

**THE PRAGMATIC CHALLENGE OF SUSTAINABLE DEVELOPMENT
LESSONS FROM SHELL CANADA**

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Abstract:

There is a general acceptance amongst practitioners, academics and laypeople that the current fossil fuel basis of the energy industry is not ecologically sustainable. Future sources of energy must meet society's needs and be environmentally benign. For energy companies, this represents the challenge of bridging the gap between today's energy system and the vision of a sustainable future. Since the complete withdrawal from fossil fuels is not viable in the short term, what are the strategic choices available to energy firms? What factors influence their ability to integrate environmental prerogatives into corporate strategy and practices? In this article we address these questions by analyzing the organizational field of Shell Resources – a business unit of Shell Canada. In particular, we focus in two areas: investments in alternative energy and the greening of current production processes. We expect the work to be useful to both academics and managers dealing with environmental issues in business. Overall, the case provides an opportunity to reflect how a resource-intensive firm manages the dynamic between what is *desirable* and what is *possible* with respect to sustainable development.

Key-words: corporate environmental strategy, ecological modernization, sustainability, energy and gas industry.

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1. Introduction

Since the publication of the *Brundtland Report* in 1987, the term ‘sustainable development’ has gained growing recognition worldwide. Today, there is an acceptance that expanding industrial development is depleting the natural capital of the planet. As the world wakes up to the ecological consequences of its patterns of production and consumption, there is increased pressure for business to acknowledge its responsibility and improve its environmental performance (Orssatto, 2001a). Some organizations have accepted their role and committed to improving their environmental performance and address the broader issue of ecological sustainability. Nonetheless, in order to safeguard the economic sustainability of the business, such firms need to meld ecological commitments with economic and structural possibilities to do so.

In order to advance the understanding of business-environment relationships it is necessary to go beyond *cliché* statements about the importance of external stakeholders: it requires a deeper analysis of business rationales for taking up environmental measures. This is certainly not an easy task. Such understanding requires the identification of factors motivating or inhibiting not only a focal company from undertaking environmental initiatives but an analysis of the entire organizational field in which the firm operates (Hoffman 1999). We faced such problem when trying to understand the rationales of a leading world energy company to transform the concept of sustainable development into strategies and practices. We run into a large amount of information and opinions on the pressures from diverse sets of stakeholder, technologies, and policies, which make it difficult to explain environment-related investments made by Shell Canada. For a company that is increasingly portraying itself as an ecologically responsible business, how could its continuous focus on exploration of natural gas and other non-renewable sources of energy be explained?

Moreover, for those who do not satisfy themselves with normative environmentalism, the challenge is to think about the main trade-offs faced by Shell Canada in the coming years: should the substitution of coal for natural gas be promoted or avoided? Should the company work towards incremental ecological modernization or should it withdraw from the petroleum and gas business altogether?

As we will try to demonstrate in our paper, informed – indeed emotionally uncharged – answers for such questions require a systematic analysis of Shell’s organizational field. This is why the analytical framework developed by Orsatto (2001b) was applied in the specific case of Shell Resources¹. Hence, this article explores the factors that motivate or inhibit a business unit within Shell Canada *ecological modernization* – the process of institutional changes aiming to overcome the ecological crises in industrialized countries². We communicate the pragmatic challenge of sustainable development at Shell Resources through a systematic analysis of the forces influencing a business that has stated its commitment to such goals.

The article is divided into five sections. Initially, we present a brief explanation of the background and methods used in the research, followed by presentation of the challenge faced by the energy industry to make the concept of sustainable development operational. Then we proceed with the analysis of factors influencing the ecological modernization of Shell Resources. In particular, Section 4 focuses on two distinct areas of initiatives at Shell Resources: the challenge of shifting towards *alternative forms of energy* (Sections 4.1 to 4.4), and the challenge of *reducing environmental impacts in its current production practices* (Sections 4.5 to 4.7). Lastly, remarks are made with respect to the pragmatic challenge of sustainable development in the energy industry.

2. Background and Methods

The research that informs this paper was developed in three main stages: i) research design, ii) collection of data, and ii) analysis and interpretation of the data. In the research design, specialized tools for formulation and implementation of corporate environmental strategies were identified. In particular, the ecological modernization framework (EMF) was chosen for the analysis of factors influencing the formation of the environmental strategy and corresponding practices of Shell Resources. *Reflexive methodology*, in the terms defined by Alvesson & Sköldböck (2000), was used to orientate the overall research process. Essentially, the adoption of such a perspective implied a constant reflexive consideration of alternative interpretations of the data, and its potential

¹ This article builds upon the research developed by Pong Leung (2003), as a component of the Masters degree on Environmental Management and Policy at the International Institute for Industrial Environmental Economics, Lund University, Sweden. The research focused on the application of tools that support the formulation of corporate environmental strategies, in particular the areas of strategy formulation and implementation.

