

Intermediate report

Nordic Energy Perspectives



Prominent strategies for environmental sustainability in the stationary energy sector

March, 2009



Preface

Nordic Energy Perspectives (NEP) is an interdisciplinary Nordic energy research project with the overall goal of demonstrating means for stronger and sustainable growth and development in the Nordic countries.

NEP analyses the national and international political goals, directives, and policy instruments within the energy area, as well as their influence on the Nordic energy markets and energy systems and the infrastructures and institutional structures. NEP aims at clarifying to decision-makers the consequences of political and strategic decisions for politicians, energy actors and the public. The project is to promote a constructive dialogue among researchers, politicians, authorities and actors on the energy markets.

For further information about the project, please visit: www.nordicenergyperspectives.org.

This series of reports are the second reporting from the second phase of the project. The following intermediate and final reports are now presented:

Synthesis report, March 2009:

- Second NEP2 synthesis report (*Responsible: Peter Fritz, Håkan Sköldbberg, Bo Rydén*)

Final reports, March 2009:

- Widened view of energy efficiency and the resource management (*Responsible: Bo Rydén*)
- Technology options for a low CO₂ energy system (*Responsible: Tiina Koljonen*)
- Wood markets and the situation of the forest industry in the Nordic countries (*Responsible: Per Erik Springfeldt*)

Intermediate reports, March 2009:

- Reference and policy scenarios (*Responsible: The NEP model group*)
- Global scenarios (*Responsible: Janne Niemi*)
- Biomass market and potentials (*Responsible: Tiina Koljonen*)
- Nordic perspectives on the EU goals relating to CO₂, renewable energy and energy efficiency (*Responsible: Thomas Unger, Bo Rydén*)
- Prominent strategies for environmental sustainability in the stationary energy sector (*Responsible: Anders Sandoff*)
- The future of the Nordic district heating (*Responsible: Monica Havskjold, Håkan Sköldbberg*)
- Trade within the RES directive and related power interconnection issues (*Responsible: Berit Tennbakk*)
- Natural gas in the Nordic countries (*Responsible: Peter Fritz*)

Our intention in NEP is to present all reports in English. Due to lack of time, some of the texts in some of the reports are at this stage still in Scandinavian languages. We apologize for this. These texts will as soon as possible be translated into English. The translated texts/reports will be available on the project's web site, www.nordicenergyperspectives.org, soon after the Oslo conference.

Oslo, March 2009

The NEP Research Group

Prominent strategies for environmental sustainability in the stationary energy sector

Background and purpose of the study

There is an obvious need for companies in the stationary energy sector to intensify their efforts to contribute to sustainable development, both at a strategy level and in order to integrate sustainable practices into their operations. The main purposes of this study are

1. to identify mechanisms that enable energy companies to strengthen the environmental sustainability of their business and contribute to a sustainable development of the stationary energy system.
2. to operationalize sustainable development within the context of energy companies and establish a framework that can be used to arrange the different activities contributing to environmental sustainability at a conceptual level.

Methodology

To gain insight in how environmental sustainability is put into practice within corporations, close-up investigation is essential. For this reason, case studies of companies with a prominent strategy for environmental sustainability were chosen as a research methodology. Studying energy companies with a strong focus on the environment was considered beneficial for capturing the essence of sustainable practices and to support relevance and richness of the data to be collected.

The selection of case companies was based on an emerging **framework of activities for environmental sustainability** that was established from an initial study of a large number of Nordic and European energy companies. This framework has subsequently been refined and extended with the help of theoretical findings (please refer to section 2 below). The study encompasses three case companies from the Swedish stationary energy sector, all showing substantial activities in each of the areas identified in the framework.

Data was collected by means of personal interviews with representatives from different departments of the firms, i.e. from the environmental department, production, development, finance and management. Interviewing employees from a broad range of functions would open up for wide discussions on sustainable firm practices and different perspectives. Document studies served as an additional data source, both for interview preparations and to verify the findings.

