CORPORATE GREENING
PRODUCT AND PRODUCTION PERSPECTIVES

Bozena Guziana

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School of Business, Society and Engineering
CORPORATE GREENING
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Akademisk avhandling

som för avläggande av filosofie doktorsexamen i energi- och miljöteknik vid Akademin för ekonomi, samhälle och teknik kommer att offentligen försvaras fredagen den 24 maj 2013, 10.00 i Lambda, Mälardalens högskola, Högrskoleplan 1, Västerås.

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Abstract

This thesis describes corporate greening in general, and specifically the environmental technology (ET) sector as a green sector. The thesis has also particular focus on production and products related aspects and the influence of the environmental profile of the ET sector on the environmental engagement of companies in the sector. The study is based on a questionnaire-based survey, online surveys and on semi-structured open-ended interviews. The organizations within the ET sector were identified using existing platforms within this sector: Sustainability Sweden and Swentec. The results show that not all companies and industry associations in the ET sector clearly distinguish between product and production related environmental aspects. Furthermore, the product related environmental profile, which constitutes the legitimacy for the sector, can influence companies’ environmental strategy, not only positively but also negatively. The results from the survey on Global Supersector Leaders 2009/2010 in Dow Jones Sustainability Indexes (DJSI) show that all companies are aware of production and product related environmental issues. Based on results from this survey a model of corporate environmental profile consisting of product and production oriented activities as well as initiatives that go beyond the core business operations is proposed. These initiatives can be divided into two groups: environmental education and environmental projects and sponsorship. This thesis proposes products and production related impacts and environmental activities as bases for defining corporate environmental profiles, corporate greening, and for defining ‘green’ and ‘green-green’ business as well as environmental leaders. The distinction between product and production related environmental initiatives as well as the other dimensions of the proposed model in this thesis can support companies in their communication of environmental performance and environmental activities. Furthermore, ‘competitive advantage’, ‘environmental responsibility’ and ‘environmental leadership’ should motivate companies within the ET sector to be ‘vocal’ green-green firms.
To Emilia, Ksavera and Marianna
The environmental technology (ET) and clean technology (cleantech) sectors are important sectors contributing to sustainable growth. These sectors provide environmentally superior products, i.e. these sectors are characterized by product related environmental profiles which constitute the legitimacy of these sectors and contribute to recognition of these sectors as green sectors. However, what greening of companies means is not clearly described in the literature. Furthermore, one can wonder if the product related greenness of the ET sector also means that companies in this sector set and implement environmental goals relating to their own activities and manufacturing processes.

The research studies that form the basis of this thesis have the aim of adding to the body of knowledge on greening in general and more specifically, in the ET sector as a green sector. The research has accordingly contributed to understanding of greening in general and in the ET sector through highlighting the distinction between product and production related environmental impacts and activities; and through highlighting the influence of the environmental profile of the ET sector on environmental engagement in companies within this sector. This thesis proposes products and production related impacts and environmental activities as bases for defining corporate environmental profiles, corporate greening, and for defining ‘green’ and ‘green-green’ business as well as environmental leaders. This distinction is also relevant for defining ecopreneurs.

The overall results from research on the ET sector shows that not all companies and industry associations treat product and production related environmental aspects clearly. Furthermore, the product related environmental profile and legitimacy of the sector can influence companies’ environmental strategy, not only positively but also negatively.

The overall results from the survey on Global Supersector Leaders 2009/2010 in DJSI show that all companies are aware of production and product related environmental issues. According to the results from this survey, the model of the corporate environmental profile can consist of product and production oriented activities as well as initiatives that go beyond the core business operations. These initiatives can be divided into two groups: environmental education and environmental projects, and sponsorship. The initiatives that go beyond the core business can be linked to
the company’s core business or the main environmental impacts of the core business.

The distinction between product and production related environmental initiatives as well as the other dimensions of the proposed model in this thesis can support companies in their communication of environmental performance and environmental activities. Furthermore, ‘competitive advantage’, ‘environmental responsibility’ and ‘environmental leadership’ should motivate companies within the ET sector to be ‘vocal’ green-green firms.

**Keywords:** Greening, ‘Green’ business; ‘Green-green’ business; Environmental leaders; Environmental profile; Environmental technology; Product and production; Communicating; CSR; Ecopreneurs
Sammanfattning

Miljöteknik och cleantech är viktiga sektorer som bidrar till hållbar tillväxt, då de erbjuder produkter med framträdande miljöprofil. En sådan miljöprofil bidrar till sektorernas legitimitet och anseende som gröna sektorer. Litteraturen tillhandahåller dock inte någon väletablerad definition av vad det innebär att företag är gröna. Dessutom infinner sig frågan om huruvida den produktrelaterade miljöprofilen som karaktäriserar miljötekniksektorn innebär att företag i denna sektor arbetar med miljömässiga mål för egna aktiviteter och tillverkningsprocesser.

Det övergripande syftet med forskarstudierna som ligger till grund för den här avhandlingen är att bidra till den samlade kunskapen om företags miljöengagemang generellt och i miljötekniksektorn. Forskningen har bidragit till förståelse av detta genom att lyfta fram distinktionen mellan produkt- och tillverkningsrelaterad miljöpåverkan och miljöinitiativ; och genom att lyfta fram hur miljötekniksektorns miljöprofil påverkar företags miljöengagemang. Avhandlingen föreslår produkt- och tillverkningsrelaterad miljöpåverkan och miljöinitiativ som bas för att definiera företags miljöprofil och miljöengagemang samt som grund för definition av ’gröna’ och ’grön-gröna’ företag. Avhandlingen belyser också att denna distinktion är relevant för definiering av ecoprenörer.

De övergripande resultaten angående miljötekniksektorn har visat att inte alla företag och branschorganisationer hanterar produkt- och tillverkningsrelaterade miljöaspekter på ett tydligt sätt. Dessutom visas att sektorns produktrelaterade miljöprofil kan påverka företags miljöengagemang inte bara positivt utan även negativt.

Distinktionen mellan produkt- och tillverkningsrelaterade miljöåtgärder och den i avhandlingen föreslagna modellen för företags miljöporofil kan användas av företag i dess kommunikation av miljöprestanda och miljö-initiativ. Vidare, ”konkurrensfördelar”, ”miljöansvar” och ”miljöledarskap” bör motivera företag i miljötekniksektor att vara grön-gröna firmor som kommuniserar sitt miljöengagemang.

Nyckelord: Företags miljöarbete; ’Gröna’ företag; ’Grön-gröna’ företag; Miljöledande företag och organisationer; Miljöteknik; Produkt och tillverkning; Kommunikation; CSR; Ecoprenörer
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Västerås, March 2013
List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals. Parts of this thesis have previously been published in the licentiate thesis, *Is the Swedish Environmental Goods and Services Industry Green? Product and Production Perspectives*. Mälardalen University Press, 2010.


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<th>Full Form</th>
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<tbody>
<tr>
<td>APEC</td>
<td>Asia-Pacific Economic Cooperation</td>
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<td>ASSET</td>
<td>Association of Swedish Environmental Technology</td>
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<tr>
<td>BoP</td>
<td>Based of Pyramid</td>
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<tr>
<td>CFBF</td>
<td>Cleantech Finland Business Forum</td>
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<tr>
<td>CINNS</td>
<td>Cleantech Inn Sweden</td>
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<tr>
<td>Cleantech</td>
<td>Clean Technology</td>
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<tr>
<td>CR</td>
<td>Corporate Responsibility</td>
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<td>CER</td>
<td>Corporates Environmental Responsibility</td>
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<td>CSR</td>
<td>Corporate Social Responsibility</td>
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<tr>
<td>DJSI</td>
<td>Dow Jones Sustainability Indexes</td>
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<tr>
<td>EC</td>
<td>European Community</td>
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<tr>
<td>EGS</td>
<td>Environmental Goods and Services</td>
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<td>EGSS</td>
<td>Environmental Goods and Services Sector</td>
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<td>EI</td>
<td>Environmental Industry</td>
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<td>EMAS</td>
<td>The EU Eco Management and Audit Scheme</td>
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<td>EPPs</td>
<td>Environmentally Preferably Products</td>
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<td>EST</td>
<td>Environmentally Sound Technologies</td>
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<td>ET</td>
<td>Environmental Technology</td>
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<td>ETAP</td>
<td>European Environmental Technologies Action Plan</td>
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<td>ETS</td>
<td>Environmental Technology Sector</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>EUCETSA</td>
<td>European Committee of Environmental Technology Suppliers Association</td>
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<tr>
<td>GRI</td>
<td>Global Reporting Initiative</td>
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<tr>
<td>IDG</td>
<td>International Data Group</td>
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<tr>
<td>IPP</td>
<td>Integrated Product Policy</td>
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<tr>
<td>MCSR</td>
<td>Mandatory Corporate Sustainability Reporting</td>
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<tr>
<td>NRBV</td>
<td>Natural-Resource-Based View</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>RBV</td>
<td>Resource-Based View</td>
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<tr>
<td>RQ</td>
<td>Research Question</td>
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<tr>
<td>SET</td>
<td>Swedish Environmental Technology</td>
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<tr>
<td>SEEA</td>
<td>System of Environmental and Economic Accounting</td>
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</table>
SERIE  System for the Collection of Economic Data on the Environment
SME  Small and Medium Enterprises
Swentec  Swedish National Environmental Technology Council
UNIDO  United Nations Industrial Development Organisation
VC  Venture Capital
WBA  World Bioenergy Association
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1 Introduction

Increasing awareness of the environmental impacts of industrial activity has led to the development of various standards that guide and try to integrate corporate environmental management systems. Companies that are certified and those that are implementing environmental management systems or environmental programs are increasing in number (Marimon et al., 2011).