² For an early overview of the Ecological Modernization (EM) theory, see: Mol & Spaargaren 1993; Mol 1995; Spaargaren 1997; Spaargaren & Mol 1992), and Chapter 6 of Orsatto (2001). A broader and more recent debate on EM can be found in: Mol and Sonnenfeld (2000) and Young (2000).

alternative meanings.

The second stage of the research – collection of data – took place over the four months of the (Northern hemisphere) Summer of 2002. Since one of us (Pong Leung) worked during all that time from within a business unit of Shell Canada, it was possible to obtain insider's perspective of the organization. Additionally, the review of internal documents, the development of formal interviews with 24 Shell staff members, as well as the staging of a workshop at Shell Resources complemented participant observation. Finally, during analysis and interpretation of the data, current and new approaches to environmental strategy formulation and implementation were compared. Partial results of this process are presented below.

3. The Sustainable Development Challenge of the Energy Industry

In order to have a clear understanding of the challenge faced by the energy industry in the 21st century, we need to make a distinction between the concepts of 'sustainability' and 'sustainable development'. Robèrt *et al.* (2002) propose that 'sustainability' is a long-term challenge that requires a clear vision of how a business is managed within sustainable society, while 'sustainable development' is the *journey* consisting of a series of investments and actions made a step-by-step manner to reach that future vision³. Since today the energy industry is certainly not sustainable, it is important that the energy industry make investments to reach a sustainable future and that these be based on a clear understanding of sustainability.

A report from the United Nations Development Program (UNDP, 2002) states that consumption of energy is growing worldwide and unless demand is met using cleaner, safer and more efficient energy technologies, associated environmental and social problems will worsen. Currently, the majority of energy needs are met with fossil fuels, which that contribute to a number of problems, including climate change through the release of greenhouse gases, and health problems as a result of human intake of particulates generated by the burning of fossil fuels.

Hence, if sustainability in the energy sector is a long-term issue, then it is a challenge to evaluate how firms operating in the industry link current practices with the future scenario of sustainability. In this respect, our case study does not go as far as Robèrt *et al.* (2002), and Azar *et*

³ Sustainability can be defined in terms of the cessation of unsustainable actions caused by human society. Due to the complexity and delay mechanisms in the ecosphere, it is often very difficult to foresee what concentration will lead to unacceptable consequences. A general rule is not to allow societal-caused deviations from the natural state that are large in comparison to natural fluctuations. In particular, such deviations should not be allowed to increase systematically. Therefore, what must at *least* be achieved is a stop to systematic increases in concentration.

al. (2000) in addressing the sustainability issue. However, we do address an equally and related challenging issue: the *journey* towards sustainability or, in the terms expressed here, the ecological modernization process (see: Orsato 2001b; Mol 1995). As ‘energy firms’ – as the traditional ‘hydrocarbon’ firms identify themselves nowadays – embark into the sustainable development journey, they need an understanding of what investments and actions are feasible to be taken. In this scenario, the research question orientating the study presented in the remaining sections of the paper is:

What fosters and/or limits the ability of Shell Resources to operationalize the concept of sustainable development?

4. Analyzing the Ecological Modernization of Shell Canada

(...) Various estimates suggest that by 2050, nearly one third of the world’s energy needs could come from the likes of solar power, wind power, geothermal power and hydrogen fuel cells. Which leaves the other two thirds to come from conventional fuels, such as oil and gas. To make that happen, we have to strike a balance. Between the need to protect peoples way of life and their environment and the need to provide them with affordable energy. Between the costs of developing new technology to extract the utmost from current fuels and the costs of developing new power sources. This is what Shell does every day, all over the world (...)

The above text, extracted from an advertisement published in time Magazine in the 22nd of September 2003, epitomizes the challenge faced by the Royal Dutch Shell Group (Shell Group for short) and Shell Canada Limited (SCL) – the focus of analysis of the research presented here.