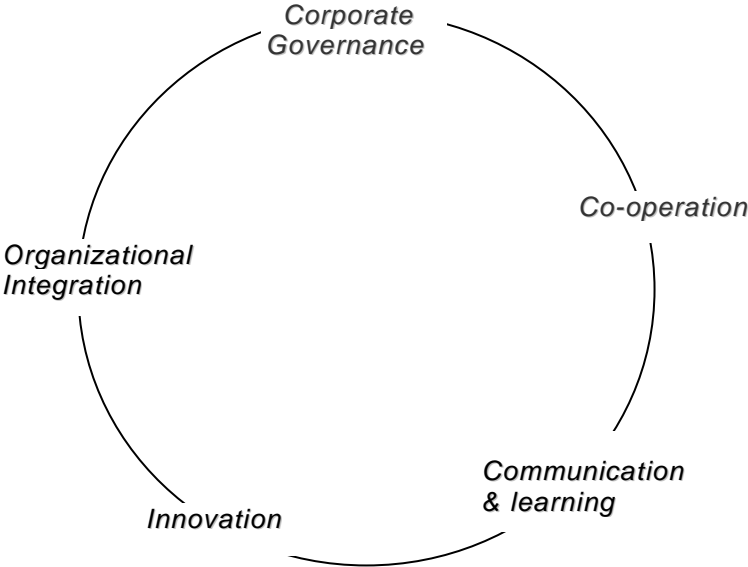
The interviews explored corporate strategies and practices for environmental sustainability and tested a tentative framework of **focus areas for sustainable development**. The framework originated from document and Internet studies conducted during the initial phase of the project. It is adapted continuously in accordance with the findings from the interview

study. As data collection is ongoing (1st case completed, 2nd & 3rd ongoing) the findings below represent a preliminary version.

Empirical findings

In section 1 below, the findings from the case study interviews are reported by highlighting *five focus areas for sustainable development*. These seem to play a dominant role in the case companies’ change-over to more sustainable business practices. The first focus area, **Corporate Governance**, focuses on the interplay between owners and the management in relation to corporate environmental issues. The focus area **Co-operation** highlights the possibilities and dimensions offered to sustainable development by joining forces beyond corporate boundaries. **Communication and learning** is a further area of interest, exploring the role of communicating with stakeholders and the benefits of learning to promote change in a sustainable direction. In the forth area, **Innovation**, it is explored how energy companies enhance the sustainability of their products and processes. Lastly, under the heading **Integration**, structures and mechanisms enhancing environmental sustainability within the company are studied.

Figure 1: Five focus areas for sustainable development



Subsequently, section 2 introduces a *framework of activities for environmental sustainability* that has the purpose to help structuring the observed activities and create a strategic road map by putting them into a larger context. These activities can be categorized into four distinct areas that represent qualitatively different fields of environmentally sustainable strategies. The areas can be seen as incremental stages, although it is common for companies to be involved in activities in all stages to different degrees. **Emission Reduction** focuses on minimizing the impact on the environment internally and on increasing efficiency; **Product Stewardship**

analyzes corporate activities directed towards developing new sustainable products and services or enhancing the sustainability of existing ones. **Clean Technology** looks at aspects connected to investments in renewable or bridging technologies. The most advanced stage, **Sustainable Development**, frequently requires high social involvement with external stakeholders. Here, a wide perspective on possible measures to promote sustainability within the sphere of activities of energy companies is applied.

1. Focus areas for sustainable development

CORPORATE GOVERNANCE

Active ownership and a close collaboration between the board of directors and managers seem to be a common denominator for companies that take an active interest in environmentally sustainable development. This shows for instance in a good understanding by both board members and the management of the company's environmental impact and the possibilities to mitigate this impact. There is also clearly a consensus at the board and management level that environmental sustainability is important for business success. In addition, focus is not solely put on generating returns but also on producing social welfare. For instance, the owners' directive stipulates that respect for the environment is part of the company purpose. This is also reflected by the fact that these publicly-owned companies experience less pressure from their owners to provide financial returns than private companies do, which results in that more funds can be put on implementing favourable projects with a longer pay-back time.