‘Greening’ or ‘going green’ is a general term for growing environmental awareness related to “a wide variety of entities, including groups, places and organizations” (Robbins, 2001, p, xiv). What greening of companies and corporations means is not clearly described in the literature. The issue of greening is treated among others in the literature on the environmental performance and on the environmental strategies. To link greening activities of a company to its environmental impacts is one solution to better understanding corporate greening.

Environmental and climatic impacts can be divided into two main categories: those related to production process and those related to products, services and processes delivered by a company. These environmental and climatic impacts occur as a result of both direct consumption of resources and direct and indirect emissions that are a consequence of the activities of the company. The use of companies’ products and services by customers can also impact on the environment. The regulatory approach has predominantly focused on reducing resource usage and emissions from production processes (Smink et al., 2007). However, product related environmental impacts are becoming increasingly important. The European Commission’s communication on Integrated Product Policy (IPP) (EU, 2003) and the Framework Directive on the Eco-design of Energy-related Products (EU, 2009) are examples of measures taken to improve the environmental profile of products and to encourage the development of new products with reduced environmental impacts.

Accordingly, traditional environmental programs in most sectors focus on direct, production-related environmental impacts. The design and development of products that have reduced environmental impact is
considered more difficult. This situation is reversed in the environmental technology (ET) sector. The business model of ET companies aims to deliver solutions that improve customers’ environmental performance. Due to the environmental profile of products the sector is regarded as a green one. A question which can be raised here is whether the product related greenness of the ET sector also means that companies in this sector set and implement environmental goals relating to their own activities and manufacturing processes.

Two main reasons for investigating environmental work within the ET and cleantech sectors can be identified. Firstly, if the challenge of sustainability is to be taken seriously, companies that provide products with an environmental profile should be expected to engage in environmental aspects of their own activities. Models of green or sustainable manufacturing and of green or sustainable products include both product and its production (Rusinko, 2007; Bi, 2011; OECD, 2011). Secondly, as these sectors are expanding quickly, their environmental impacts are expected to grow accordingly and should be addressed.

Technological change is central to environmental action and has contributed to solving various environmental problems (Shin et al., 2008). This is especially true for the ET and cleantech sectors. The need for environmental technology has long been associated with the concept of sustainable development (Cerin et al., 2007). There is also strong commitment to ET and cleantech playing crucial roles in meeting global environmental challenges, in particular climate crises, through adaptation of products delivered by these sectors (Caprotti, 2012). Surprisingly, the interest in the environmental impact of the ET and cleantech sectors, i.e. in environmental impact of production of these products is absent. Holtbrügge and Dögl (2012) conducted a systematic overview of the state of corporate environmental responsibility (CER) research published in international management journals from 1997 to 2010. They expressed surprise that most studies focus on heavily polluting environmentally affecting industries, and that environmentally friendly industries such as renewable energy and electric mobility are not covered.

The sector is an influential factor in firms’ environmental engagement and strategies. The literature shows that environmental activities to reduce environmental impacts are more common in ‘environmentally sensitive’ industries than in industries not regarded as environmentally sensitive. The impact of sector influence on firms’ environmental approach in environmentally friendly sectors has not been explored.

This thesis will increase knowledge about environmental work within the ET sector. The thesis will also contribute to further understanding of
corporate greening, with particular focus on i) production and products related aspects, and ii) the influence of the environmental profile of the ET sector on the environmental engagement of companies in the sector.

1.1 Greening of industry

The way industry views the natural environment has changed from viewing environmental engagement as being inimical to business interests to regarding environmental management as a strategic tool for gaining competitive advantage (Esty and Winston, 2006; Hart, 2007; Porter and Reinhardt, 2007). In Sandhu’s words, there has been a shift of paradigms in corporate environmentalism from poachers to gamekeepers (Sandhu, 2010). While the benefits of going green are still discussed, many business organizations treat environmental challenges as not being different from other challenges of managing business. Business are also beginning to recognize that reconciliation is not a choice (Sandhu, 2010); the survival of business is ultimately dependent on maintenance and protection of the natural environment (Hart, 2007; Porter and Reinhardt, 2007) and mitigation of climate change (Wittneben and Kiyar, 2009).

There is an enormous body of research about environmental activities in business organizations in different areas. The collective learning and capabilities of a firm in green innovation and environmental management constitute the firm’s ‘green core competence’ (Chen et al., 2008). Initiatives of companies that aim to reduce the environmental impacts of their activities, usually at levels beyond regulatory compliance, are researched under the umbrellas of a broad range of concepts such as ‘environmental management’, ‘environmental performance’, ‘environmental strategies’, ‘environmental proactivity’, ‘greening of industry’, ‘corporate environmentalism’, ‘ecological/environmental responsibility’, ‘environmental stewardship’, ‘industrial ecology’, ‘clean(er) production/technology’, ‘eco/initiatives’, ‘ecopreneurs’. With the establishment of environmental sustainability as a goal for international action (WCED, 1987), the environmental activities are often studied as ‘sustainability’, ‘sustainable production’, ‘sustainability entrepreneurs’, ‘sustainability reporting’ and ‘sustainability performance’. Companies’ environmental engagement and activities are also often studied under the heading ‘corporate social responsibility’ (CSR). More recently, business’ response to climate change has been in focus and ‘corporate carbon strategies’ (Lee, 2012), ‘climate change accounting’, ‘carbon accounting’ and ‘corporate climate change disclosure’ have been subjects of research.
Acknowledgments

This work was supported by...
The literature on corporate environmentalism is mainly limited to organizations in developed countries (Sandhu et al., 2012), or as Banerjee (2003) put it corporate environmentalism is inherently a Western-centred concept. However, there has been a recent growth in interest in environmental responsiveness in developing countries such as China and India.

Criticisms of corporate environmentalism/greening can be split into four main areas. These are the hijacking of the environmentalism agenda by corporations (Welford, 1997; Brown, 2010); “to what extent corporate greening actually contributes ecological sustainability or whether it does at all” (Kallio and Nordberg, 2006, p. 447) as environmental measurers do not always result in significant improvement of the firm’s environmental impacts (Zsóka, 2008); disinformation about environmental responsibility by companies, i.e. greenwashing (Laufer, 2003); and the lack of critical perspectives in research in the field (Älström et al., 2009).

1.2 Corporate Social Responsibility

Companies’ interactions with society consist of a variety of issues in addition to environmental activities; product safety, ethics, governance, social activities such as philanthropy and community involvement, human rights, and equal opportunities. The term CSR encompasses this variety. The responsibility of corporations is a controversial subject (Ählström, 2010). While Friedman (1967) states that corporations should only be responsible for maximizing profits for the shareholders, others claim that corporations have responsibilities to all stakeholders, and not only to shareholders (Caroll, 1999). The CSR concept refers to the general belief that companies have a responsibility to society that extends beyond the shareholders or investors. For an overview of classifying main CSR theories see Garriga and Melé (2004); for an overview of CSR definitions see Maon et al. (2010).

The EU defines CSR as “a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis” (EU COM, 2001, p. 6). In its renewed strategy for CSR the EC puts forward a new definition of CSR as “the responsibility of enterprises for their impacts on society” (EU COM, 2011a, p. 6). The EC continues “To fully meet their corporate social responsibility, enterprises should have in place a process to integrate social, environmental, ethical, human rights and consumer concerns into their business operations and core strategy in close
collaboration with their stakeholders, with the aim of maximising the
creation of shared value for their owners/shareholders and for their other
stakeholders and society at large; and identifying, preventing and
mitigating their possible adverse impacts” (EU COM, 2011a, p. 6).

Stakeholders play a crucial role in the EU’s definition of CSR, and in
the literature on CSR action. However,”…CSR is not only about
satisfying stakeholders. In order to succeed, it needs to holistically take
into account aspects relating to environmental protection, sustainability
and governance in ways not seen before” (Idowu and Filho, 2009, p. vii).

Greening and making environmental improvements that exceed what
is required by law is a common CSR activity (Egri and Ralston, 2008;
Peloza and Shang, 2011). Compared with other CSR issues,
environmental issues have been gaining a great deal of attention
worldwide, for their global impacts and economic significance.

1.3 Aim

The general aim of this thesis is to understand how product and
production related greening activities are treated in companies in general
and particularly in the ET sector by companies, networks and industry
associations. A more specific aim of this thesis is to study how the en-
vironmental profile of the ET sector influences environmental
engagement at company level.

