making it last longer. It is difficult in the current climate to open spaces of radical innovation where the efforts have been focused in growing and sustaining what is already there. This is reflected in the main business strategy that simply put is “More upstream- and profitable downstream, which seems to be far from BOP” (Manders, 2005:75). Although the GameChanger platform has been able to open the innovation opportunity and it has initial support “Shell is sending mixed signals about its intentions towards this space: is it really going to go for it? It needs to work out how it feels about this, this is a core decision that needs to be taken”(Manders, 2005:54).

The development of a business in this market requires the understanding of different levels of complexity. One of the entrepreneurs working in the Solar Mini-Grids at community level in South Africa, expressed in an insightful way how the challenge goes beyond developing the appropriate technology. There are three levels of complexity that need to be taken into account in developing this market. The first one is the world of partnerships with other sectors, in which a donor mentality prevails. How to form accountability systems? How to be able to coordinate efforts? Additionally it has been identified, at least in the South African environment, how the donor world sometimes intends to impose ideas on the community where it operates, prevailing the objectives set by donor programs rather than the needs of the community.

Secondly besides making sure that real needs are addressed the second level of complexity implies the capacity of the community to organize itself and its ownership of the systems and services. There is always a potential for disruption of current power structures within a community through an intervention. The complexity of the internal dynamic of the community should not be underestimated.

The third level of complexity is setting a working dynamics and business model in which all parties benefit. However there will be always contradicting goals. Setting clear non-negotiable principles for all partners and the community is key. This includes specifically the final aim of creating human capacity and evolution of consciousness within all of the stakeholders involved. This can be easily overlooked through the implementation process, but is critical to be able to create sustainable outcomes for all stakeholders (Fontini, 2006).

A technical challenge is the creation of low carbon-ecologically sensitive solutions: This is critical from a reputation but also sustainability point of view. This is also an

aim in the Energy Ladder Domain, to help the base of the pyramid citizens to leapfrog in terms of energy efficiency and resource use. However in practice it can happen that other solutions will prevail. Sustainability should become an explicit condition for the development of the domain and not an implicit assumption.

There is also an organizational challenge. The current strategy sets an organizational drive to globalize and standardize the business across the Shell Group in order to increase efficiency. However: “standardization fails to use local resources for local needs” (Manders, 2005:4). As demonstrated the Base of the Pyramid approach requires the capacity to localize operations and customize products and services locally.

According to the Energy Ladder exploration workshop output, key criteria for success in this domain includes: (Manders, 2005:85)

- Focus on core competencies
- Partner across sector
- Localize the value creation

These are also the key challenges for organizations to contribute to sustainability as exposed in Chapter 3. The key is to be able to “nurture local markets and cultures, leverage local solutions and generate wealth at the lowest levels on the pyramid. Producing in rather than extracting wealth from, these countries will be the guiding principle”. This will require “companies to transform their understanding of scale, from a bigger is better ideal to an ideal of highly distributed small-scale operations married to world-scale capabilities” (Manders, 2005:85).

4.6 Evaluating Space of Innovation Opened by Energy Ladder Domain

In Chapter 3 the context in which Shell operates and its current strategy were explained; this contrast with the requirements of the Energy Ladder Domain in terms of purpose, paradigm of working and organizational aspects. The main differences lie in a need to design and develop products and services customized to a local context; the need to create appropriate technology and the capacity to bring global skills and capabilities in a large network of localized middle to small size projects. It requires thinking through the whole supply chain and understanding critical aspects, which are not taken into account in traditional business models such as development requirements of a community. Energy becomes a catalyst for development but development needs to be seen beyond material uplifting to take into account organizational capacity of the community, ownership, pride, ecological sustainability at local level and critically human development. Shell cannot do this work on its own, since these are not its main competencies. To develop a feasible business the capabilities of different type of organizations are necessary and thus partnerships become critical.

When compared with the principles and categories to foster sustainability explained in Chapter 3 it is apparent that this business to be successful will need to take by design the principles and conditions of sustainability. In the specific context of the Energy Ladder Domain these principles will mean that the adequate scale for self-reliance of the community and the environmental conditions of the local environment need to be taken into consideration to create ecologically sound products. It means designing the process to allow the integral participation and empowerment of the community members in their capacity to manage and develop the business.

The critical conditions for sustainability explained in chapter 3 also apply to developing a business at the base of the pyramid. This includes the need to utilize local knowledge, local management and develop a local sphere of influence; the capacity to create products that respond to the context; the need to reduce material and energy flows in order to increase efficiency and value for local communities. Finally, the process should have a “learning surplus”³ or capacity of people to increase their level of understanding of the energy system in relation to their social context. The more consciousness these processes create the more sustainable they will be in the long term. According to this analysis the Energy Ladder Domain requires an approach based on the parameters of sustainability and has the potential to create a systemic change opportunity for Shell.

GameChanger as a platform has been able to unify and connect diverse innovation initiatives across the Shell Group, creating an independent space where the entrepreneurs are able to explore, learn and develop new possibilities. This is very important to protect the initiatives from the current organizational structures and dynamics of the mainstream business. “The cleanest organizational structure for entrepreneurship, though suitable only in the very large company, is a totally separate innovating operation or development company” (Druker, 1985:168).

The GameChanger platform is intimately connected to the Group strategy acting as the exploration arm and future strategic choices playground; within the transitions theory this will mean a transition arena defined as semi-protected experimentation room within which systematically and structured long term innovation processes are developed and as such a systemic instrument to influence and evolutionary change core structure of a system.(Kemp, et al, 2005).

This is fundamental in order to keep the innovation aligned with main competencies of the business but also to assure it is going to be taken within the core. “But it is also inadvisable- in fact, almost a guarantee of failure- for a business to try to become entrepreneurial without changing its basic policies and practices. To be an entrepreneur on the side rarely works” (Druker, 1985:174). “The transformative power of experiments is small unless they are linked to long-term strategies for structural change involving policy makers” (Kemp et al, 2005:24). In the experience of one of the entrepreneurs it is more difficult to innovate within the business, but it is highly rewarding and successful when it yields results; this was the case with biofuels (Groeneveld, 2006).

The paradox is that GameChanger through the Energy Ladder Domain is opening a space of innovation that requires implementing a business model with opposite assumptions and functional requirements than those of the mainstream business (Localization instead of globalization, customization instead of standardization, multi-dimensional approach instead of linear approach, complex multi-sector partnerships instead of long supply chains). If the Energy Ladder Domain is accepted as an official space of innovation for Shell, it will be creating the opportunity for the opening of a counter-culture space because the requirements to make this business successful need to stand in a different and sometimes contradicting paradigm to the mainstream business, at the same time is the mainstream business within the current strategy

³ Learning Surplus is a concept used by former Mayor of Bogotá Antanas Mockus to recognize the learning outcome for all actors involved in any public intervention.

which will approve the inclusion of the Energy Ladder Domain in the GameChanger platform.