The Shell Group is one of the largest in the world with US\$128 billion in revenues, operations over 120 countries and 101,000 employees worldwide in 2001. The corporate objective of the Shell Group is to engage efficiently, responsibly, and profitably in the oil, gas, power, chemicals, renewable and other selected businesses and participate in the research and development of other sources of energy. Shell Canada Limited (SCL) has its offices located in Calgary, Alberta and is one of the largest integrated oil and gas companies in Canada. In 2001, SCL had earnings of over CDN\$1.0 billion (US\$ 738 million) on revenues of CDN\$7.7 billion (US\$ 5.7 billion) with

3,400 employees. Shell Resources, the focus of our case study, is the unit that explores and produces primarily natural gas, and is known as the ‘upstream’ operations.⁴

Today, there is no question that energy companies have a tremendous impact on the environment, whether it is directly through exploration and refinement of petroleum, or indirectly through the consumption of carbon-intensive fuels. This explains the wide acceptance among academics, practitioners and lay citizens that the future provision and use of energy should have an environmentally benign character. The challenge is, therefore, to bridge the gap from today’s unsustainable fossil fuel basis to the future vision of a sustainable energy industry. In bridging the gap, there is always a tension between ‘what is desirable and what is possible’. The ‘desirable’ is represented by the vision of sustainability; what an industrial sector or organization ‘should’ be doing to become sustainable. On the other hand, the ‘possible’ refers to economic, social, cultural, and, most importantly, structural conditions that impose limits on what ‘can’ be done in the short and medium terms. In the words of evolutionary economics, one has to consider the ‘lock in’ situations around the current energy basis and, by consequence, the industrial sector directly related to such technological dominance (Nelson & Winter 1977). Hence, if the management of the transition towards sustainable practices is to become a reality, a clear picture of the limits between the possible and the desirable needs to be developed.

Orssatto (2001b) developed a framework⁵ that can be used to build such an image. By dichotomizing the factors that motivate or inhibit the uptake of environmental initiatives by firms, the ‘ecological modernization framework’ simplifies the analysis of a specific organizational field – in this case, the one in which Shell Resources is embedded. Figure 1 generically depicts ‘environment-contingent factors’ (eco-factors for short), which represent the influences motivating and inhibiting the integration of environmental initiatives in a specific industry. Regulations, consumer demand for cleaner industrial processes and products, the influence of related businesses, interest groups, and competition, all may be determinants of ‘greening’. These factors range from

⁴ The ‘upstream’ sector includes exploration and production companies and the ‘downstream’ sector consists of refineries, gas distribution utilities, oil product wholesalers, service stations and petrochemical companies. For more information on the oil and gas industry see: Petroleum Communication Foundation. (1999). *Exploring Canada’s oil and gas industry*. Calgary: Petroleum Communication Foundation.

⁵ The Framework builds upon extensive research in the automobile industry during 1996-2001, as well as data collected during 1999-2003, as part of the action-research program at the International Institute for Industrial Environmental Economics (www.iiee.lu.se).

the voluntarism of some ecologically driven practices by particular firms to the will of government to regulate organizational practices.

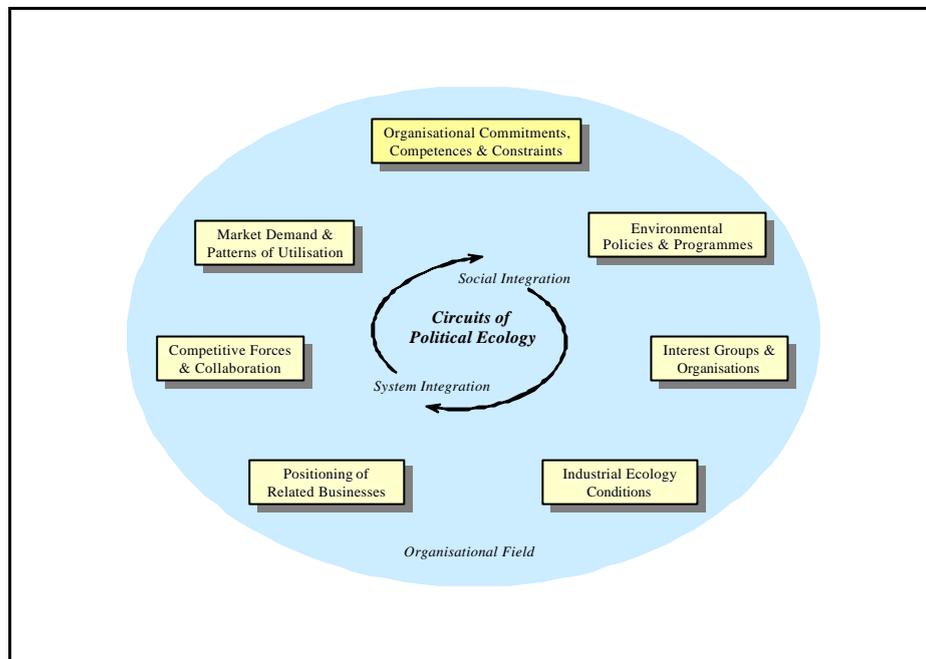


Figure 1: *The Ecological Modernization Framework*

Source: Orsatto (2001: 210)

Within the framework, eco-factors should be seen as interdependent components that might sensitize agents to the probable sources of innovation and resistance that are likely to occur in a specific sector, as the next sections describing the Shell Resources case will demonstrate. For example, in 2002 Shell Resources announced a US\$6.5 million investment into renewable energy. A deeper look into the *organizational commitments, competences and constraints* of the firm can help understand part of the rationale for this investment.