The specific research questions (RQs) addressing greening in general are:

A) What kind of environmental activities do Sustainability Sector
Leaders communicate? (Paper IV)
B) How can a corporate environmental profile be described?
   (Paper IV)
C) How can ‘green’ and ‘green-green’ business be defined?
   (Paper II)

The specific RQs addressing the ET sector are:

D) Are the companies in the ET sector implementing environmental
   management systems? (Paper I)
E) Are the companies in the ET sector communicating
   environmental issues on their webpages? (Paper II)
F) How are production and product related environmental aspects treated/ communicated within the ET sector; by companies, by networks and by industry associations? (Paper II, Paper III, Paper V)

G) How does the environmental profile of the sector influence the environmental engagement of companies in the sector (Paper II)?

1.4 Thesis outline

This thesis is based on the contribution of five scientific papers. These papers are concerning greening in general (RQ A, B, C) or greening within the ET sector (RQ D, E, F, G). Figure 1 shows how each paper relates to the overall thesis.

*Paper I* addresses the question of differences between product and production aspects in the environmental work and environmental marketing of companies in the ET sector at company level. *Paper II* investigates the production and product dimensions of environmental work and environmental management systems within the ET sector at company level. This paper also highlights the importance of clarity around production and product related environmental aspects in defining the environmental profile within the ET sector as well as in describing environmental leaders. Furthermore, product and production aspects are proposed as base for defining green and green-green business. *Paper III* studied the national and regional initiatives supporting growth of environmental technology in Sweden with focus on environmental related aspects of product and production as well as environmental education initiatives. *Paper IV* examines how production and product related environmental aspects are treated by companies within other sectors and proposes a model of corporate environmental profile. *Paper V* studied environmental leadership in the environmental technology sector at industry level with focus on industry associations.
This thesis comprises 8 chapters as follows:

Chapter 1 Introduces the research area for the appended papers, formulates the aim and presents an outline of the thesis.

Chapter 2 Describes the methodology.

Chapter 3 Sets the context of the thesis and discusses related work. This chapter is divided into two main sections. The first section
focuses on production and product dimensions in the greening of industry and the concepts of ‘green’ and ‘green-green’ business. The second section focuses on the ET sector, defining ET and environmental goods and services (EGS), and presents research about the ET sector.

Chapter 4 Presents the theoretical framework of the thesis and consists of five main sections: Legitimacy theory, Stakeholder theory, Communicating CSR, Firm size and Industry effect.

Chapter 5 Presents results of the research study.

Chapter 6 Discusses the work presented in the thesis.

Chapter 7 Draws final conclusions and summaries.

Chapter 8 Presents a brief overview of potential future research areas related to the work described in the thesis.
2 Methodology

The focus of this research is on greening of industry in general and on environmental work within the ET sector. Environmental initiatives within companies, not only in this sector but in general, consider the environmental impacts of companies. These impacts can be divided into two main categories: those related to production processes and those related to products, services and processes delivered by a company (Groenewegen et al., 1996). The total environmental impact of a company should also include the supply chain (Hart, 1995). The ET sector delivers products that have prominent environmental profiles. However, companies in this sector do not necessarily set and implement environmental goals for their own activities and manufacturing processes. The distinction between production and products is therefore central to the research project in this thesis. Accordingly, production and products are discussed ‘at company level’. ‘Products’ in this context refers to all the products, services and processes/technologies delivered by a company, and production refers to the manufacturing process and activities of the company that result in the delivery of products. The environmental sector includes provision of products for both intermediate and final consumption (Eurostat, 2009), see Figure 2. A product of a company in the ET sector may be a component of production or a part of a process used by another company in creating their own products (intermediate use). The final consumption consists of goods and services used by individual households or the community to satisfy their individual or collective needs or wants.
There is considerable flexibility in the design of environmental management systems (EMS) and the mixture and number of environmental management practices can vary markedly across companies, both in the number and types of adopted practices (Khanna and Anton, 2002). A broad definition of EMS and environmental initiatives is used in the online surveys. Environment related practices such as ‘environmental policy’ and other codes of conduct on environmental issues – including ‘sustainability’, CSR, ‘environmental goals’, ‘certification’, and ‘environmental and sustainability’ reports — as well as ‘production’, ‘processes’, technologies’ and ‘product’ headings on the website, are examined with regard to production and product related environmental aspects.

This great diversity of environmental practices adopted by companies and organizations implies a risk of subjectivity in the content analysis of online surveys, which is one of limitations of this thesis. It should also be emphasized that this research only examines statements the companies make about their environmental work, and does not consider whether they are actually implemented. There are also limitations regarding findings based on information featured on the websites. Firstly, lack of environmental information on the website may not necessarily indicate a lack of environmental action. Some of companies may have established environmental policies or initiated environmental programs that are not disseminated on their websites. Secondly, webpage information can be changed at any time. It should also be mentioned that no information was found about the criteria for including environmental technology companies in networks and platforms studied in this research project.
Table 1 presents an overview of papers and methodologies in this study. The study has started with a questionnaire-based survey (see Appendix 1), and continued with online surveys. The web is a strategic tool for corporate responsibility (Esrock and Geichty, 1998; Wanderley et al., 2008; Lundquist, 2009; Lundquist, 2012) and there is increasing research into issues relating to communicating CSR on the web (Groschl, 2011; Morhardt, 2010; Hynes and Janson, 2007; Williams, 2008) and into whether corporations are fully exploiting the potential of the web for their CSR communication (Esrock and Geichty, 1998; Coope, 2004; Adams and Frost, 2006; Lundquist, 2009; Lunquist, 2012).

In the final stage of research the semi-structured open-ended interviews (Burns, 2000) with companies’ representatives (see Appendix 2) as well as industry associations (see Appendix 3) were carried out.

Table 1  Overview of surveys in this thesis.

<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Type of survey</td>
<td>Questionnaire-based</td>
<td>Online survey</td>
<td>Online survey</td>
<td>Online survey, interviews</td>
<td>Online survey, interviews</td>
</tr>
<tr>
<td>Platform</td>
<td>Sustainability Sweden</td>
<td>Swentec</td>
<td>Swentec</td>
<td>Sustainability Sector Leaders 2009</td>
<td>Sustainability Sector Leaders 2009</td>
</tr>
<tr>
<td>Amount companies/organizations investigated</td>
<td>53 respondents (150 sample)</td>
<td>331</td>
<td>10</td>
<td>19</td>
<td>4 Industry associations 8 companies</td>
</tr>
<tr>
<td>Type of companies/organizations</td>
<td>SMEs</td>
<td>5 segments: -Waste Management and Recycling -Solar Energy Technology -Wind Energy Technology -Bioenergy -Environmental Training and Information</td>
<td>3 national networks 7 regional networks</td>
<td>19 sectors: Automobiles and Parts Banks Basic Resources Chemicals Construction and Materials Financial Services Food and Beverage Health Care Industrial Goods and Services Insurance Media Oil and Gas Personal and Household Goods Real Estate Retail Technology Telecommunication Travel and Leisure Utilities</td>
<td>4 segments : -Waste management and recycling -Solar Energy Technology -Wind Energy Technology -Bioenergy</td>
</tr>
</tbody>
</table>

Four of the papers, Papers I, II, III and V, are directed at the ET sector. As the results of studies directed at the ET sector show that there is a
fairly low level of awareness of the production and product related dimensions of the environmental profile it was interesting to examine how production and product related environmental dimensions are treated by companies within other sectors. *Paper IV* is directed at 19 companies ranked as Global Supersector Leaders 2009/2010 in the DJSI. For an overview of companies and sectors see Table 10 in Chapter 5.

The organizations studied within the ET sector were identified using existing platforms for companies within this sector; Sustainability Sweden and Swentec. Sustainability Sweden (SS, 2007) was part of Dagens Miljö (DM 2007), launched 2003 by the International Data Group (IDG). The listed companies, organizations and investors were divided into 13 categories: Air Purification, Chemical Management, Water and Wastewater Treatment, Energy (and subsectors), Solid Waste, Recycling, Soil Restoration, Environmental Consulting, Infrastructure Services, Commodity and Processing Industry Services, Construction Industry, Knowledge Brokering, Agencies and Organizations, Others. This platform is no longer in use. However, in 2007 IDG acquired the journal Miljöaktuellt from the Swedish Environmental Protection Agency and there was a merger with Dagens Miljö.

Sventec was a national centre for ET between 2005 and 2010, providing a national portal. There were about 900 companies listed on Sventec, divided into 20 segments or business areas (see Table 6 in Chapter 3). The Swedish Agency for Economic and Regional Growth has responsibility for the platform and on 13th March 2012 it was announced that the platform was under development (Sventec, 2012).

Recently, IDG in cooperation with Miljöaktuellt has been developing information on environmental technology in Sweden, partly using the platform developed by the Swentec. This is further described under section 3.2.4 Supporting environmental technology in Sweden.