The capacity of the domain to influence the main business depends on the terms the Future Energy Panel will use to approve the domain. Will the domain be approved within a clear strategic choice to get into this market as a business opportunity? Or will it be taken as an opportunity for future development, keeping the innovation domain on the side without correspondence with the global business strategy? In this later case it will serve the Shell Group as an opportunity to legitimize its current business strategy.

If the domain is included it has as a minimum the potential to create new competencies within the company. These ones will be useful in the future if the mainstream strategy needs to change due to market conditions and different society demands. The convergence between failure of the current system and success in the new space will create an opportunity for the Energy Ladder Domain to transform the main business.

The success of the Energy Ladder Domain in the market will make Shell play in a totally different league, the dimension of distributed energy systems, small scale, and customer regulated systems. This is a current tension in the market, the drive towards decentralized vs. centralized energy systems and the main driver of the change is sustainability. Shell is an outsider into this new world without organizational competencies or products to compete. The Energy Ladder domain will open the company to this market.

However its scale within the medium term business strategy of the company will remain small in comparison to the main business, and will not be able to fundamentally affect it, since as exposed previously the current system stills runs on hydrocarbons. As large companies like Shell increase the reserves through new technology the more difficult it is to implement the transition to a sustainable energy system. Additionally only an unexpected event (such security issues, terrorism, disruption, war, natural events, market failure etc) will be powerful enough for Shell and the world to aggressively shift towards more sustainable systems.

The Energy Ladder Domain value relies also in the network of connections that it will open outside Shell's mainstream business. Although compared with Shell's internal mainstream business the initiatives and investments may be small, these initiatives applied to a particular localized context may create a high impact for local communities and the partners involved in the interactions. These partners range from other multinationals like General Electric, Phillips and Procter & Gamble, to national and local governments, universities, research institutes and SME's. (. .

In summary the Energy Ladder Domain opens the door for Shell to create new competencies for a new market and different energy future. However the innovation domain, if accepted, will remain a small venture compared to the mainstream operation within the current middle term strategy. Its value lies in two aspects. The first one is the opportunity it opens to the company to develop these new competencies, which increases the organizational resilience and adaptability to unexpected events; and secondly the impact the Energy Ladder Domain business may have in localized contexts and the opportunities for sustainability it will open on those local societies.

4.7 Increasing Energy Ladder Domain Potential Sustainability Impact

The following are critical observations about the domain from a sustainability point of view and how can it increase its potential impact.

The first concept to observe is the Energy Ladder concept itself. The traditional path of development as people increase GDP is to move from biomass to kerosene, paraffin, LPG, diesel, batteries, grid electricity and petrol. “Further up the ladder, as incomes and activities grow, the need for efficiency and sustainability for both water and energy, and connections between the two, increase. Recycling of both energy and water becomes a key activity at the top of the ladder” (Manders, 2005:47). The Energy Ladder is based on industrial patterns of consumption and development, however for sustainability what is required is to precisely change that pattern and be able to increase the quality of life of the majority of the world population without the use of fossil fuels and heavy industrial processes on the ecosystem.

The opportunity is revolutionary in the sense that the implementation of complex sustainability systems will be easier to implement in those sectors of society where the process of industrialization has not yet been developed. These are mainly rural communities and marginal neighborhoods in the large cities of the developing world; which are the target customers for the Energy Ladder Domain. The goal is to create capability and more energy use at the bottom of the pyramid without creating the system dependence on fossil fuels. Critical aspects that need to be taken into consideration include:

- Low-carbon technology implementation and creation of efficiencies in a complex system.
- Synergy with other aspects of development to achieve that efficiency such as the already tested energy-efficient stoves or the Bio-Fuels from Jatropha project, which creates, closed loop economy and self-reliance for the community. The key concept is macro-supply chains, which mean the understanding of the critical economical and social potential of a community, its blockers and how energy in synergy with other development aspects can create that locally sustainable chain. This is the aspect that requires partnerships.
- Capacity building in the community needs to integrate the creation of consciousness about energy and resources management. Currently people in the middle class are not conscious in general about the network of utilities complexity and its relationship with sustainability. People at the base of the pyramid as they shift towards post-modern sources of energy can become conscious about the importance of resource conservation and change the pattern of behavior that will traditionally emerge in middle class consumers.
- Connecting base of the pyramid citizens with top of the pyramid citizens in three ways: first as Prahalad (2005) explains, by base of the pyramid consumers serving as testing ground for new technologies that can help to redesign systems at the top. Secondly by exporting products from the base of the pyramid to the top (such as some of the entrepreneurial ventures of the Shell Foundation) and thirdly by profiling sustainable patterns of consumption to top of the pyramid consumers to inspire sustainability.

4.7.1 Piloting Spheres

The Energy Ladder Domain is in the process of being consolidated and has the status of proposal. The business case is being developed further to justify that approach to

the Future Energy Panel and the proposal is to get an independent exploratory unit for the domain. In the meantime the projects within the domain continue to be implemented finding a way to be incorporated by the main business.

The following are recommendations for improving the piloting strategy as based on my own experience in intending to implement a project within the domain:

Geographies: The Future Energy Panel recommended to focus efforts in identifying additional lessons, concretizing further the value of the current activity (social investment, Shell foundation) and understanding how this can increase the license to operate meaning facilitating the further advantage of the main business in key markets. These ones are currently India and China.

A complementary strategy is to define which markets will be more receptive to this type of approach according to the current social, political and economic situation. Piloting in markets with low interest from a main business point of view could also be valuable in terms of opening new possibilities for the company, without a reputation risks. A potential interesting market is South America, due to the strong influence of equality as a core value in the political ideology and the high level of experimentation with untried political and economic strategies. A critical potential market will be Venezuela, since the political agenda is heavily influenced by social development targets and requires innovation in how to provide those. At the same time it is a good opportunity to enter one of the most important fossil-fuel resource holders currently. The multinational oil company, which can access this market within the current political regime, will gain a considerable global competitive advantage.

Aim at leadership: Once the budget is approved the process should aim at leadership regarding the question asked earlier of whether Shell really wants to do this, is fundamental since “If an innovation does not aim at leadership from the beginning, it is unlikely to be innovative enough, and therefore unlikely to be capable of establishing itself. All entrepreneurial strategies, that is, all strategies aimed at exploiting an innovation, must achieve leadership within a given environment. Otherwise they will simply create an opportunity for the competition” (Druker, 1985:136).