4.1. Organizational Commitments, Competencies and Constraints

Organizational commitments, competencies and constraints represent the (internal) aspects fostering or limiting an organization to 'go green', such as ethical and moral commitments, as well as the limits imposed by the organizational structure and culture to do so. In the specific case of Shell Resources the company has shown a strong public commitment to sustainable development

through speeches by senior executives. A quote from the Chief Executive Officer of SCL at the time (Faithfull, 2001), epitomizes such commitment:

We don't have all the answers. Sustainable Development is not simply a set of rules or guidelines; it is a continuous process of hard work. We must listen to others and be responsive in ways that make sense. In Canada and around the world, Shell is learning that with the need for accountability comes the need to be more open about the business. This transparency depends upon broad engagement with stakeholders, setting measurable goals and report performance against those goals.

To sum up, the Royal Dutch/Shell Group of Companies, including Shell Canada, is committed to a business strategy that generates profits while contributing to the well being of the planet and its people. There is no alternative.

While some environmentalists may suspect that this is nothing more than '*greenwashing*', the commitment also goes beyond the public forum into the boardroom. For instance, Shell Resources has earmarked millions of investment dollars for energy efficiency improvements. Such type of investments do not need to generate the same level of return as other projects, and they have indeed been approved in circumstances that would not occur in other projects. This rule also holds true with investments in wind energy. The managers involved in wind energy development at SCL remarked that it was not possible for wind energy to generate the same return as investments in more traditional forms of energy, e.g. natural gas development. Shell Resources staff attributed the investment in wind to the ecological commitment and leadership of the CEO (Chief Executive Officer) at the time.

As noted by Orssatto (2001b), the decision to pursue environmentally friendly practices is not a result of organizational commitment alone, as firms base their activities in specific competences that influence their scope of action. In an interview with the manager of the SCL's wind portfolio, the process of wind development was compared with the development of natural gas reserves. In both cases, the resource must first be found in remote areas, whether an area with a steady, strong wind or a natural gas deposit. Then the land must be purchased and developed with the approval of local stakeholders and government. Once the wind turbine or gas well has been installed, infrastructure must be put in sensitive areas to transport the energy, natural gas or electricity to another center.

As one could guess, Shell Resources already has existing competencies in these areas. In fact, the manager of the wind development stated that although her direct staff was very small, staff from other parts of the organization complemented the team. For example, someone with expertise in land purchasing worked on a part-time basis to help the wind team purchase land. Although, there are obviously differences between the generation of energy from natural gas or wind, Shell Resources can certainly transfer existing competences in gas exploration to the generation wind energy. Such competences are less relevant, however, for other forms of renewable energy, such as solar, which generally requires photovoltaic panels to be placed in urban settings.

Shell Resources also uses a 'carbon screen' during the evaluation of new investments. It consists of an assessment of carbon emissions associated with each project, followed by the allocation of a price to carbon emissions, which is then used for future project calculations. In an increasingly carbon-constrained business environment, this carbon screen is extremely useful tool to inform decision-making. For example, as wind energy does not produce carbon, the addition of carbon costs to investment calculations is considered a positive eco-factor for the shift towards wind energy; or, in the language of environmental sociologists, towards ecological modernization. Such organizational commitments competences and constraints, however, are not sufficient to explain Shell's relatively modest investments in wind energy – when compared to investments in traditional energy. Governmental policies and programs play a central role in the organizational field of the energy industry.

4.2. Environmental Policies and Programs

Legislation, monetary instruments, and voluntary agreements that influence the industry with respect to more ecological practices are examples of environmental policies and programs. In particular, fiscal incentives to the alternative energy sector constitute an example associated with our topic. In 2002, the Canadian government introduced the Wind Power Production Incentive, a US\$170 million investment that provides financial support for the installation of 1,000 megawatts of new wind production over the next five years. This can be considered a (positive) eco-factor influencing companies to pursue alternative energy practices. Additionally, Canada has recently ratified the Kyoto Protocol, committing the country to reducing greenhouse gas emissions and the promotion of alternative forms of energy.