The study of the ET sector, with the exception of Paper I, investigated specific segments: Waste Management and Recycling as a mature subsector; and Solar Energy Technology, Wind Energy Technology and Bioenergy Fuels as examples of new technologies. In Paper II, Environmental Training and Information was also included. This segment was chosen because it can indicate increased engagement in environmental issues as well as increased motivation to communicate this engagement. *Papers II and V* were directed at companies. As ecological modernization requires not just changes at the level of firms but also broader sectoral and institutional shifts (Gibbs, 2010), surveys of supporting national and regional networks (*Paper III*) as well as of industry associations (*Paper V*) were also included in this research project.
The methodologies used in papers included in this thesis follow. Paper I studied companies listed in Sustainability Sweden and is based on a questionnaire (see Appendix 1). At the time the survey was carried out there were 214 companies listed on the Sustainability Sweden website. Two further selection criteria were: i) that the enterprise has more than 2 employees (in order to apply the CSR issues such as workplace conditions), and ii) that the enterprise was established after 1960 (the interest is in the modern ET sector). A total of 148 companies in the list fitted these criteria. Two companies – one that had one employee and another that was founded before 1960, were added, bringing the sample to 150 companies.

The questionnaire was based on the Awareness Raising Questionnaire, which is part of a toolkit provided by the European Commission to stimulate CSR within small and medium sized companies (SMEs) (EC, 2007). The questionnaire consists of six sections and questions from the EU questionnaire. Questions related to the research focus on environmental work in the ETS sector, formulated by the author of this thesis, are found in the section about company details and in the section about environmental policies and are marked with italics in Appendix 1. Four sections, concerning workplace policy, marketplace policy, community policy and company values, were unchanged from the EC toolkit. The printed questionnaire was mailed to the sample of 150 companies. 53 companies responded to the survey. No further initiatives were undertaken to encourage companies to answer the questionnaire. The results of this survey are compared with results of other surveys of environmental issues in small enterprises in Sweden (Nutek, 2003; Alexandrova and Perunicic, 2007; Anadol et al., 2007).

Paper II is based on an online survey of companies listed at Swentec, as of March 13, 2009. The investigation was performed in two steps. First, the presence of environment related information on websites of all companies listed in five segments was investigated: Waste Management and Recycling, Solar Energy Technology, Wind Energy Technology, Bioenergy Fuels and Environmental Training and Information. In total 331 company websites were examined. In the second step, all environment related information on company websites (including headings, text and all documents available online and for download) were studied and analysed in detail with a focus on the product and production related environmental initiatives. Because of time limitations, the study in this step was limited to 3 subsectors; Waste Management and Recycling (WM&R) as a mature subsector, Solar Energy Technology (SET) and Wind Energy Technology (WET) as new technologies. In total 200 out of the 331 companies studied in the first step of the survey were
investigated. These companies are referred to according to their position in Swentec list and the subsector. For example, 8 SET means the 8th company in the Solar Energy Technology list.

Paper III compared aspects of greening such as production and product related environmental aspects and environmental education in the ET sector and in the ecotourism sector, as examples of two environmentally driven business sectors. This thesis only presents results regarding the ET sector based on online surveys of regional and national networks that support the ET sector, listed at Swentec as of 10 February 2010. In all, 31 organizations were listed. National and regional initiatives with holistic ET orientations were selected for the study, three national level organizations and 7 regional initiatives. For comparison, other organizations such as subsector oriented organizations were not included. The webpages of networks were studied according the language, product and production related information both in the presentation of the organizations and of members, and education related information. Membership numbers of organizations were collected via mail and telephone contacts.

Paper V investigates the character of ecopreneurship in the ET sector, with focus on environmental responsibility and environmental leadership at both the company and sector level in four ET subsectors: Waste Management and Recycling, Bioenergy Fuels, Wind Energy Technology and Solar Energy Technology. The survey is based on semi-structured open-ended personal and telephone interviews (see Appendix 2 and 3). In this research project the different interview modes were assumed to not inherently yield different results (see Sturges and Hanrahan (2004) for an overview of comparing telephone and face-to-face qualitative interviewing).

Personal interviews were conducted with representatives of industry associations of Waste Management and Recycling and Wind Energy; and telephone interviews were conducted with representatives of industry associations of Bioenergy Fuels and Solar Energy Technology and all companies studied (see Appendix 3). The environment related information and statements on the websites of all organizations were also surveyed. The companies were identified at the Swentec website, separately from previous studies within this research project.

Notes were taken during the discussions but the interviews were also recorded. In addition to the prepared questions, interviewees were always asked for additional comments. Interviews lasted approximately 45 minutes each. All representatives of industry associations interviewed were asked to read the material written about the organizations following
the interviews. In the case of Solar Energy Association the information was completed according to the subsequent comments. Some results in this thesis are based on interviews with the representatives of industry associations that are not presented in Paper V (Table 20 in Chapter 5, depicting vision/goals, crucial issues and problems areas presented).

Paper IV studied description and reporting of environmental issues, with focus on product and production related aspects, among 19 companies ranked as Global Supersector Leaders 2009/2010 in the DJSI. Company websites and information available online were analysed for evidence of CSR (often also referred to as corporate responsibility (CR)), sustainability, corporate citizenship and environmental variables as well as production and product related environmental impacts and initiatives. A broad range of initiatives was included in the consideration of environmental dimensions of sustainability, including environment related websites, information about environmental issues under other headings, sustainability reports and other documents.

The data relating to CSR and environmental issues on the websites of the 19 Global Supersector Leaders were analysed in two ways. The first method related to the placement of CSR/sustainability and environmental information on the corporate website, and the headings in these sections. The placement on the corporate website gives a measure of how easily visible the CSR and environmental issues are in relation to other content (Coope, 2004; Lundquist, 2009). The second method was the content analysis of the environmental information with a focus on production and product related impacts. As “people won’t read lengthy pdf:s” (Coope, 2004, p. 21) Appendix 4 includes the headings of websites in order to provide an overview of the key CSR issues from the perspective of the companies. As stakeholder orientation is one of the trends within CSR, table in Appendix 5, which shows results from the survey of sustainability reports, includes “stakeholder engagement”.

This research project started with a questionnaire-based survey, and continued with online surveys and semi-structured open-ended interviews. Interviews were chosen as a means of gathering in-depth information. Semi-structured and open-ended interviews enabled the collection of information to be supplemented according to the receipt and response of the interview (Kumar, 1999). Compared to the online surveys, the questionnaire has a major disadvantage of a high risk of a low response rate. The web surveys enabled an increased sample size. For example, in this study, of the sample of 150 companies, 53 companies responded to the questionnaire, while webpages of 331 companies were studied. Interviews are more comprehensive than
surveys, and the interviewer can ensure that all questions are answered, but they are more time consuming and there is a danger of interview bias (Kumar, 1999) and researcher interaction bias (Miyazaki and Taylor, 2007). In the present study psychological characteristics, and especially the researcher’s attitudes toward the issues being studied can be potential sources of bias in the data collection process (Miyazaki and Taylor, 2008). Moreover, social desirability biases can appear in both questionnaires and in interviews. These may manifest themselves in the present study as over-claiming regarding the environmental engagement of the respondents (Brace, 2004). Due to the size effect (see Chapter 4.4) there is of course a big difference between information available online on webpages of big corporations ranked as sustainability leaders and SMEs within the ET sector. There is also a difference in this respect between companies and industry associations within the ET sector. The industry associations publish a large amount of information on their webpages and the interviews do not reveal much additional information as they do in the case of the companies studied within the ET sector.
3 Background and Related Work

3.1 Greening of industry with focus on production and product dimensions

As previously mentioned there is no agreed upon definition of greening. Linking greening to product and production related impacts can be a way to specify greening of industry and companies. This notion has support both within academia and the public sector. Remmen (2001) states that the greening of industry can be defined as companies taking responsibility for the environmental impacts from their production processes and products. According to UNIDO (2011, p. 8) ‘greening industry’ means “long-term focus on continuously improving environmental performance regardless of sector, size or location”.

There is a lot of research with focus either on production, such as ‘sustainable manufacturing’ and ‘green manufacturing’ (Bi, 2011; OECD, 2011) or on the product such as ‘product stewardship’, ‘sustainable products’ (Maxwell and van der Vorst, 2003), and ‘eco-friendly products’. Despite their names, the definitions of these concepts tend to take a holistic view, including both products and production of products. The manufacturing of the product is a part of sustainable product development (Maxwell and van der Vorst, 2003), and product stewardship is a part of environmental manufacturing (Madu et al., 2001; Rusinko, 2007). In more recently published paper the sustainable manufacturing is described as modelling and optimizing at product, process and systems level; there process refers to manufacturing process (Jayal et al., 2010). Irrespective of the ‘green products’ or ‘green manufacturing’ focus, the models advocate ‘green manufacturing of green product’.