Testing inside: Shell’s large capital projects are an important testing ground for innovation in this domain. Usually located in isolated rural areas and currently more and more in developing countries, large capital infrastructure projects do impact significantly on the environment and communities. After 20-30 years of operation, what used to be a subsistence economy becomes an industrialized site and the small rural villages become boom towns attracting thousand of immigrants, unable to cope in terms of infrastructure and governance with the impact of development. This poses great security and reputation risks to Shell and also encourages a pattern of unsustainable development. At the same time the concentration of financial and human capital is large and there is an opportunity to plan development and build self-reliance within the communities. If Shell is able to create sustainable development based on future energy propositions at the base of the pyramid in current oil & gas exploitation sites it can create a much stronger licence to operate. For this it will require to integrate Base of the Pyramid approach within existing project frameworks as part of the social investment and sustainability agenda.

Balance between synergies and management: Although entrepreneurial management is important it needs to be balanced with an approach in which people connect and co-create through the projects possible avenues of implementation. Increasing the synergies between projects in the domain is fundamental to increase the rate of

development. As transition management indicates these types of processes require fundamentally different style of management that accepts uncertain processes, uncertain outcomes, allows for searching and experimenting and is primarily focused on involving, empowering, co-creation. Creating and maintaining such an innovation space is key to achieving the innovations.

Transdisciplinary approach: The approach is fundamental to shift the pattern of development and resolve a problem with its contradictions at a different level and logic by which the problem was created. For this to be possible the following aspects are important to be considered:

- As a key objective Energy Ladder Domain projects aim at creating human capacity and increase consciousness for all those involved. This means this becomes an explicit goal in every Energy Ladder Domain pilot project.
- People do connect with people in different contexts and at different levels and technical solutions are not the only answer.
- The team shares information and knowledge from different disciplines but is able to transcend them by understanding the complexity of the context and the level of solution required.

Replicability: Technology may be replicated but the content and process of intervention from one project to the other is shaped by the context's own network of relationships.

In conclusion, Shell has consolidated its innovation efforts across the group through the creation of GameChanger Innovation Platform. At the same time it has correlated innovation domains to the company business strategy and the GameChanger methodology expects innovation initiatives to be adopted by the mainstream businesses. As exposed in chapter 3 the main innovation domains correspond to finding ways of exploiting fossil fuels in more environmental and social sustainable ways. This includes domains such as coal to liquids, CO₂ management and bio-fuels. From this point of view they are product innovation rather than systemic change and the linkage between the company CSR strategy and its sustainability understanding does not conduce to the transformation of the business towards fulfilling its innovation potential towards sustainability. As a reminder to the reader, in the context of energy this means passing from a Carbo-cultural regime to a Helio-cultural regime.

The Energy Ladder domain is an area of innovation which opens a totally different door of opportunity for the Shell Group, since it is targeting a whole new set of consumers and it requires the creation of a new business model which stands in an opposite organizational paradigm from the current mainstream business. This includes the need to contextualize the business model in a local environment, the requirement for multiple types of entrepreneurship (innovators, business entrepreneurs, local entrepreneurs), the need to create transdisciplinary solutions and partner with other stakeholders to implement solutions which require to take into account the context complexity.

The nature of the market and its objectives fulfill the principles and conditions of sustainability and become a revolutionary opportunity to create a different type of social organization through the provision of sustainable sources of energy in emerging communities such as rural and marginal urban ones. However in order for this

opportunity to be fully realized, the Energy Ladder Domain should make its sustainability objectives (reduce the use of carbon based energy sources) explicit so that climbing the energy ladder doesn't mean reproducing the traditional development path.

At the same time in order to justify its existence within the Shell Group, the Energy Ladder domain is required to benefit the current mainstream business. This has been addressed by using this innovation as a capability to increase the benefits offered to governments when negotiating oil & gas contracts.

The last step after analyzing the Company, GameChanger innovation platform and the Energy Ladder Domain is to view innovation from the perspective of a project. The project to be explored is the eco-villages initiative developed by myself. This level of analysis is important because besides opening a space of personal reflection, it also contributes through experience to understand the opportunities, obstacles and contextual drivers affecting innovation within a multinational company. Furthermore, it helps to illustrate how innovation requires the understanding of the system's scales to be able to get higher chances of success and deeper insight into the type of solutions required.

4.8 The Eco-village Project: from Idea to Opportunity

The idea presented in June 2005 to GameChanger was the development of Shell's residential infrastructure as eco-villages or sustainable settlements. Large Shell capital projects often need to build residential infrastructure to house and provide facilities for employees and contractors. This infrastructure is usually designed and constructed with a conventional "western" modern design approach in isolation from the end users and does not give due consideration to sustainability of the materials, construction, operation and abandonment of the end product.

Key design considerations overlooked usually include:

- Life cycle of source construction materials;
- Environmental conditions at the specific location;
- Energy efficiency of house design and installed electrical equipment (eg air-conditioning); and
- Resource consumption and waste treatment.

The result of not taking these aspects into consideration results in a range of long-term impacts including:

- Higher capital costs of infrastructure development;
- Higher operating costs;
- Negative environmental impact (resource consumption, waste treatment and disposal, biodiversity);
- Creation of unsustainable aspirations within local communities, imposing western-modern lifestyle as ideal;
- Separation of Shell employees and local culture/ communities ("fortress approach"); and
- Disruption of the sense of place of original inhabitants.

The proposal was to address this challenge by the creation of sustainable residential infrastructure following the model of eco-villages. The settlements will be

- Energy efficient;
- Utilize local materials;
- Adapted to environmental and ecological conditions;
- Culturally aesthetic; and
- Providing the same or higher living standards as conventional camps.

The proposal also consists of a component focused on the participation of local communities, which will be empowered with new skills, and the capacity to create their own sustainable settlements. The construction process can open opportunities for small businesses, and create demand of local materials and work force.

It was identified that sustainable settlements have not received enough funding and attention from the public sector in many development countries, even if they can become a clear solution to satisfy people's needs. The proposal used the concentration of human, technical and financial capital that oil and gas projects bring to a region to contribute proactively to sustainable development.

The proposal received funding to be developed into a business concept and identify potential businesses interested in funding a pilot experience. Initially, the research focused on determining if the technical capability to develop sustainable settlements was proven in the market. Additionally there was a need to identify why this approach had not been implemented before in Shell, and prove the potential business benefits.

The opportunity was identified when working for a capital project in Nigeria; a colleague of mine and I developed environmental and social studies to understand the future risks of locating a gas plant. In the process, we were able to interview the communities regarding potential sites where the plant could be located. The communities were mainly fishing villages. One of the sites had long, undeveloped beaches that held a large tourism potential. I had lived in an eco-village in South Africa for almost a year with farm workers intending to develop a sustainable settlement and at the same time, through my studies I knew about the eco-design discipline. My colleague had also been interested in sustainable architecture for a long time. On that beach, both of us realized the potential of eco-tourism in this area. However, most probably, this site was going to be converted into an industrial zone. The best possibility was to create a high profile eco-resort to host Shell employees in the area and inspire a different model of development for the government and surrounding communities.