It was observed that companies with a prominent strategy for environmental sustainability have a good alignment of interests and goals between owners, the board of directors and management and thus can take action swiftly and effectively. Particularly, this facilitates investments in measures that reduce emissions from energy production. Yet again, the congruence of goals also smoothes the way for the more extensive investments that are necessary for the transition towards an energy system based on renewables. In conclusion, if owners and manager have a shared understanding of goals and means how the company can serve as a tool to make the energy system more sustainable, change can occur quite rapidly.

CO-OPERATION

Co-operation was identified as a strong feature of the energy companies studied. One way co-operation is looked at is to see it as a means for business expansion. The benefits of strategic co-operation are an extension of available competences and production resources, leading to better economies of scale and financing possibilities. If synergies can be achieved, the businesses can operate more efficiently, resulting in benefits for the environment.

Within the operational business, co-operation showed to be a means to increase the sustainability of the energy production. The usage of waste heat from industries is an obvious and widespread form of co-operation. A less common form is the outsourcing of heat production. By connecting local landowners' biomass furnaces to the district heating network, renewable heat can replace a portion of the in-house fossil fuel production. Furthermore, co-

operation with the local forest or agricultural industry has the advantage that emissions from transportation can be reduced significantly. Co-operative business models proved further to be a convenient way to expand wind power.

Co-operation is also beneficial for the exchange of ideas, for instance within networks such as business associations (Swedenenergy and Swedish District Heating Organization) or professional networks. It can further be a mechanism to spread best practices and contribute to their institutionalization, thus creating new professional norms. Moreover, co-operation with universities can lead to innovations.

Going a step further, close co-operation between regional environmental coordinators and energy companies has the potential to give even better synergies. To sum up, co-operation offers numerous opportunities for improving the sustainability of the stationary energy system worthwhile to explore.

COMMUNICATION & LEARNING

Communication about environmental issues both within the company and with its stakeholders is a central aspect of creating awareness for the changes that need to be implemented to move towards a more sustainable energy system. From an internal perspective, communication and learning are seen as vital to create employee commitment to environmental issues which facilitates implementing common goals. Regular internal environmental training empowers employees to take responsibility for the environment in their own work tasks which often results in bottom-up initiatives to improve environmental performance. To speed up learning, it is also common to hire outside consultants, particularly in the start-up phase of new sustainability-related projects. To judge from the empirical data, it seems safe to say that a learning organization is a requirement for bringing about the changes that are necessary to make the energy system more sustainable.

Moreover, external communication creates transparency about the company's sustainability-related goals and the means by which these are to be achieved. This helps to create trust and acceptance for corporate strategies and products with the company stakeholders. It is also seen as desirable to maintain a dialogue with stakeholders, in particular customers. On the one hand it is important to get input as to customer preferences for the development of new, value-creating products. On the other hand companies want to raise awareness with consumers about how they in their turn can influence the development of the energy system positively, for example by purchasing renewable electricity, switching to district heating or saving energy. However, creating a dialogue with customers is seen as a one of the big challenges since common knowledge and awareness about energy issues is perceived as rather low. The remote meter reading system currently being introduced is considered to be a useful tool to intensify the dialogue with customers.

Another interesting observation emerging from the interviews was that good environmental performance is considered to be a future "hygiene factor" for energy companies, meaning that companies that do not engage in sustainability will lose business. With this in mind, external communication about corporate activities for sustainable development seems particularly advocated.

It should also be acknowledge that environmental communication to a broader public via reports, the homepage and media can have an impact on sustainable development by showing good examples that can inspire others.