However, production and product related environmental aspects are touched upon rather inconclusively in the literature. In some fields, such as ‘environmental innovation’ (Chen et al., 2006), ‘green marketing’ (Prakash, 2002), and as mentioned above, ‘environmental performance’, this distinction is clearly established. Other examples can be found in discussions on ‘environmental leadership’ (Dechant and Altman, 1994),
‘environmental improvement options’ (van Berkel and van Kampen, 2001) and in such fields as ecopreneurship (Schaltegger, 2002; Schaper, 2010), ‘environmental accounting’ (Perrini and Tencati, 2006), ‘sustainable consumption and production’ (Clark, 2007), and more recently ‘environmental information management’ (Erlandsson and Tillman, 2009) and ‘greenwashing’ (Delmas and Burbano, 2011). A systematic review by Peloza and Shang (2011), “How can corporate social responsibility activities create value for stakeholders?”, categorizes CSR philanthropy as the dominant category of CSR activities, and the next most common category of CSR activities includes those related to business practices. This category is characterized by a wide variety of CSR activities. Notably, environmental protection practices by companies represent the most popular form of business practice.

In some cases the distinction is clearly mentioned in general descriptions but is not implied in the survey. For example, in their research about environmental leaders, Runhaar et al. (2008, p. 176) state that “these leaders prove that high performance with clean production processes and clean products is in fact feasible, profitable and demanded by consumers”. However, they do not use the production and product dimensions to describe “backgrounds of environmental leadership” of identified companies, nor are they used in the presented typology of environmental leaders.

There is little empirical research in the literature that distinguishes between production and product related aspects. Smink et al. (2007) investigated the interplay between process and product oriented environmental policies in the car industry. These authors found that the corporate environmental strategies of both BMW and GM are based on a process-oriented strategy that is supplemented with product-oriented initiatives. The initiatives are implemented singly and are not fully coordinated with other environmental efforts. Gilley et al. (2000) proposed ‘process-driven’ and ‘product-driven’ dimensions as two generic types of environmental initiatives. They studied the effects of these two types of environmental initiatives on economic performance. Their results indicated that the different types of initiatives have distinct implications. Investors react significantly more positively to announcements of product-driven environmental initiatives than to announcements of process-driven initiatives. Furthermore, the authors suggested that product-driven initiatives are likely to lead to improvements in the environmental impacts of processes.

Chen et al. (2006) investigated the role of green innovation in corporate competitive advantage through a survey of Taiwanese
companies operating in the information and electronics industries. This study divided green innovation into ‘green process innovation’ and ‘green product innovation’. The authors found that the performance of green product and green process innovation are both positively correlated to competitive advantage. Vachon and Klassen (2008) examined the relation between environmental collaboration in the supply chain and manufacturing performance and found that upstream practices were more closely linked with process-based performance, while downstream collaboration was associated with product-based performance.

3.1.1 Environmental performance and environmental reporting

Environmental impacts of companies are the main subject for greening of industry. A wide variety of tools is used to monitor and manage the environmental impacts of business activities. These environmental impacts can be divided into two main categories: those related to production process (manufacturing) and those related to products, services and processes (Groenewegen et al., 1996, p. 171).

Accordingly, the “…measure of a firm’s environmental performance is the sum of environmental attributes of its products and processes” (First and Khetriwal, 2010). The early frameworks of environmental performance indicators were presented by Azzone et al. (1996) and Thoresen (1999). First and Khetriwal (2010) developed a framework most recently. This framework is presented in Table 2. In all above mentioned frameworks the production and product related aspects are present.

Table 2  Four main indicators measuring environmental performance.

<table>
<thead>
<tr>
<th>Environmental performance</th>
<th>Examples of variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental sustainability of the production process</td>
<td>Deployment of environmental management system, certifications, existing green purchasing and supplier programs</td>
</tr>
<tr>
<td>Environmental characteristics of the products</td>
<td>Design for environment, ecolabels to reduce impact during the use phase</td>
</tr>
<tr>
<td>Transparency and managerial oversight of the firm’s environmental activities</td>
<td>Consistency and quality of environmental reporting, engagement of top management in environmental decision making</td>
</tr>
<tr>
<td>External recognition of environmental efforts</td>
<td>Receiving environmental /sustainability awards and ranking</td>
</tr>
</tbody>
</table>

Source: Adopted from First and Khetriwal (2010)
Companies can report on environmental issues in two contexts: i) mandatory reports – such as annual accounts, and/or ii) voluntary reports – such as environmental reports, based on ISO 14000 or the EU Eco Management and Audit Scheme (EMAS), or Sustainability or Corporate Responsibility reports which are often based on the Global Reporting Initiative (GRI). Environmental management systems can be certified according to the global standard ISO 14001 or the European Regulation EMAS. GRI is the best known framework for voluntary reporting of environmental and social performance by business and other organizations worldwide (Sjenjwald Brown et al., 2009). There are also industry specific initiatives and programmes, such as the chemical industry’s Responsible Care Program (King and Lenox, 2000).

Production and product related environmental impacts are treated in different ways in different tools and guidelines, and are not always clearly defined (Table 3). In general, production related aspects are considered more frequently than product related aspects. GRI comprises 28 indicators which focus on production and two which focus on products and services (GRI, 2000–2006). Reporting Guidelines for UK Business (Defra, 2006) lists 22 production related indicators while environmental performance of products and the supply chain are considered in additional sections1. These Reporting Guidelines exhort every business to “consider reporting on how it influences the environmental performance of its supply chain and products” (Defra, 2006, p.19). The environmental section of Swedish Annual Accounts only requires audits of production related environmental impacts. The ISO 14000 series covers both production and product related environmental impacts, but very explicitly. The standards in the ISO 14000 series fall into two major groups: organization-oriented standards, and product-oriented standards. According to ISO 14001:2004 an organization has to identify and control environmental impacts of “its activities, products or services”.

Table 3 Production and product related dimensions in selected tools for environmental work.

<table>
<thead>
<tr>
<th>Regulation/Tools</th>
<th>Production dimension</th>
<th>Product dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Swedish Annual Accounts</td>
<td>Environmental perspective</td>
<td>Missing</td>
</tr>
<tr>
<td>(ÅRL) (mandatory)</td>
<td>Chapter 6, Article 1, Section 4</td>
<td></td>
</tr>
</tbody>
</table>

1. During 2012 a revision of guidance was conducted and the final version of the guidance was due to be published in December 2012 (Defra, 2012a).
There is a growing trend going from voluntary reporting and self-regulation to mandatory corporate sustainability reporting (MCSR) (Economist Intelligence Unit Limited, 2010), with country specific regulatory development (Vormedal and Ruud, 2009). Some countries have introduced legal reporting requirements in some form (Vormedal and Ruud, 2009; Ioannou and Serafeim, 2012). For example, all Norwegian-registered firms are liable under the Norwegian Accounting Act (Vormedal and Ruud, 2009), while the Swedish Accounting Act only requires companies to report when disclosure on the external or working environment is deemed necessary to attain an understanding of the company’s development, position and results. In some case, such as in Sweden, adopting the MCSR is mandatory for state-owned companies. Examples of countries that adopt a MCSR law are Denmark, Norway, China, Brazil, India and USA (MiljöRapporten, 2012).

Furthermore, there is a growing focus on climate change. In April 2013, the UK will be the first country to make it compulsory for companies to include greenhouse gas emissions data for their entire organization in their annual reports (Defra, 2012b).

### 3.1.2 Environmental models and strategies

Increasing complexity and diversity in the practice of greening and environmental management has resulted in attempts to characterize companies’ environmental action by both academics and practitioners. A number of researchers in the environment and business field have developed typologies of environmental management and environmental strategy. González-Benito and González-Benito (2006) provide a functional classification of voluntary environmental activities in companies consisting of three categories: 1) planning and organizational practices; 2)

<table>
<thead>
<tr>
<th>Regulation/Tools</th>
<th>Production dimension</th>
<th>Product dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRI (voluntary)</td>
<td>Environment Performance Indicators (30) 28 quantities indicators</td>
<td>2 indicators (EN26,EN27); one (EN26) is both quantitative and qualitative</td>
</tr>
<tr>
<td>Environmental Key Performance Reporting Guidelines for UK Business (voluntary)</td>
<td>22 production related indicators: Emissions to air (6) Emissions to water (2) Emissions to land (5) Resource use (9)</td>
<td>Environmental performance of products as additional section</td>
</tr>
</tbody>
</table>

Source: Guziana (2010)
operational practices; and 3) communications practices. The operational practices can be product-related (practices that focus on designing and developing more environmentally conscious products) and process-related (practices that focus on the development and implementation of more environmentally conscious manufacturing and operational methods and processes).

There are several reviews of environmental management and environmental strategies (Hass, 1996; Tilley, 1999; Sharma and Ruud, 2003). Models for environmental management strategies fall into two main groups: (i) a progression approach – with stages/phases along a continuum, that identifies a development in time; or (ii) a categorical approach – consisting of conceptually derived interrelated sets of ideal types (Hass, 1996; Cramer, 1998; Kolk and Mauser, 2002). Different organizations are and will be at different stages of environmental responsiveness. Researchers have developed phase models to describe an evolutionary progression from little or no action to being leading edge companies. One of the most recent phase models is a framework developed by Dunphy et al., (2007). The progression approach can be compared with ‘path dependence’ between strategies (Hart, 1995), or automorphism, where companies imitate their old strategies in order to manage new environmental demands (Schwartz, 1997; 2006/2009). However, applicability of environmental management classification schemes is consequently questioned, as most companies cannot be placed in a single stage (Kolk and Mauser, 2002). Greening can thus be viewed as a dynamic process. “Companies do not become “green”, they become “greener” (Miller and Szekely, 1995, p. 403) and “Going green is a constant learning path. There will be a learning curve for every individual and every organization” (Chen et al., 2008, p. 198).