If there are programs fostering investments in alternative forms of energy, then why are Canadian companies not adopting more aggressive strategies and practices to move away from fossil

fuels? A look into the full range of environmental policies and programs provides an answer. Although the Canadian federal government sponsors programs supporting wind energy, it also provides incentives towards further developments of oil and gas reserves. According to Globe and Mail (2002), between 1970 and 1999 the Canadian government spent CDN\$ 40.4 billion (US\$ 29.7 billion) on oil and gas developments. While the government spending on renewable energy has indeed increased in recent years, these investments are pale when compared with those allocated to the continuous development of the oil and gas businesses.

Hence, it is not difficult to understand why any ambitions Shell Canada may have to move away from the gas business is limited by the dominant environmental policies and programs in its organizational field. In other words, Shell Resources is developing its strategy in alignment with the targets for gas exploration set by the Canadian government. Of course, the Canadian government is not the only stakeholder in this business. There are others 'stakes' in the hands of many interest groups and organizations who will embrace in environment-related disputes, characterized by Orsatto and Clegg (1999) as 'circuits of political ecology' (see the center of Figure 1). An example of such disputes is presented next.

4.3. Interest Groups and Organizations

Interest groups and organizations constitute another eco-factor influencing the strategic choices of Shell Resources. The role played by shareholders is an example of an inhibiting aspect such interest groups exert on the organization. To appease shareholders, Shell management sets a 15% return on investments. This requirement is a clear limitation of Shell Canada to invest in wind energy. Although wind energy is able to generate a positive return on investment, it is not profitable enough to divert capital that could be committed to more profitable ventures such as natural gas. The higher demand for wind energy and costs associated with production of natural gas will likely increase in the future, but as long as the return on investment of natural gas is much higher than that of renewable energy, then shareholders are expected to maintain their support for gas exploration.

Shareholders are certainly not the only interest groups influencing Shell's strategy; other stakeholders are gradually becoming more important. Access to natural resources is becoming increasingly difficult in the oil and gas industry (WRI, 2002). Shell Resources faced such constraint recently, when denied the 'license to operate' in a community within the town of Ferrier, Canada. Citizens opposed Shell's plans to develop a gas well in the region, forming a coalition of over 50 landowners to challenge the company. The dispute took a few months to resolve. The community

was concerned about the possibility of a release of poisonous hydrogen sulphide gas, as well as impact on the region's natural environment. After the parties failed to find common ground, a public hearing was held, so both sides could expose their rationales. To the surprise of industry observers, months after the hearing, the government denied Shell the license to drill the well. As stated by one Shell Resource representative, the Ferrier case demonstrates the ability communities have to deny the license to operate.

4.4. Market Demand and Patterns of Utilization

Another reason for Shell Resources to continue with the natural gas business relates to market demand. According to Canada's Energy Outlook (Natural Resources Canada, 2000), there will be significant growth in natural gas consumption in North America over the next 20 years. Part of the explanation for the increase in demand relates to the switching from coal to natural gas in electricity generation in North America (U.S. Department of Energy, 2001). Coal-fired power plants are expected to switch to natural gas partially due to the lower environmental impacts of gas over coal. In this respect, Shell will contribute to lowering the environmental impact of electricity generation through a process of ecological modernization.

Whether such shift from coal to gas characterizes a positive environmental outcome certainly depends on the perspective adopted by the analyst. A switch from coal to natural gas represents a reduction of emissions of carbon and other pollutants. It is also an improvement in physical encroachment into nature, as coalmines have a larger physical footprint than natural gas wells. Hence, because the switch to cleaner fuels reduces the relative impact on the environment, it can be seen as an advance towards ecological modernization – even though the long-term exploration of fossil fuels is ecologically unsustainable. This explains why, in 1997 managers within Shell Resources divested themselves from the business of oil production but maintained the association with natural gas. Some of the Shell's senior managers stated that the high market demand for natural gas expected in North America partially explains Shell's strategic choice.

High market demand for natural gas reinforces current patterns of utilization of energy-dependent products and services. Patterns of utilization can be thought of as both the concept and the technology embedded in a product or service, influencing the way in which they are owned or used. Patterns of utilization, in this respect, may enable or hinder environmental innovation. The design of buildings, for instance, influences the way in which people use them. As Winston Churchill once said, "at first we shape our buildings, and then our buildings shape our lives". As the

majority of the environmental impacts of buildings will happen during its use phase, the construction sector certainly has an influence on the general patterns of utilization of households and commercial buildings.

In fact, selling natural gas puts Shell's commitments towards sustainability in the spotlight. For firms operating in the traditional gas business, success depends on people using as much gas as possible. But, as it has been mentioned in the opening of this article, selling more natural gas will also result in higher environmental impacts. Since Shell has publicly committed to sustainable development principles, what should the company do? What would then characterize a sustainability-oriented solution? Since Shell intends to remain in the gas business, a solution for this dilemma can only be based on ecological modernization. In this case, eco-efficiency measures have the potential to extend the time span of gas reserves.