To sum up, communication contributes to strengthening the relationship with stakeholders, particularly customers, which in turn gives increased opportunities to develop the organisation in a sustainable direction. Learning is a mechanism that accelerates change, which is what drives the sustainability agenda forward. Communication and learning should thus be prioritized areas for companies, not only to speed up the transition towards sustainable business practices internally but also to create stronger awareness about the necessity of behavioural changes with regard to energy consumption among its key stakeholders.

INNOVATION

Innovation at a strategic and at an operational level is important to secure the company's ability to stay competitive. It is also a necessity in order to improve the environmental sustainability of a company's products and processes.

The companies point out that a timely identification of opportunities and threats from the environment (preferably beyond Swedish borders) is vital to direct the innovation process. Internal innovation has been observed both at a centralized level and within business units. At a centralized level, a wide view on innovation is applied and issues of strategic nature such as the product portfolio and potential co-operations are areas of interest. Observed areas of innovations are energy services, carbon neutral district heating, a new business model for wind farm projects etc. At the business unit level, innovation activities are more focused on operational issues. For example, the business unit Production tries to find better technical solutions to optimize the energy system or tests different energy crops. The business unit Markets elaborates on pricing models that give customers incentives to save energy. Furthermore, an open climate within the company facilitates employee involvement, making it easier to address innovative ideas to other business units or the management.

A third source of innovation is external stakeholders. Owners, customers and co-operations can generate new ideas that the company can develop and integrate into its business. Connected to the interest to innovate is the necessity to take risks. Willingness to take a certain amount of risk can thus be considered a property of the energy companies studied. It seems important to understand that innovative solutions are needed on many levels to cope with the challenge to make the energy system more sustainable.

ORGANIZATIONAL INTEGRATION

The fifth area that appears to be central for companies that take an active interest in sustainable development is their strong capability to integrate respect for the environment and sustainability thinking into the different business areas and processes. Central to the capability to integrate sustainability swiftly is a well-established and competent environmental organization. A timely adoption of the ISO 14001 norms for environmental management appears to be a decisive factor for achieving a high environmental standard. It has thus to be acknowledged that efficient environmental management is a socially complex process with competence being accumulated under a considerable period of time. The focus on incremental improvements is a distinctive feature of environmental management systems, whereas stability and continuity are seen as a guarantee for sound environmental management more generally. To ensure continuous progress, the follow-up of environmental goals is a standing point on the meeting agenda of the management team responsible for heat and power production, which gives environmental issues due importance.

An interesting observation is also that environmental aspects have been widely integrated in steering-documents and management tools. For instance, environmental goals have been incorporated in the business plans, whereas environmental performance plays an

important role in the internal process dimension of the balanced scorecard, a widely used performance measurement tool.

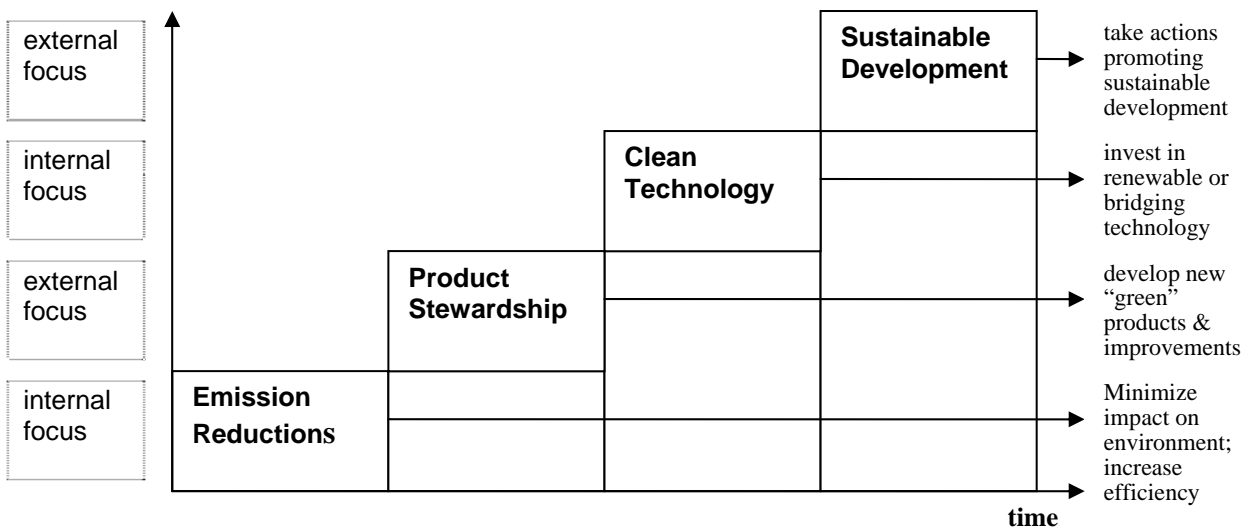
When it comes to integrating sustainable practices into the production system for heat and power, the existence of flexibility has been addressed as an important point. A rigid production system makes the financial and environmental optimization of the energy system more difficult, compromising sustainability goals.