The most recent comprehensive review of models identified in the literature, conducted by Kolk and Mauser (2002), examines the literature between 1987 and 2000. According to this review few models are ‘pure’ typology models, whereas most environmental management models are ‘stage or phase’ models with between three and five stages. The product and/or production-perspective is explicit in the ‘title’ and/or in ‘designation of stages/positions’ in only a few of the models (Table 4). For example, Hart (1995) developed a theory of competitive advantage based on the relationship of the company with the natural environment, a

2. More recent literature overviews have considered research trends in resource and environmental management (Maysami et al., 2009), and links between quality management, environmental management and firm performance (Molina-Azorín et al., 2009).
natural-resource-based view (NRBV) of firms, and described three interlinking strategies: ‘pollution prevention’, ‘product stewardship’ and ‘sustainable development’. ‘Pollution prevention’ is process oriented, whereas ‘product stewardship’ minimises the lifetime environmental costs of products. Accordingly, Hart proposed two alternative scenarios: i) ‘path dependence’, and ii) ‘embeddedness’. ‘Path dependence’ suggests a sequential logic linking the three strategies (e.g. product stewardship is dependent on prior capabilities in pollution prevention), whereas ‘embeddedness’ suggests synergies between strategies (e.g. product stewardship is one of the most effective ways of pollution prevention). Firms that take a purely sequential path may fail to take advantage of the synergies that exist across the strategies (Hart, 1995). The reviewing of the NRBV fifteen years later (Hart and Dowell, 2011) resulted in four strategic capabilities: pollution prevention, product stewardship, clean technology and base of pyramid. The area sustainable development strategy has been separated into two distinct areas: clean technology and Base of Pyramid (BoP). These two areas are related to viewing sustainable development as a multidimensional opportunity and have been developed from sustainable-values framework (Hart and Milstein, 2003) and from concept BoP (Prahald and Hart, 2002). This concept advocates the idea that huge opportunities and economic growth could be created if global businesses began focusing on the poor as potential customers (Prahald and Hart, 2002).

**Table 4**  Examples on environmental management models with production and product orientation.

<table>
<thead>
<tr>
<th>Title of the model (type)</th>
<th>Designation of stages/positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lee and Green (1994)</td>
<td>Strategic options for green product development (typology)</td>
</tr>
<tr>
<td></td>
<td>Do nothing or phase out; Generic strategies; Diversification; Remedy, Tonic; Bread-and butter; Nimble; Leadership; Pioneer.</td>
</tr>
<tr>
<td>Cramer and Jansen (1995)</td>
<td>Stages of technological innovation (continuum)</td>
</tr>
<tr>
<td></td>
<td>Optimization of production and products; Further renewal production technology; Function-oriented innovations.</td>
</tr>
<tr>
<td>Hart (1997)</td>
<td>Environmental Strategy (continuum)</td>
</tr>
<tr>
<td></td>
<td>Pollution prevention; Product stewardship; Sustainable Development.</td>
</tr>
<tr>
<td>Hart and Dowell (2011)</td>
<td>Strategic capability</td>
</tr>
<tr>
<td></td>
<td>Pollution prevention; Product stewardship; Clean technology; Base of pyramid.</td>
</tr>
</tbody>
</table>

Source: Adapted from Kolk and Mauser (2002) and Hart and Dowell (2011)
3.1.3 Green, green-green business and ecopreneurs

Robert Isaak (1998) contributed to the development of theories of corporate greening with his theory on ‘green logic’ and the distinction between ‘green’ and ‘green-green’ businesses. This distinction is based on when, in relation to the founding of a firm the greening takes place – after or concurrent with the founding. ‘Green’ businesses are businesses that discover the cost, innovation and marketing advantages (if not the ethical arguments) of greening their existing enterprise. ‘Green-green’ businesses are businesses that are environmentally friendly from conception, and that strive for a ‘social and ethical transformation of that particular business sector’ (Isaak, 1998, p. 87).

Entrepreneurs are individuals who conceive new business opportunities and take the risk required to convert those ideas into reality. Greening and the adaptation of environmentally responsible business practices can provide an additional range of opportunities for entrepreneurs, such as “development of new products and services, improving the efficiency of existing firms, new methods of marketing; reconfiguring existing business models and practices and so forth” (Schaper, 2010, p. 11).

Several definitions of ecopreneurship can be found in the literature, among others such as ‘entrepreneurship through environmental lenses’ (Schaltegger, 2002), ‘entrepreneurial activity that benefits environment’ (Hedrickson and Tuttle, 1997) or ‘a process by which entrepreneurs introduce eco-friendly (or relatively more eco-friendly) products and process in to the market place’ (Pastiaka, 2002).

There are different approaches to categorise ecopreneurs and sustainability entrepreneurs and there are different criteria for these categorizing. The values and motives of ecopreneurs is a key dimension. For example Pastakia (1998) distinguished between commercial and social ecopreneurs, Linnanen (2002) distinguished between ecopreneurs with a desire to change a world and those with a desire to make money.

Accordingly, the dichotomy between accidental ecopreneurs, opportunists, and those driven more by nonprofit value is well established. The opportunists are rather recent entrants among ecopreneurs and are likely to be involved in ET, which provides the most directs promises for the economics of scale (Linnanen, 2002). It should be added here that even ‘opportunistically green’ or ‘accidentally green’ entrepreneurs contribute to a sustainable society (Walley and Taylor, 2002); and a variety of entrepreneurship is required for development towards a sustainable society (Lindhult, 2009). The green and sustainability entrepreneurship has potential to be a major force in the...
transition to a more sustainable business paradigm because of the leading role which they provide to other firms (Schaper, 2010), by demonstrating economic benefits which come from being greener (Schaper, 2010), and by example in creating social and environmental health (Tilley and Young, 2009).

Based on his distinction between green and green-green businesses Isaiak defines ‘ecopreneurs’ as those individuals who seek out and set up ‘green-green’ businesses. Examples of other criteria used for categorizing ecopreneurs are as following: responding to market failures (Dean and McMullen, 2007), markets effects of the business (Schaltegger, 2002), dimensions of sustainability (Tilley and Young, 2009).

Walley and Taylor (2002) presented a classification of green entrepreneurs based on the work of Isaak. However, their emphasis on business greening was based on the process- and product-orientation, and not the timing of the greening as in the Isaak classification. According to this classification, there are two types ‘green businesses’ – those founded on ‘green processes’ and those with ‘green products’. Furthermore, while Isaak suggests that ‘ecopreneurs’ pursue social and ecological goals by means of profit-oriented organization, Walley and Taylor (2002), turning this definition around, suggest that ‘ecopreneurs’ are those ‘green entrepreneurs’ who pursue profit goals by means of ecological or socially oriented businesses. According to this definition a growing number of companies within the ET industry could be classed as ‘ecopreneurs’.

3.2 Environmental technology

The ET sector arose from environmental protection expenditure by the private and public sectors to ensure compliance with environmental regulation or improve resource management (traditional ET sector). These days the focus is on contributions to sustainable development, economic growth, job creation and innovation. The climate change debate has raised interest in low carbon technology and clean technology, and the ‘cleantech’ concept is becoming increasingly common within the environmental area. ‘Environmental technology’ is a collective term for a large number of specialties that were previously distributed over a number of sectors. ET sector is now regarded as a sector or industry in its own right but is difficult to define as it is interdisciplinary. A variety of terms are used interchangeably with or related to ET which describe a sector which aims to provide technologies, goods and services that are less environmentally damaging than existing and/or to treat and prevent
environmental damage. Examples of these terms are: ‘environmental industry’ (EI), ‘eco-industry’, ‘environmental good and service sector (EGSS)’, ‘environmentally sound technologies’ (EST), environmentally preferable products (EPPs), ‘green technology’, ‘green industry’, ‘green companies’, ‘green jobs’, ‘eco-innovation’, ‘clean technology’ and ‘low carbon technology’. After an initial fast growth period in the 1970s and 1980s, the growth of the environmental industry slowed down, stabilised and showed signs of consolidation at the end of the 1990s (Diener and Terkla, 2000). A renewed urgency has been seen since 2006 as a result of the scientific consensus, media attention and political interest in global warming. The ET industry or ‘cleantech’ industry is now one of the fastest growing industries in the world (Concordia University, 2012). 2010 the global market for ET industry and cleantech was estimated at roughly EUR 1.15 trillion a year and there is broad consensus that the global market could almost double, with the average estimate for 2020 being around EUR 2 trillion a year (Ecorys, 2012).

3.2.1 Traditional ET and cleantech

In contrast with the distinction between ET and EGS, the difference between ‘traditional’ ET and ‘cleantech’ is more established. Cleantech refers both to a sector and to an investment category. The cleantech sector was born in the early 2000s and has developed rapidly over the following decade (Caprotti, 2012). By the end of 2010 the term ‘cleantech revolution’ had become widely used (Caprotti, 2012).