Shell – and other firms operating in the gas business – can develop programs where profits are possible to be made through the reduction of energy consumption. Although this might sound impractical at first glance, it is technically and economically viable. By retrofitting buildings with energy efficiency technologies, for instance, higher mark up for gas would be possible. In this case, the 'profits' from energy savings would be shared between the user who would pay relatively less for the energy provided, and the gas provider who would supply the same energy with less gas. Some improvements, for example, take advantage of super-insulated windows that require consumers to use less energy for heating. This provides an example of how changing patterns of utilization may turn into a profitable corporate venture. The implementation of such novel practices, however, depends not only on the ability of firms to gradually change patterns of utilization but, as the next section will explore, also on a vast number of related businesses.

4.5. Positioning of Related Businesses

No discussion on alternative energy is complete without a reflection on hydrogen. As research on fuel-cells and carbon sequestration technologies continues, hydrogen extracted from natural gas has the potential to become a fuel source with significant environmental benefits (Pembina Institute, 2002). The fact that Shell is a gas provider may facilitate its entry into the hydrogen business.

Of course, a single industry player does not accomplish such a dramatic shift alone, because there is often a high degree of interdependency between a firm and its related businesses. The shift towards more environmentally friendly sources of energy is largely dependent of the positioning of

organizations that directly or indirectly relate to the existing energy system, as well as the envisioned sustainable industry. To help highlight this point, it is useful to reflect upon the emergent fuel-cell industry in Canada. A 2002 report described this industry as clustered around four major metropolitan areas (*PriceWaterhouseCoopers*, 2002). In two of these areas, Calgary and Vancouver, Shell is considered a major player. One of the characteristics of a cluster is the strong linkages among firms and their technological and business infrastructure, including activities such as delivery of hydrogen and access to financing.

In Calgary, where Shell Canada is headquartered, major energy companies are interested in developing the infrastructure to provide hydrogen, but the cluster is only in its embryonic stage, with one fuel-cell developer. In Vancouver, where the industry is more established, Ballard Power System, a major fuel cell developer, is leading the development of a new industrial cluster, with supporting services such as access to financing becoming gradually available. In this sense, the evolution of the fuel-cell industry is an example of how related businesses play a major role in helping the 'hydrogen economy' to emerge.

Shell has initiated partnerships with the Canadian fuel-cell industry through Shell Hydrogen – an international subsidiary of the Shell Group. In Vancouver, for instance, it has a joint venture with Ballard called the Chrysalix Energy Limited Partnership, which promotes and supports start-up companies involved in development of fuel cells and related systems, and the hydrogen infrastructure. Although senior managers with Shell Resources have stated that a shift towards hydrogen is a long-term goal, the embryonic stage of related businesses is certainly a limit to its realization.

In summary, energy companies face a tremendous challenge to shift towards alternative forms of energy. Although there are organizational commitments towards sustainability goals, several eco-factors inhibit radical strategies to be deployed. In the case of Shell Resources, such factors include high market demand for current forms of energy, policies that support further fossil fuel development, and the lack of related businesses to support them.

4.6. Competitive Forces and Collaboration

The competitive forces characterized by Porter (1985) certainly play a major role in facilitating or hindering the pace of ecological modernization of an industrial sector. Depending on characteristics of the 'circuits of political ecology', such forces can also assume a collaborative character (see: Orsatto & Clegg, 1999).

The Canadian Association of Petroleum Producers (2002) describes the intensity of rivalry within the natural gas business as very high. The main explanation for this relates to the very nature of the gas business. In this business, the price of gas is not set by any individual producer but by the open market – hence gas is a ‘commodity’, or ‘article of trade’. In this situation, because neither Shell Resources nor other firms in the gas business can control their own prices, the key to improving return on investment lies primarily on operational efficiency. Failing to do so would leave the company in an extremely fragile situation: As one manager at Shell Resources put it:

...all the infrastructure is suffering from increasing unit costs. [Natural gas] is still a great business to be in, because our product is in such great demand that prices are going up. So even though we have higher costs, we have got higher prices and it is still very profitable. If prices ever collapsed then you will be exposed.

Since cutting costs is the only viable route for a company to manage its profit margins, all firms within the gas business have to deploy what Porter (1985) called ‘cost leadership’ strategies. And because operational efficiency leads to resource efficiency and a consequent reduction of greenhouse gas emissions, this can be considered an area for ‘double Dividends’ opportunities (see: Porter and van der Linde, 1995). In short, competition based on cost in the gas business can be seen as a positive factor influencing ecological modernization. While energy improvements reduce costs, the overall improved environmental performance reduces fossil fuel depletion. Such opportunities for energy efficiency improvements in infrastructure generally depend on the industrial ecology conditions, the last eco-factor to be discussed.