The first round of research confirmed the wide availability of proven technology to develop sustainable settlements in terms of water, energy, waste, and construction processes. Secondly, it was identified that the critical skill required was the ability to coordinate an eco-design process that could take these aspects into account. Eco-design is the discipline of integrating design, architecture, engineering, environmental science, art and technology development to create assets which:

- Utilize the principles of nature and the socio-economic and environmental characteristics of a particular context and
- Dramatically reduce our consumption and utilization of resources and waste streams.

The eco-design skill was less available in the market, especially for the development of a whole community system. Wide experience exists in the eco-design process of

individual buildings, but fewer examples existed at a commercial scale for community development.

A second part of the research involved understanding why Shell had not taken this approach before. There were two main reasons:

- Residential infrastructure is such a small asset in a capital project in terms of cost and development requirements that it simply was commissioned with basic specifications to the Engineering and Procurement Contractor (EPC) to build it as part of the overall contract. Not much consideration was given to the quality and it was trusted that local architects would build something adequate.
- Lack of awareness that this could be done with the residential infrastructure of the Group.

A third part of the research was a strong networking exercise to identify potential pilot projects and opportunities. The following organizations were consulted: Shell Foundation, Shell Real Estate, Shell Global Solutions Civil's department, Shell Gas & Power and some of its projects. Through the networking, three important events happened. The first one was that Shell Real Estate was establishing a Sustainable Development strategy and as a result of the networking process I was invited to participate in its development based on the GameChanger research. This workshop was facilitated by an international eco-design expert who was able to convey the importance of this approach for a company like Shell. The reception of the eco-design approach in the Shell Real Estate unit gave a powerful sense of purpose to this service unit. Shell Real Estate redefined internally its mission from being managers of Shell's Real Estate assets to become "custodians of Shell Real Estate assets from cradle to cradle" meaning from construction to decommissioning within a sustainability approach. It also realized the financial value that such an approach could bring at the Group level. As a result of my participation in this workshop I became part of the Shell Real Estate sustainable development task force and in this way I was included as a resource in Shell Real Estate projects.

I became in fact an implementation arm for the strategy, since I had already found the funding to contribute, while the overall Shell Real Estate strategy required to find its own funding. Within the Shell Group, Shell Real Estate is only a service company, not a profit-making unit and thus it depends on another profit-making unit to provide funds for these types of initiatives. In fact, it took them a year and a half to get funding for the overall strategy. Additionally the head from Shell Real Estate and in general the overall team, became strong supporters of this GameChanger project.

The second event was an energy efficiency workshop focusing on infrastructure to which I was invited to participate and where I had the opportunity to meet people from the industry. This workshop introduced me to the approach of a global architecture and engineering firm, which has been commissioned by the Chinese government to create the master plan for the first sustainable city. These opened my eyes to the large opportunity the eco-village project may be for Shell. The third event was that the department I work for sponsored my assistance to a European conference on sustainable cities, where I was able to build an important network in the eco-design discipline.

Although the Nigerian project that originally inspired this project was proposed to participate in the pilot process of this GameChanger, due to organizational reasons it was not possible. However as a result of the networking exercise a potential pilot

project was identified in Qatar. The gas projects in the country needed to build an 800-houses residential complex in partnership with Exxon Mobil for all the staff required for the next four years. For the first time as well, due to the scale of the development, a full time Shell Real Estate consultant was allocated as project manager. This manager happened to have a very clear understanding of sustainability and interest in the potential of green design and agreed to incorporate this GameChanger project in the initiative.

This relationship led to the participation in Doha in a week technical specifications workshop to develop the **Request for Proposal** process of the residential project. The preparation for the workshop allowed me to research further and understand eco-design through a network of architects and experts. I do not have the technical knowledge of eco-design since I am not an architect or an engineer, but I had to learn the language and some technical information to be able to pull the eco-design process together. More than the technical knowledge, which was present in the firm of architects employed as consultants, it was vital to have the capacity to stand in a different paradigm of development and intervene in critical decision-making points to foster this sustainable perspective. This opened new possibilities for the experts to explore alternative routes and come up with different solutions to common problems. Additionally, the research team, based on the Doha Technology Park, identified this project as an opportunity for their portfolio. A partnership potential was opened with General Electric, which is also present in the Technology Park and had developed cutting edge technology to increase sustainability of residential infrastructure. The project has the potential to be presented in Qatar as a pioneer experience of ecological design led by Shell, General Electric and Exxon Mobil, constituting a multi-industry initiative with the capacity to influence the construction industry in Qatar and become a demonstration example in Doha of a different paradigm of urban development.

Through the concrete experience in Qatar, we were able to put together an initial eco-design process for the Shell Group and make concrete proposals for other projects about the benefits and advantages of including this approach.

The next step was the presentation of the business case for approval to move to a piloting phase. For this purpose the department I work for agreed to hosting a customer event where the main internal stakeholders related to this initiative were going to be gathered. The purpose of the customer event was to present the business case, get feedback from the mainstream business and move the project to the pilot phase by the approval of additional funding from these businesses.

The customer event was an ambitious initiative, high rank senior executives from Shell Global Solutions, Shell Gas & Power and Shell Real Estate were invited as well as sustainable development managers from all the businesses and across the group. In total 35 people accepted the invitation including two high rank senior executives.

The presentation included a background on eco-design and the eco-villages initiatives and the four main points of the business case. The first part was well received but it looked like an academic exercise. From previous experience we knew how difficult it was to introduce a new concept such as eco-design and thus we decided to give enough background at the beginning of the presentation in order to be able to bring everybody on board. The second part was the business case which consisted of five main arguments:

1. Increased employee value proposition: Creating sustainable settlements in difficult countries provided higher levels of comfort, health and integration of the expatriate employees to the local cultures. In places such as Nigeria this was critical to increase employees productivity and also attract talent to these difficult locations.
2. Reputation Enhancement: Bringing added value to the countries where we operate, opening avenues of relationships in the local context with different stakeholders, create high profile demonstration projects that improve Shell's brand reputation.
3. Improving Environmental Performance: Reducing CO₂ and other emissions, increase energy efficiency, reduce waste, increase efficient use of water and materials.
4. Opportunity for Social Investment: Approach to be used in livelihood restoration of resettled communities, social investment in infrastructure assets, as demonstration examples for local and regional government and the opportunity to generate employment and SME opportunities.
5. Creating asset operational savings.

Three key areas of implementation for this project were identified:

- a. Application of Eco-Design in Shell's residential Infrastructure
- b. Application of eco-design in cases of communities resettlement due to the capital project impact and social investment strategies
- c. Application of eco-design in cases of commercial building development.