The difference between ET and ‘clean technology’ is that ET has represented ‘end-of-pipe’ technologies in the past, essentially policy or legislation-driven, with limited opportunity for attractive returns and representing small markets. Cleantech is market-driven and seen in terms of economic opportunity (Caprotti, 2012). Accordingly, “the modus operandi of today’s cleantech companies is first to provide competitive returns for investors, and second to deliver solutions to global environmental problems” (Stack, 2007, p. 21).

In Sweden both terms are used interchangeably. According to a survey conducted in 2008, there were still those who regarded ‘cleantech’ as meaning the same as ‘environmental technologies’ (Nutek, 2008). Currently, the term cleantech is used more frequently. Swentec used ‘cleantech’ as a direct translation of ‘miljöteknik, i.e. ‘environmental technology’ in Swedish, and ‘cleantech’ in English (Swentec, 2009). The Swedish Trade Council uses the term ‘environmental technology’ (Exportrådet, 2012). The Swedish Energy Agency in its report “Swedish
cleantech opportunities. A market overview from the Swedish Energy Agency” (2010) mostly used the term ‘cleantech’, but a table showing the largest importers of Swedish environmental technology is available in the report. The Energy Agency explains that the term cleantech is ”an abbreviation of clean technologies and refers to energy and environment-related technologies developed with the objective of reducing harmful effects on the environment. The sectors included in the cleantech concept are energy, transport, waste, agriculture, water and air” (Energy Agency, 2010). This description of cleantech is in line with the broader term ‘environmental sector’ used by Swedish Statistics (SCB, 2012), which as well as environmental technology also includes sustainable agriculture and fishing, sustainable forestry and ecotourism (Growth Analysis, 2011).

According to Nutek (2008), the term ‘cleantech’ is used within trade and industry, while the statistics come under “cleaner technologies and products” as in the OECD/Eurostat manual (1999).

For the purpose of this thesis the distinction between environmental technology and cleantech is not relevant. The term ET sector used in the thesis includes both traditional environmental technology and cleantech.

3.2.2 Defining environmental technology and environmental goods and services

Although a new generation of ET is emerging, it is relatively new as an academic field. The literature does not provide internationally agreed definitions or classifications of ET sector; EGS or cleantech and different definitions and classifications are in use. The ET and EGS are difficult to identify and classify while they are continually developing in new and often unexpected directions. The environmentally driven markets are dynamic (Nutek, 2008) and ET constantly evolving (World Bank, 2007). Traditionally, the emphasis of the industry has been to ‘clean up the mess,’ and ‘end-of-pipe’ activities. These traditional areas of waste management and recycling are mature industries. New technologies move the emphasis towards more proactive clean technology.

The ‘environmental industry’ has no clear statistical status (Andreasson et al., 2008). As a result of entrenched statistical boundaries the ’environmental industry’ has been underestimated, and is an “invisible industry” in terms of statistics and sector analysis (Jänicke and Zieschank, 2008). Precise definitions are required not only for statistics, but also to facilitate comparisons and to prevent incorrect interpretation of results (Nutek, 2008). Furthermore, defining EGS is important for
trade liberalisation. The concept of EGS\(^3\) was established in the trade literature by the push to treat EGS issues as distinct within trade negotiations and therefore, required decisions about the products and services that could be classified as EGS (OECD, 2005). The disagreement over which goods to include is one of main barriers in the negotiations (Cosby \textit{et al.}, 2010; Monkelbaan, 2011; Laborde and Laktatos, 2012). For overview on issues in liberalization of EGS see among other Steenblik, 2005; World Bank, 2007; Monkelbaan, 2011; Laborde and Laktatos, 2012.

There are two commonly acknowledged early attempts at defining the environmental industry. Shrivastava (1995) provided a first definition from an academic perspective and the Organisation for Economic Cooperation and Development (OECD) in cooperation with the Statistical Office of the European Communities, Eurostat (OECD/ Eurostat, 1999)\(^4\) provided a definition from a public sector perspective. The EU adopted the 2004 European Environmental Technologies Action Plan (ETAP)\(^5\) which included a definition of ET (EU, 2004). OECD’s and APEC’s lists of environmental goods are examples of work within trade liberalization (Steenblik, 2005).

Table 5 presents examples of definitions of environmental technology from academia, public sector and organizations (see also Cerin \textit{et al.}, 2007 for an overview of different definitions of environmental technology where environmental infrastructure as a subsector is highlighted). The majority of definitions cover subsectors. The early definitions are more detailed about both subsectors and the environmental improvements they provide. Some definitions have adjusted to include new concepts. The definition of Jänicke and Zieschank (2008) interprets the OECD/Eurostart definition (1999) with up to date concepts such as ‘integrated resource management’ and ‘eco-efficient production and consumption’. The definition of Diener and Terkla (2000) relates closely to that of cleantech as it includes ‘resource efficiency’ and ‘higher productivity’. This definition also includes the sustainability axiom ‘sustainable economic growth’. The term ‘environmental quality’ is used in a few cases (Kemp, 1997; Ramakrishnan, 2004). Kemp (1997) speaks of

\(^3\) It can be added here that the concept of EGS is also well established in ecosystems literature and refers to goods and services produced by ecosystems where their economic value is an important area of concern.

\(^4\) 2009 a new handbook was approved by the Eurostat Working Group on Environmental Expenditure statistics (EUROSTAT, 2009).

\(^5\) On the webpage for the ETAP there is now link to the information about new eco-innovation action plan (ECO-AP) (http://ec.europa.eu/environment/etap/; 2012.05.05). The ECO-AP is a successor of the ETAP (EU, 2011b).
“conserving or restoring environmental qualities”, while Ramakrishnan (2004) uses “improvements in environmental quality”. The term ‘environmental quality’ is the basis for the definition of ‘green jobs’ (UNEP/ILo, 2008).

Kuehr (2007) criticises the commonly used OECD/Eurostat definitions of ET as being too broad and suggests tentative operational definitions. Kuehr defines ET within four categories, which differ in their ecological effectiveness, from measuring, through cleansing, cleaner to clean technology. This definition emphasises ‘continuous improvement’. Kuehr was however misleading about the OECD definition. ET is defined by the OECD in “Environmental Goods and Services Industry. Manual for data collection and analysis” (OECD/Eurostat, 1999) and this definition includes both “end-of pipe” and “cleansing technologies”. The ‘Pollution Management’ group is one of three groups within EGS industry, contrary to Kuehr’s statement.

ET and clean technology are relative concepts, and are defined in relation to other solutions and alternatives as providing better options from an environmental point of view (Nutek, 2008). The definition of ‘environmentally sound technologies’ (UNCED, 1992) expresses clearly that ‘environmental soundness’ is relative. Early definitions of ET were not explicitly relative, but the concept was widely accepted and understood. The examples of national definitions are based on the relativeness (Defra, 2009; Swentec, 2009). Relativeness can cause problems, particularly in identifying EGS for international trade purposes (World Bank, 2007). It can also be stated that the relativeness is not only specific for environmental technology, all new technologies should be more resource effective compared to the old one (Andreasson et al., 2008).

Table 5 Examples of definitions of ET with analyses of explicit relativeness.