4.7. Industrial Ecology Conditions

According to Orssatto (2001b), industrial ecology conditions (IEC) facilitate the minimization of environmental impact associated with the full life cycle of a product. In simple terms, IEC are divided into two areas: infra- and socio-structures. Infrastructures are those investments in tangible assets that allow for improved environmental performance. Socio-structures refer to the labor skills, knowledge and personal networks to effectively implement industrial ecology principles.

As mentioned in the previous section, the industrial ecology conditions available to Shell Resources facilitate the ecological modernization of its infrastructure. At the time of the research,

the head of environment for the business unit stated that over 100 energy efficiency projects were being implemented. In an interview with a member of Shell Canada’s energy efficiency research team, various projects to recover lost energy in the production process through infrastructure investments were identified. Altogether, these projects are expected to contribute to the ecological modernization of Shell Resources.

5. Debating Shell’s Environmental Strategy and Practices

In light of the discussion presented in the previous sections, here we briefly summarize and debate the two main areas of ecological modernization of Shell Resources: alternative energy sources, and the greening of Shell operations. Figure 2 depicts the main areas of investment of Shell resources. The symbols (+) and (–) represent, respectively, positive and negative influences on the ecological modernization of the company. In other words, the figure represents factors fostering or inhibiting environment-related investments of Shell resources.

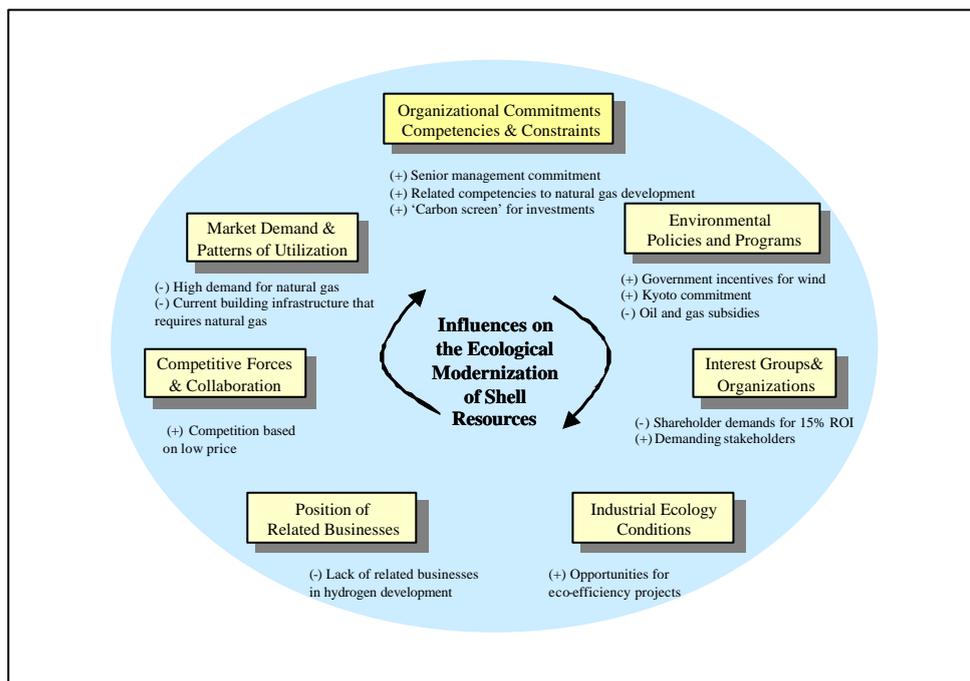


Figure 2: *Influences on the Ecological Modernization of Shell Resources*

Since the analysis of the political influences on the eco-factors was not included in our research, an attentive reader will realize that we deliberately have not addressed the ‘circuits of political ecology’, stylized in the center of Figure 1.

5.1. Alternative Energy Sources

Shell Resources is likely to remain a producer of natural gas for at least three more decades. The rationale for this strategy is straightforward: the *market demand* for natural gas is expected to keep growing. A partial explanation for the large demand relates to the switching of fuel sources that will be powering electricity generators over the next 20 years in North America. Due to the lower environmental impacts of natural gas over coal, coal-fired power plants are expected to switch to gas. Although there is an expected increase in the use of renewable and other alternative forms of energy such as hydrogen, hydrocarbons are likely to remain as the main source of energy over the next 20 years.