The response from the senior executives was highly critical. In their perspective the business case was not strong enough, the following were critical gaps that were required to be filled:

- a. Capital investment vs. operational savings: the business case as presented didn't demonstrate that extra capital investment with sustainability measures was going to create operational savings throughout the project life-cycle, to justify those investments. A financial analysis was required. This was a very sensitive point since in the current situation of the Shell group the reduction of capital investment in large projects was fundamental, anything that intended larger investments was difficult to get across.
- b. The majority of Shell projects run as part of Joint Ventures with other oil companies. In practice these Joint Ventures become independent companies in which Shell has a share. If a Joint Venture implemented this approach paid by Shell as a shareholder, the reputation benefit was for the Joint Venture not for Shell and this included the competition. The feedback was that we needed to convince the Joint Venture to invest (meaning all the partners) in the implementation of this approach. Shell was not going to pay for it on its own.

- c. Employee value proposition was regarded as not fundamental for the business case.
- d. There were many open questions in terms of how the approach benefited local communities.

The GameChanger panel decision was that the project needed to address these concerns and justify the business case in a better way. The Qatar project stood behind the proposal and decided to move to the next phase on its own (detail design phase for the residential development in Doha). This meant they were going to pay for this work to be done. However the other budget providers withheld the support until the business case was developed further.

Personally this was difficult to manage, as my work within the innovation domain confronted for the first time the mainstream business and the response was very critical. Although I could see the external relevancy of the innovation and had found already the support from many units within Shell, I needed to convince the mainstream business that this innovation could contribute to the current strategy priorities. This meant in practice the innovation wouldn't add more cost, and could bring tangible benefits for capital projects in the field. On the positive side, the customer event served to get more realistic about the innovation within the Shell business context, get the initiative to be known within the businesses, and get expressions of support from many individuals and units who wanted this approach to be implemented.

As a follow up step we prepared a temporary budget to respond to this feedback and at the same time develop a strategy that could take us to piloting phase. This strategy consisted in convincing two other projects to allow us to develop design functional specifications and concepts, which gave them the capacity to sell the initiative to the Joint Venture partners. If these ones accepted it, then we could move to pilot phase. In the process of developing those functional specifications and concepts we were in practice building the business case for a specific context. With these results we could come back to the panel to move forward.

The customer event brought the opportunity through Shell Real Estate to participate in the development of a master plan for the re-development of all Shell sites in Nigeria. This was lead by Shell Real Estate and the global architecture firm HOK. Our main input was to coordinate the process of integrating sustainability into the master plan by facilitating the explicit incorporation of social and environmental opportunities in the design process.

The project subcontracted the technical development of environmental technology to a specialized London firm that was really innovative in the type of systems it developed for the sites. The final result was a very innovative sustainability concept, totally aligned to the definition of sustainability from this thesis. In the process a financial business case was developed as a result of my participation and using the input from the experts. In this way I was able at the same time to open the opportunity for an additional pilot project and create the tools to demonstrate the business case internally. The case will be presented to the client, which is Shell in Nigeria. Their feedback will be valuable to understand how this radical approach of sustainability is received in one of Shell's critical countries.

The second opportunity was the commissioning by a Shell project in Iran to develop a sustainability concept for the future construction camp and the resettlement of a fisher village. The mission is to provide the Shell manager with all the tools required to convince the Joint Venture partners to adopt this in the project. This piece of work was financed by Shell Gas & Power innovation and research. The project will allow us to apply eco-design in the case of community assets and infrastructure (fisher village), which will set the base for these types of social-development projects.

As part of the process, different design concepts and a financial business case will be developed. A group of Iranian experts and Dutch eco-design experts will be included in the concept development process, which I will manage. After finalizing the concepts, the feedback from the Joint Venture partners will allow me to understand deeper what are the critical constraints to implement this approach in these types of projects. If the concept is accepted, we will have a second pilot project.

The last project to be tested will be the detail design phase of the Qatar residential complex. Within the GameChanger process the strategy will be to wait for the results of these three semi-pilots and based on those experiences, build a stronger business case. An external event will be organized bringing large potential partners from Shell into this initiative, including the architecture firm developing the sustainable city in China, General Electric, other experts and key internal stakeholders in order to co-create the broader business opportunity for the Shell Group. A key question to answer will be ‘Are we able to create a macro-supply chain to develop sustainable solutions in residential and commercial infrastructure, in which Shell has a specific role?’

Additionally, a first meeting with all the entrepreneurs from the Energy Ladder Domain and external business consultants will happen to refine each project business plan and the overall Energy Ladder Domain business plan which will require approval in the short term.

The output of all these meetings plus the results from the pre-pilot projects will shape the real business opportunity and justify the business case. Is from this point forward that a broad strategy will be launched.

4.8.1 Key lessons

Based on the experience, the following were key learnings about the process of innovating for sustainability in a multinational company:

Innovation within the already established framework is easier: The project was able to attract support because it tackled an existing activity to propose a new approach in a subsidiary activity to the core business. This activity, however, is necessary, so the budget to develop this infrastructure is already allocated, and the proposal has been that, within the budget, this radical transformation could be achieved. Thus the benefits are larger than the risks.

The need to justify the case within the mainstream business strategy: Although the innovation is about doing something different from a current activity, bringing forward the business case requires using the same language and parameters of the mainstream business. If the concepts introduced are too foreign and there is no clear relationship with the current business priorities, the innovation will encounter difficulties. This is because the innovation needs to demonstrate relevancy within the current mainstream business, meaning it is more difficult to create through Game Changer, systemic change innovations.

Creating the network and finding similar interests: The timing also influenced the outcome, since Shell Real Estate was thinking at the same time of having a sustainable development strategy and the GameChanger project then became a concrete opportunity for implementation.

Gathering support from the power structure: Even with the support from different units relevant to the innovation within Shell, without support from the mainstream business of structure, the innovation loses momentum.

Use the CSR and Sustainability language established in the organization to gather support: Interestingly, almost every decision maker understood the concept and its relevance. I give credit to the 10-year implementation of the sustainable development principles in the business, so the sustainable development history in Shell and the CSR policies and measures established gave a clear organizational framework, and increased the capacity of people to receive and understand the initiative. However at the time of approving the concept, the current mainstream strategy became a priority. This means in practice that these sustainability initiatives need to find a way to support the Shell core business otherwise it is difficult to find scenarios for implementation. From this point of view they will be complementary and in the periphery of the Shell group's priorities and this reinforces the concept that Shell's main strategy is a product improving one, rather than a systemic change one.