Integration further links to the framework of activities for environmental sustainability. It seems important to emphasize that environmental sustainability should not only be addressed on an emission reduction level, but permeate even product development, clean technology and wider sustainable development considerations.

2. Framework of activities for environmental sustainability within the stationary energy system

The second purpose of this study is to operationalize sustainable development within the context of energy companies in the stationary energy system and establish a conceptual framework under which the different activities contributing to environmental sustainability can be arranged in a meaningful way. For this purpose I have resorted to “The Sustainable Value Framework” by Hart and Millstein (2003) as a source of inspiration. The *framework of activities for environmental sustainability* can be seen as a tool to structure and illustrate the activities that energy companies undertake as building blocks of their overall strategy for environmental sustainability. As mentioned, the categories represent qualitatively distinct areas of environmentally sustainable strategies. While the categories represent separate areas following their own logic, the sequence of the categories can also be seen as a model encompassing incremental stages. Climbing up the ladder from stage to stage would thus lead to an increasingly comprehensive strategy for environmental sustainability. However, the empirical study showed that companies in practice implement a combination of activities from the different stages. This combination, it is argued, depends on a company’s individual strategic preferences and its available resources and capabilities, amongst other factors. Figure 2 below illustrates the framework conceptually and gives a short description of each category (as described earlier in the introduction of empirical findings).

Figure 2: Framework of activities for environmental sustainability



Source: Adapted from Hart, S. & Milstein, M. 2003: "Creating sustainable value".

As visualized in the framework, activities can have either an internal or an external focus. I want to give but a very brief explanation of what this dichotomy entails. The *Emissions Reduction* stage has an internal focus, where close attention is paid to the existing production system and to minimizing the company’s impact on the environment from its business activities, in particular operations. Improvements are of an incremental and path dependent nature; nevertheless, they can be significant over time. The *Product Stewardship* stage has an external focus. It follows a market logic, striving to create sustainable products that meet existing or potential customer needs. In this stage, the apprehension of potential changes in customer preferences as a result of the climate change debate is crucial. In the stage *Clean Technology*, again the internal focus is dominating. The need to reposition the company to secure access to cost-efficient and environmentally benign production resources can be seen as a driver. Activities in this stage have the potential to bring about more radical changes to the energy system. The *Sustainable Development* stage focuses strongly on the external context and stakeholders. The company is driven by a sustainability vision that extends its scope of activities beyond corporate boundaries.

This short excursion indicates that the four areas follow widely differing inherent logics, which obviously makes it challenging for companies to achieve a coherent and balanced strategy for environmental sustainability that entails commitment to all four areas. The consequences of this diversity on such strategy will be an interesting issue to investigate further. Furthermore, it is certainly of interest to analyze the balance of corporate activities for environmental sustainability across the different stages once data collection has been completed.