There are certainly opportunities to build on current *competencies* for the development of wind energy, as many of the current competencies for wind energy are complementary to Shell Resources. Besides, there is a *commitment* from senior management to explore wind energy business. However, other factors influence investments in wind energy. Shareholders represent a major *interest group* that demands a level of financial performance that cannot be met by investments in wind. Since investment in wind energy generates much lower returns than those in traditional forms of energy, there is a clear limitation for the management of Shell to invest in this alternative form of energy generation.

While some *environmental policies and programs* support wind energy development, they are marginal when compared with current subsidies for oil and gas. Such policies and programs certainly limit the development of renewable energy sources. For a shift to the most promising of all alternative energy sources – hydrogen – many *related businesses* are also required to support such a move.

Taken together, these factors partially explain why Shell Resources is likely to continue producing natural gas, and shift only very slowly to alternative forms of energy. Although the organization has committed to developing renewable sources of energy, the analysis of each eco-factor forming the ecological modernization framework unravels why Shell often holds back from what is *desirable* and instead focuses on what is *possible*. In practical terms, this means that the viable strategy to follow in the next years encompasses a modest but ever-increasing investment into alternative energy, the substitution of natural gas for more carbon intensive forms of energy, and the continuous greening of organizational processes, discussed next.

5.2. Greening Organizational Processes

Although, Shell Resources is primarily a producer of natural gas, there are still many factors influencing the ability to 'green' its operations. The discussion on *competition and collaboration* showed that Shell Resources cannot control the price of the gas it sells. Since the costs of exploration have risen over time the only alternative left to Shell is to focus on cost reduction. This requires, that cost savings in operations offset increases in costs from other areas of the company.

The discussion of *environmental policies and programs* showed that government policies were moving towards a reduction in carbon emissions. Additionally, the analysis of the *industrial ecology conditions* show that, within Shell operations, there are many opportunities for energy efficiency projects. Combined, these factors indicate that resource productivity is an important part of the strategy due to the potential for costs savings, as well as the need to reduce carbon emissions.

As explored in Section 4.3, Shell faces increasing pressure from *interest groups* such as non-governmental organizations. Such pressures from communities and NGOs are likely to increase in the future, as there are more conflicts regarding land use. In this regard, Shell is trying to reduce the physical space of operations, or its 'ecological footprint'. Reduction in space will also reduce disturbance of the natural environment and conflict with neighbors. Finally, by improving its environmental performance Shell Resources is not only addressing the increased pressure from communities and interest groups, but also using environmental prerogatives to increase its reputation and, by consequence, its market value.

6. Final Remarks

The challenge of transforming the vision of sustainable development into strategies and practices has been taken by the Shell Group, a leading player in the 'hydrocarbon' industry. After being targeted by environmental activism⁶ in 1995, Shell adopted a proactive environmental strategy, significantly improving its accountability (Kolk 2000). The company quickly learnt that the overall environmental performance was becoming increasingly important to stakeholders. But while commitments towards sustainable development have been made, putting them into practice is still one of the biggest challenges faced by Shell today.

⁶ In 1995 *Shell* disclosure plans to sink obsolete oilrigs in the North Sea. *Greenpeace*, a green activist organization lead a fierce campaign to pressure *Shell* to change its plans. The subsequent outcry lead by *Greenpeace* enticed consumers to boycott *Shell* petrol, resulting in a 60% downfall in sales in Germany alone. In the end, the *Brent Spar* oil platform, instead of being sunk in deep-sea waters, was dismantled on land.

In this article we presented a more detailed diagnostic of this challenge. By applying the analytical framework developed by Orssatto (2001b), to the organizational field of Shell Resources (see: Leung, 2002), we provided a more comprehensive understanding of the factors limiting and fostering ecological modernization in the Canadian gas industry in general, and Shell Resources in particular. We believe that a systematic analysis of each eco-factors can lead to a more realistic view of the 'sustainability path' available to Shell. In this respect, although some environmentalists would rather prefer to see Shell shutting down its petroleum and gas businesses, this article has shown that such a view is questionable, as current actions can only be assessed in light of a desired future outcome. Fundamentally, there is a tension between what an organization *wants* to do in ideal terms and what it *can* do within its organizational field to reach the ultimate benchmark of sustainability. And what it can do is also constrained by societal needs – in the case of Shell, the need for energy.

We expect this work to be useful to both academics and practitioners. For academics working within the *organization and environment* field, the framework can be used in research design; in particular, for the definition of empirical variables of organizational greening in the gas industry – or energy industry, as firms portray themselves. The study is also expected to be useful to managers dealing with environmental issues in business. This article can help them to develop a clearer understanding of the forces influencing the pace of ecological modernization of the industry. This is particularly useful as a business case for strategic environmental management. Lessons from Shell Canada will certainly be useful to those looking for a realistic account of transforming the hydrocarbon business into a sustainable energy industry.

7. Reference List

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