Innovation Platforms do help: The role of GameChanger throughout the process was important. Besides providing the budget, the managers acted like mentors through the research process. Their capacity to open action paths when one felt confused about how to move forward was important. Additionally, understanding the relationship of the project within the Energy Ladder Domain allowed knowledge to be filtered to the process and a network of entrepreneurs and innovators that could support us. However, I believe the interaction between entrepreneurs could be stronger by creating formal spaces of interaction and sharing, making us all an active part of the Energy Ladder Domain agenda, which in its strategic development concentrates in the GameChanger managers. Additionally, GameChanger was a legitimizing structure when approaching different businesses through the group. It helped to open doors informally just by name, and formally through the GameChanger managers themselves who have access across businesses to decision makers.

Top-down / Bottom- Up: As per the transitions innovation framework innovation is more effective when concrete experimental projects are performed within a broader strategic agenda. In this case being part of the Energy Ladder Domain and the Game changer platform immediately create a relationship of the innovation with the strategic aim of the business and at the same time allows concrete results to inform that future strategic possibility. The Eco-villages project has been able to feedback positively in the practical issues that the Energy Ladder Domain will need to confront and has opened strategic paths from practical experience, at the same time that it has been enriched by the strategic aims of the domain. Still, there is the need to get final approval to incorporate the domain officially within the Gamechanger platform.

The Chicken or Egg Situation: On the one hand one is not able to demonstrate an innovation idea in a particular context without implementation, but in order to get the funds to implement or develop a concept one needs to demonstrate the feasibility of the idea. In the case of the eco-villages project we have been able to bridge that chicken or egg situation through GameChanger bridging funds and through Gas & Power innovation and research, which decided to support the development of the Iran

concept. In this case the support from the innovation platform, allowed the process to continue after the panel's feedback.

Access to First Class resources: Innovating within a multinational brings access to first class resources. It is not difficult to get immediate interest from the best contractors, other organizations of similar caliber, top universities or research centers when one wants to involve them in a Shell innovation. The multinational brand has power to open doors in all sectors and with global players. This is an eminent advantage of using current power structures to create the alternative.

Interestingly enough, innovating for sustainability within the framework of a multinational is a different process from working in the non-profit sector. The paradox is that in the former resources are not the problem but the capacity to make a convincing case with enough evidence is; while in the second to make a convincing case may be easier due to shared belief-systems, but resources for implementation are a key obstacle. In this way I deem important to be able to pull multinationals towards this sustainability innovation space, to increase the speed into which sustainability solutions are feasible in society.

4.8.2 Obstacles

Organizational Restrictions were presented in, for example, contracting structures, legal and Intellectual Property (IP) frameworks that may not be adequate for small-scale business or innovation experiments. In this specific case, the current organizational costs within Shell makes that the work required to push this innovation forward is much higher than if one was going to innovate outside the multinational's framework. In my specific case since I am a consultant and my market value per hour is high compared to market rates, as the time I use exploring these concepts and developing the eco-villages project makes the project itself expensive to implement.

Differences in Operation Requirements: The requirements from the sustainability innovation may not match with the current organizational structures of Shell projects. The mindsets and structure of the corporation sets the limits of the current paradigm and reality of the innovation. For example in this project, it will be difficult to include a community participation process in the building of the residential infrastructure within the timelines set, unless one can convince management about the advantages of creating a social participation process which may delay the building of the residential infrastructure but can increase the social capital and benefit Shell's relationships with the communities. It is fundamental for the GameChanger platform to recognize explicitly the need to set up different processes and systems according to the requirements of the innovation.

Personally it has been a highly rewarding experience in terms of creating the opportunities, interacting with the entrepreneurs and innovators network and going through the experience of needing to justify sustainability in a business language. The innovation platforms open through multinationals can be powerful if one can achieve through the process the complexity required in the initiatives to develop hard core innovation solutions for sustainability.

5. Understanding the potential of Multinationals in contributing towards sustainable societies.

Based on the Energy Ladder Domain characteristics, it can be concluded that the space for innovation created has a high potential to contribute to sustainability due to the characteristics of the market, the organizational requirements needed to act in that context and the need for innovation.

Characteristics of the market:	The need to create energy solutions to facilitate development within base-of-the-pyramid communities.
Organizational requirements:	Multi-sector partnerships and strong local network of connections. Interventions require developing of whole supply chains taking into consideration other aspects of development
Need for innovation:	Products and services development require a complex understanding of the context from an environmental, social, cultural and economic point of view. This means design that is trans-disciplinary.
Development entrepreneurship:	Technical innovations, business models and local entrepreneurship are key for success. Local entrepreneurship development requires generating human capacity and seeing people beyond their capacity to consume but as integral beings able to learn and develop.

This space of innovation has been opened thanks to the implementation of the sustainability concept within Shell 10 years ago, the creation of the GameChanger platform and the increased interest in management literature to approach this market.

The Energy Ladder Domain counts with multiple projects, which, in their content, have taken sustainability as a core value and are experiencing the challenge of bringing an idea into practice. I am developing one of the projects, and through the experience, I have identified key challenges and advantages for innovating for sustainability within a multinational company. This includes the capacity to access resources, the potential of using CSR and sustainability frameworks to justify innovation, the possibility to access networks and knowledge beyond the business but supported by it, and the far-reaching consequences of success from this platform.

At the same time there are key obstacles for innovation from the multinational including the difficulty of dealing with over-complex organizational arrangements for the size of the experiments, the increased cost base of acting from this sector and the need to customize the innovation to the modus operandi of the business. However the potential for impact beyond the business is high due to the “extraordinary global reach, holistic view, extensive management and relationship-building skills and tremendous and long-term impact on society of multinationals” (Manders, 2005).

The question however is how to judge if the space of innovation is able to create sustainability paths for society. There are two non-exclusive methods, one by comparing the space of innovation in regard to potential visions of sustainability, such

as passing from a carbo-cultural regime (fossil fuels dominated) to a helio-cultural (solar energy dominated) society.

This becomes a participatory approach utilizing potential visions of society based on thorough and integrated analysis of the complex societal systems. In such an integrated analysis the feedback from different stakeholders is fundamental. However how are these visions legitimizing? The answer is by the use of scientific evidence, social knowledge and an interactive networking-process with specific stakeholders. The approach of transition management offers basic principles for organizing and structuring such processes (for example regarding selection of participants, methods supporting the process and strategies to transfer and diffuse knowledge and innovations). The transition management process is based on developing shared problem perceptions, future visions and change-strategies.

A second approach is to understand what the characteristics of the pilot projects and their current and potential effects are. This approach will examine the network of connections, the effects on people and the sustainability design approach. Are all components of sustainability taken in an integrated fashion? What are the spinoffs and consequences of the interventions? This was done when examining the Energy Ladder Domain in particular.

In the introduction of this essay it was explained how the CSR debate has been centered on either analyzing whether companies are “walking the talk,” or on what is the on-the ground impact of their operations (performance). The third dimension presented here focuses the analysis on the innovation and entrepreneurship initiatives that will contribute to the sustainability of society. CSR is then transcended from a specific agenda in the corporation to a core business topic and from reputation speeches and positions to concrete action oriented initiatives and their current and future impact.