The framework will be further refined and strengthened by providing stronger theoretical underpinning. In the following, a four-field matrix is presented that illustrates the framework empirically, providing a selection of activities for environmental sustainability observed for each of the areas. To distinguish further between different types of activities, a distinction between technical activities and so-called bonding activities is made. Bonding activities require greater social involvement, whereas technical activities evidently demand engineering competence or system knowledge.

Table 1: Framework of activities for environmental sustainability: an empirical illustration

	Emission Reductions	Clean Technology
I N T E R N A L F O C U S	<p><u>TECHNICAL ACTIVITIES</u></p> <ul style="list-style-type: none"> • Fuel switching (fossil fuel oil to palm-acid oil, peat to biomass, etc.) • Upgrading of power plants (installation of accumulator tank for overnight storage) • Energy efficiency measures (installation of economizers, connecting separate systems) • Connecting external suppliers for biomass generated district heat deliveries • Energy recovery from waste (waste heat from industry, waste water to heat pumps) 	<p><u>TECHNICAL ACTIVITIES</u></p> <ul style="list-style-type: none"> • Biogas recovery and upgrading plant at water purification station to be built in cooperation with public water treatment company • Biomass gasification project (where biogas is produced through gasification of biomass and wood waste) • Planned investment in cogeneration plant (CHP, combined heat and power) based on locally-produced biomass. • Test drilling for additional geothermal wells • Wind farm development projects in different stages
	<p><u>BONDING ACTIVITIES</u></p> <ul style="list-style-type: none"> • Setting carbon emission reduction and other environmental targets • Environmental reporting (climate specific, f.ex. carbon intensity) • Certified environmental management system (ISO 14001, EMAS) • Use of locally produced biomass (=less pollution from transports) • Environmental training of employees • Integrating the environment in steering documents and management tools • Reducing indirect emissions: <ul style="list-style-type: none"> - Environmental guidelines for company cars, & promotion of ECO- driving - Business travels: Guidelines re environmental requirements for business travels - Implementing construction measures for energy efficiency at the company site 	<p><u>BONDING ACTIVITIES</u></p> <ul style="list-style-type: none"> • Co-operation with other energy companies or developers regarding new wind farm projects • Working for an expansion of the district heating network for new residential construction work • Minority holdings in wind power developing company • Minority holdings in regional energy farming company • Building up competence in different areas crucial for development of own investment projects in clean technology
	Product Stewardship	Sustainable Development
E X T E R N A L F O C U S	<p><u>TECHNICAL ACTIVITIES</u></p> <ul style="list-style-type: none"> • Fuel gas: Increase the portion of biogas in distributed fuel gas • Open new fuel gas filling stations • Installation of remote meter reading with all customers • District heating extension plans/projects • Production improvements that make deliveries of climate-neutral district heat possible 	<p><u>BONDING ACTIVITIES</u></p> <ul style="list-style-type: none"> • Sustainability vision • Ambitions environmental policy • Contribute to regional (sustainable) development • Taking an active role in climate debate • Participating in CDM/JI projects under the Kyoto protocol • Collaboration with other utility companies (common projects), public administration or other stakeholders / Co-operation with local forest or agricultural industry • Providing energy advisory services to customers, f.ex. via homepage • Environmental or energy related education (external) • Environmental communication • Supports external green R & D
	<p><u>BONDING ACTIVITIES</u></p> <ul style="list-style-type: none"> • Create energy services that improve energy efficiency with customers, either by giving incentives to save energy or through technical measures • Continuous endeavour to find co-operation partners that contribute to making the production mix more sustainable, e.g. farmers producing biogas • Secure different forms of access rights to renewable energy • Product diversification: Include fossil free district heat in the product portfolio • Innovation through customer involvement (open-source innovation) 	<ul style="list-style-type: none"> • Participation in environmental network activities

References

Hart, S., Milstein, M., 2003. Creating sustainable value. *Academy of Management Executive*, Vol. 17, No. 2, pp. 56-69.