This analytical framework facilitates to answer the main questions of this thesis: How effective are targeted innovation platforms within MNCs in designing and implementing meaningful innovations for SD? How meaningful are these innovation efforts in terms of the broader CSR strategy of the company and its sustainability performance?

In the case of Shell, by choosing an approach in which the main business is focused on increasing the global reserves of fossil fuels as the key strategy; and the sustainability initiatives and innovation platform are a support to legitimize this strategic business decision, the business is then predominantly contributing to delaying the transition to a different energy regime. In this sense, its CSR and sustainability strategy do not contribute to systemic change. The innovation capacity of the multinational is focused in sustaining the current system.

However, within the innovation platform, the Energy Ladder Domain opens a different possibility, demonstrating how innovation platforms can produce systemic change innovations. Its power relies in that as a market requirement it needs to develop a business model that takes the principles and conditions of sustainability at the core. In relation to the main business the opening of this innovation space may not have the effect of changing the current business or strategic direction of the company, but if it survives, it opens a future resource for the company in which it can rely if the external or internal conditions change.

At the same time, even if the Energy Ladder Domain does not open a space to transform the main business but it is actually used to legitimize the current strategy, by existing it becomes a possibility that has been opened to cause a co-evolution with external stakeholders.

It has been identified that an innovation, from its creation to becoming a common practice in society, can take between 30 to 40 years (Niele, 2005: 111). However with the current pace of change, this may be reduced to half. Realizing this one should ask what is the critical balance between small systemic change initiatives and continuing the practices of the current system, in terms of the effects on the environment. Will this balance help us to stabilize the CO₂ content on the atmosphere, or the threshold limits of ecosystems? Or do we need faster change?

The company reflects the multiple agendas played in the world and thus, it seem to be sustaining the current system and at the same time opening new possibilities for change. This means that the final answer will depend on the co-evolution of other actors and sectors, since it was acknowledged that although the power of multinationals in the current system is significant, these companies depend and respond to contextual drivers that go beyond their organizational control such as new knowledge, policy, disruptions, innovation based on process need, changes in industry structure or market structure; demographics, changes in perception, mood and meaning etc.

This co-evolution process requires the development of partnerships of different natures at different levels. Specifically the Energy Ladder Domain entrepreneurs acknowledge the concrete role that Shell could play in the type of initiatives they were developing. Key insights from their experience include:

- Shell's main competency is technical innovation, management, and trading and business development. These should be the competencies exploited in a co-evolutionary process with other actors.
- In an intervention at the base of the pyramid the design of product and service delivery should not involve Shell in the implementation and organization process in the communities. Other organizations have the capability to generate entrepreneurship and community organization processes. These should be key partners.
- Shell can contribute at the beginning by participating in the design of a product or service, the process of implementation, setting the management structure of the overall initiative, contributing to the conceptualization of the business and creating data monitoring methodology.
- Shell should contribute at the end: By providing access to market, sharing best practice, connecting customers and evaluating the process.

The experiences of multinationals intervening directly in social development have already created opposite effects to those intended such as conflict and social unrest. For example throughout the 40 years history of Shell's operation in Nigeria the company has used multiple approaches to interact with communities. These have range from utilizing philanthropy as a mean to pacify the neighbor settlements increasing violent pressure from those that were not benefited, to supporting government development plans and agendas.

The current situation of community unrest in the Niger Delta is an expression of using community development as a mechanism to legitimize the current business with the

unforeseen effects of creating conflicts, corruption, jealousy and disintegration of the communities Shell intended to support (SPDC, 2004) These examples are key arguments of those critics of CSR, since social development is not the key competence of the company.

The last remaining question is; who starts a participatory/network-governance) transition management type of process? And is it within the power or interest of the multinational and responsibility to do so? Although a large corporation is not responsible for policy making at public level, the role of its innovation initiatives can become catalyst to involve different stakeholders in a process of co-learning and co-exploring, which, with time, can affect policy. The answer then is yes, but at the specific level of the innovation. For example the project of eco-villages can be a catalyst case to steer a discussion about sustainable cities and sustainable construction in the city of Doha. Or the project of mini-grids can be a catalyst about the technology and modes of service delivery of rural electrification in South Africa. In this perspective, by sharing the learning of innovation within a wide range of stakeholders, even if not as part of its core business, the multinational corporation will be contributing to the creation of a future society. This catalyst role is key to accelerate innovation towards sustainability.

6. Conclusions

This study has provided a framework to analyze CSR initiatives from the perspective of the core business. It was argued that the key role of multinational companies is to innovate with products and services that contribute to a sustainable society and, through entrepreneurship, make those services effective.

To be able to do so, operationally independent but strategically linked spaces of innovation need to be created. GameChanger and the Energy Ladder Domain within it are a concrete example of the type of space that can be created. There are various contextual drivers that influence the investment of multinationals in innovation initiatives including market structures, new knowledge, unexpected events, industry transformation, political incentives, etc.

At the same time the CSR framework and in the case of Shell the sustainable development drive of the last ten years has developed a language in the company that allows sustainability to be understood, formal policies and procedures support this language. It has been shown how this framework has evolved from a reputation response, to a progressive establishment of policies, measurement systems and implementation of initiatives. Additionally due to the over-booking of reserves scandal the company has changed its strategic direction and conceptual understanding of sustainability; from a potential future role the company can play in developing alternative energy systems, to the concentration of the company efforts in developing more hydrocarbon reserves and in the process managing the environmental and social effects.

Within the innovation agenda this has been reflected in two ways, one by increasing innovation by finding ways to use current fossil fuels without their main environmental impact (clean coal, tar-sands, carbon sequestration) and secondly to open spaces for alternative energy systems such as renewable energy. The first approach is still driven by the traditional modernist values of Shell and belief that ecosystem complexity can be managed. The second one has been a consequence of the first sustainability approach of Shell but it has been reduced in the current strategy as achieving at least one renewable energy business.

The Energy Ladder Domain is a potential space based on radically different values not from an ideological point of view, but rather from the core requirements of the market itself. The domain consist of different projects managed by internal entrepreneurs who understand the complexity of the requirement and the importance of sustainability. If the space of innovation is fully endorsed and the business flourishes, it can open a counter-cultural space within the company, due to the type of initiatives, the modus operandi, the values system and the type of relationships that it is already creating. As exposed, the Energy Ladder domain needs to develop a business model that is based on the principles and conditions of sustainability and in that sense it establishes a radically different modus operandi than the mainstream business. The business is still to become a start-up, and it will depend on the mainstream business to accept the possibility of developing a radically different approach to current operations, within this paradox lies its main challenge and eventually, its potential success.

The question 'How effective are targeted innovation platforms within MNCs in designing and implementing meaningful innovations for SD?' can be answered from the case studied. Innovation platforms within multinational have a large potential to

contribute towards sustainable development. The innovation methodology, the resources, skills and support they provide to internal entrepreneurs allow for innovation to become a new market or product.

However how the innovation platform is set in relation to the main business is critical to understand its potential towards creating products and markets that contribute towards sustainability and produce systemic change.

Three distinct levels can be identified; in the first one internal entrepreneurs will need to innovate within their own departments and units. In the second one the innovation platform allows a separate space for innovation providing funding and support, such as Game Changer, but the innovations are linked to strategic innovation objectives and evolve in relationship with the main business. The third case, not explored in this thesis, is when a company decides to open innovation in such a way that is not necessarily attached to what exists but is able to create totally different radical possibilities opening new businesses to the company. Most probably in this case the only boundaries will be the organization mission and purpose.

The power of innovation to transform the core business is not only a function of how the innovation platform is set, but more fundamentally it relates to the entrepreneurial culture of the company. In the case of Shell, the mainstream business is indispensable for the functioning of modern society; it actually has been the engine of development of our current world. From this perspective although the company is innovative, it is not necessarily entrepreneurial, since the role of its main business is assured in the current society. This explains how the main innovation agenda has been linked closely to the current business strategy keeping the company within the domain of the hydrocarbon business.

It is then, more difficult to develop systemic change innovation within Shell than product development. This brings the Energy Ladder Domain into a new perspective, it is not only relevant in terms of its potential to provide sustainability solutions but also in the challenge it has with regards to Shell's organizational culture and set up. If it succeeds it will open a totally new realm of possibility towards the future. If it fails, Shell will be losing the development of potential capabilities which could become critical for the survival of the company in the future.

Regarding the second research question: How meaningful are these innovation efforts in terms of the broader CSR strategy of the company and its sustainability performance? One may say that in the case of Shell the CSR strategy has been conditioned in recent years to the pressure for the market following the over-booking of reserves issue. In this case CSR and all its organizational set up will not be contributing to the sustainability cause for the future, but it will rather be used as a legitimizing exercise to the refinement of the current business. The actions that will be implemented as a result of external promises will still be within the framework of producing new and old forms of hydrocarbons and "managing" the environmental and social consequences. Largely the debate will be played in a "textual reality" as defined in chapter 4.

In this case the main innovation agenda is backing up the business strategy, which is not transforming the system but improving the current status quo. These innovations may open possibilities to reduce the environmental effects of current operations, and the development of certain technology may produce relevant results to advance in the sustainability agenda, such as carbon sequestration. However my assessment overall

is that taking into consideration the current reality of climate change, the unpredictability of the limits of ecological thresholds, the increased inequality in the world and the fast depletion of resources, losing 15 years of potential innovation in improving the current system may be highly costly to create a sustainable future.

If the Energy Ladder Domain works it will have a dual effect. On the one hand it will open a relevant path of innovation to achieve sustainable solutions at the base of the pyramid co-creating with other stakeholders relevant possibilities in concrete local contexts. The impact of these initiatives should not be underestimated, especially in local contexts and the possibilities created could bring something valuable to what we currently know. The opposite effect will also happen at the same time, the potential success of The Energy Ladder Domain will be used by the mainstream business to legitimize its current unsustainable strategy even further through the use of the CSR and stakeholder engagement framework.

The question one is left with is how the future could look if a major oil company decides to use all its muscle to change the system and in the process totally reinvent itself? Unfortunately this is not the case of Shell under the current business strategy.

However it does not mean that the relationship between CSR strategy and innovation platforms does not work. It actually means we should be careful when defining the terms in concrete situations.

If the CSR strategy is defined in a company to legitimize the current unsustainable business, and the main future strategy “feeds yesterday and staves tomorrow” as an earlier quote by Druker, meaning is focused to continue playing the same game in a better way, then it becomes more difficult for business innovation platforms to deliver sustainability solutions. A different case is presented if the social responsibility of the corporation has been taken seriously vis a vis the main business of the company. In this case a CSR strategy as traditionally defined may not be necessary since it will be completely integrated into the mainstream future core business development. In that context innovation platforms and entrepreneurial management will be critical to allow innovation to be the driver of the company’s continuous transformation. In this scenario the power of multinationals to accelerate society’s transformation towards sustainability will be significantly increased.

As a conclusion it is clear that in order to evaluate how responsible a company is, one needs to look to the current role of the business in society and its social, economic and environmental effects and compare them with its future business strategy in relation to its innovation agenda. This will allow a comprehensive evaluation of the level of responsibility the business is taking with regards to its contribution to the development of a sustainable society.

With regards to an understanding of what a sustainable society means and the role that multinational can play in that future society, throughout this exploration it has been demonstrated how sustainability requires an evolutionary understanding of reality to be able to set current systems within the geological scale of the planet. This is fundamental to be able to foresee a potential sustainable future, such as the definition by Niele (2005) of energy regimes. This aspect is also critical to be incorporated in a sustainability innovation approach. Additionally, key parameters for sustainable systems have been defined including principles, conditions and praxis examples. The theoretical approach of transdisciplinary complexity thinking and transitions

management have been valuable conceptual tools to define organizational requirements for sustainability.

Based on the exploration, an alternative conceptual role of the multinational can be defined. If for sustainability biophysical components, social and cultural characteristics need to be taken into account to develop systems at the right scale; and if this system should intend to become closed economic and environmental loops by for example shifting from the production of products to the production of services; and if within this scale a different energy regime needs to evolve, then the role of the multinational organization can be defined as:

Organizations that instead of mobilizing resources across the planet in processes of production and consumption, will create innovation networks with the capability to transmit technology and skills to feed local self-regenerating systems. Critical skills to fulfill this role will be the capacity to understand local context, create networks of multi-sector partnerships to develop whole supply chains that transcend a specific sector of development in a process of co-evolution.

Finally, the intent of this research was to understand how to accelerate change for sustainability by using the current power structures effectively. It has also produced lessons that could be transcended from a multinational context to any organizational or societal context; these are:

- Spaces for innovation should be independent and linked strategically to a broader future agenda; innovations should build the future by addressing current evident needs
- Multi-sector partnerships and transdisciplinary methodology are key to transcend linear solutions and develop complex ones.
- The main beneficiaries of the innovations should be integral part of the development and implementation to generate self-governing systems.
- The type of organization for innovation needs to reflect what it aims to achieve in terms of values, organizational structures and way of working.

The process of writing this thesis was a space of reflection for my own journey in learning how to develop solutions and processes for a sustainable society. It has shown me how, in what seems to be the darkest places and impenetrable power structures, small actions can open possibilities and new avenues of development with large potential effects. In fact, it is never only the context that creates reality, but rather our personal connection to it that opens the window of opportunity to co-create the future.

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