<table>
<thead>
<tr>
<th>Source</th>
<th>Definition</th>
<th>Relativeness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agenda 21, 34.1, 1992</td>
<td>Environmentally sound technologies (EST) are those that “protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes”.</td>
<td>Explicit</td>
</tr>
<tr>
<td>Shrivastava, 1995</td>
<td>“Environmental technologies are defined here as production equipment, methods and procedures, product designs, and product delivery mechanisms that conserve energy and natural resources minimise environmental load of human activities, and protect the natural environment. They include both hardware, such as pollution control equipment, ecological measurement instrumentation, and cleaner production technologies. They include operating methods, such as waste management practices (materials recycling, waste exchange), and conservation-oriented work arrangements (car pooling, flextime), used to conserve and enhance”. (p. 185)</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Definition</td>
<td>Relativeness</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Kemp 1997</td>
<td>Environmental technology may be broadly defined as each “technique, process or product which conserve or restores environmental qualities”. (p. 11)</td>
<td></td>
</tr>
<tr>
<td>OECD/Eurostat 1999</td>
<td>Environmental industry as the set of “activities which produce and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, products and services that reduce environmental risk and minimize pollution and resource use”. (p. 9)</td>
<td></td>
</tr>
<tr>
<td>Diener and Terkla 2000</td>
<td>Environmental industry as the sector of activities “associated with compliance with environmental regulations, environmental assessment, analysis and protection; pollution control, waste management, and remediation of contaminated property; the provision and delivery of the environmental resources of water, recovered materials, and clean energy”; and the technologies and activities to deliver “energy and resource efficiency, higher productivity, and sustainable economic growth (enabling pollution prevention)”. (p. 306)</td>
<td></td>
</tr>
<tr>
<td>Ramakrishnan 2004</td>
<td>“Environmental technology as the technologies that provide improvements in environmental quality.” (p. 148)</td>
<td>Explicit</td>
</tr>
<tr>
<td>Etap/EU 2004</td>
<td>“all technologies whose use is less environmentally harmful than relevant alternatives. They encompass technologies and processes to manage pollution (e.g. air pollution control, waste management), less polluting and less resource-intensive products and services and ways to manage resources more efficiently (e.g. water supply, energy-saving technologies).” (p. 2)</td>
<td>Explicit</td>
</tr>
<tr>
<td>Kuehr 2007</td>
<td>“Environmental Technologies (ET) contain four different categories: measuring, cleansing, cleaner, and clean technologies differing in their ecological effectiveness. ET reduce pollution at least in one environmental medium, only accepting the transformation of emissions into another form or into another medium as a short term measure in order to cope with harmful pollutants. Thus, ET implements the continuous improvement of processes, products and services by the conservation of raw materials and energy and by the reduction of toxic substances, waste and emissions within the production cycle.” (p. 1320)</td>
<td>Explicit</td>
</tr>
<tr>
<td>Jänicke and Zieschank 2008</td>
<td>“Environmental industry” as (similar to Eurostat and OECD) the sum of enterprises that produce marketable goods and services both for traditional additive pollution management (“clean-up” or “end-of-pipe-treatment”) and integrated resources management or eco-efficient production and consumption).” (p. 5)</td>
<td>Explicit</td>
</tr>
<tr>
<td>Defra (UK) 2009</td>
<td>They are any technology that, when compared to other similar technologies, does the same thing but with a low environmental impact.</td>
<td>Explicit</td>
</tr>
<tr>
<td>Swentec/SCB (Sweden) 2009</td>
<td>Any technology that directly or indirectly contributes to a better environment. Environmental technology comprises products, systems, processes and services which provide clear environmental advantage compared to current or alternative solution, from a life cycle perspective.</td>
<td>Explicit</td>
</tr>
</tbody>
</table>

3.2.3 Classification

Environmental industry spans different sectors and it is difficult to define a clear boundary that includes the whole area (OECD/Eurostat, 1999; Mansfield and Thomas, 2005). For this reason there have been several attempts to classify ET. One issue in classification concerns boundary issues and identifies the all subsectors that should be included. The national approaches to classifications of ET and platforms for promoting
companies are examples of such classification (see Table 6). It can be mentioned here that there are for example different views on activities of ‘sustainable agriculture and fisheries’, ‘sustainable forestry’ and ‘ecotourism’. These sectors are included in manuals published by Eurostat (OECD/ Eurostat, 1999; Eurostat, 2009) but not always in the national classification and statistics of the ET sector.

Table 6  Examples of national classifications of ET.

<table>
<thead>
<tr>
<th>Country</th>
<th>Subsectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sventec</td>
<td>Soil Remediation, Solar Energy Technology, Sustainable Building, Systems Engineering, Control, Engineering and Monitoring, Transportation, Waste Management and Recycling, Water and Wastewater Treatment, Wave Power, Wind Energy Technology</td>
</tr>
<tr>
<td>Sweden</td>
<td>11 Categories: Solar, Wind, Bio &amp; Agriculture, Water &amp; Wastewater, Transportation</td>
</tr>
<tr>
<td>Solutions</td>
<td>14 Subsectors: Air Pollution Control (APC), Cleaner Technologies and Processes (CTP), Decommissioning/Decontamination of Nuclear Sites (ND), Energy Management/Efficiency (EE), Environmental Monitoring and Instrumentation (EMI), Environmental Consultancy Services (ES), Landscape Services (LS), Marine Pollution (MPC)</td>
</tr>
<tr>
<td>UK</td>
<td>Noise and Vibration Control (NVC), Remediation and Reclamation of Land (RRRL), Renewable Energy (RE), Transport Pollution (TPC), Waste Management (WM) and Recycling and Recovery (RR), Water and Wastewater Treatment (WWT)</td>
</tr>
<tr>
<td>Envirolink</td>
<td>10 Subsectors: Energy, Waste Management and Recycling, Logistics, Materials and Products, Tourism</td>
</tr>
<tr>
<td>Northwest</td>
<td>Construction, Industrial Processes, Water Treatment and Waste, Water Management, Environmental Services, Environmental Measurement</td>
</tr>
<tr>
<td>(2009)</td>
<td>6. Envirolink Northwest is the energy and environmental technologies and services sector development organization in England's Northwest. This organisation went into liquidation in January 2013.</td>
</tr>
<tr>
<td>Finland</td>
<td>7. Cleantech Finland® Business Forum has been established in order to enhance the development and global competitiveness of Finnish cleantech businesses. Forum is an information and interaction platform for companies, organizations and authorities that have common interest to promote Finnish cleantech businesses. The forum consists of a website (<a href="http://www.ymparistofoorumi.fi">www.ymparistofoorumi.fi</a>), e-newsletters and CFBF meetings. Cleantech Finland® Business Forum is operated by the Confederation of Finnish Industries EK. (<a href="http://www.ek.fi">www.ek.fi</a>).</td>
</tr>
<tr>
<td>Cleantech</td>
<td>(2009)</td>
</tr>
</tbody>
</table>
There are also attempts both from scholars and public organizations to categorizing of subsectors in the ET sector, as shown in Table 7. Kuehr (2007) distinguishes between ‘clean’ and ‘cleaner’ technologies, and thereby differs from other classifications. The distinction between ‘cleansing’ and ‘clean/cleaner’ technologies is well established in the literature, and can be seen in many classification schemes, although the cleansing technologies are expressed in different terms (‘pollution management’ versus ‘cleaner technologies and products’ in the OECD’s classification (OECD/Eurostart, 1999); ‘end-of-pipe’ technology versus ‘cleaner processing’ in the classification of European Committee of Environmental Technology Suppliers Associations (Eucetsa). The terms ‘cleaner production’ and ‘clean production’ are used interchangeably in the literature to mean the opposite of the ‘end-of-pipe’ approach. ‘Clean technologies’, as defined by Kuehr (2007) “do simply not have any negative impacts on the environment”. Kuehr also uses the term ‘zero impact’. It is questionable whether any technology or economic activity can really have ‘zero impact’. The concept of ‘zero emissions’ may be more suitable as the ultimate, most ecologically efficient category of environmental technologies. In practice, ‘clean products’ only exists as a category in a small number of classifications (OECD/Eurostat, 1999; Skea, 1995; Kemp, 1997).

A new handbook on the ET sector was introduced in 2009. This handbook bases on the definition and classification of the sector on the OECD/Eurostat environmental industry manual and on the System for the Collection of Economic Data on the Environment (SERIE) and System of Environmental and Economic Accounting (SEEA) framework. The environmental technologies and products are classified to two main groups: environmental protection (EP) and resources management (RM). Environmental protection focuses on physical outputs, while recourse management focuses on inputs of natural resources.

Table 7  Examples of classification of categories within ET. The number of categories is shown in brackets.

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
<th>Categories</th>
</tr>
</thead>
</table>
| Skea 1995 | (6) | Pollution control  
Waste management  
Recycling  
Waste minimisation  
Clean technology  
Measurement and monitoring  
Clean products |
| Shrivastava 1995 | (5) | Design for disassembly  
Manufacturing for the environment  
Total quality environment management  
Industrial ecosystems  
Technology assessment |
3.2.4 Supporting environmental technology in Sweden

Sweden has been proactive in a number of international political processes aimed at supporting development and export of environmental technology. Development and use of environmental technology was a priority area for the government during its mandate of 2007–2010 (Swentec, 2008) as well as in the following mandate period. In order to strengthen Swedish competitiveness, the government and industry are investing in the environmental technology sector through several initiatives. Networks and initiatives exist at both the regional and national level.

The Swedish Trade Council, which is responsible for helping Swedish companies with exports, supports the Swedish environmental technology sector at the national level; *Energy and Environmental Technology* is one
of seven business areas (Swedish Trade Council, 2012). The Swedish Trade Council established the Environmental Technology Network in 1999. This network comprised approximately 700 companies, authorities and organizations working in the environmental technology sector (Swedish Trade Council, 2007).

The Swedish Environmental Technology Council (Swentec), was between 2005 and 2010 another organization at national level with the task form government to strengthen the Swedish environmental technology sector. Swentec has developed to a national portal providing knowledge about the environmental technology and cleantech sector and promoting good examples. This portal gathered a broad network of environmental companies, suppliers and visit plants (more than 900 companies at end of 2010) as well as other relevant actors. From the spring 2010 companies listed could be searched also using geographical location, based on the Province, not only the Environmental technology area.

This assignment was in line with the government’s overall goal to create conditions for more jobs and growing companies in Sweden while meeting challenges in the environment and climate change area. The role of Swentec was changed on 1 April 2008, when it became a delegation attached to the Ministry of Enterprise, Energy and Communications and was commissioned by the government to develop an overarching and effective structure for strengthening Swedish environmental technology (Swentec, 2008). An action plan, with 82 measures to increase growth and export of Swedish cleantech was published 2010 (Swentec, 2010). The Swedish Agency for Economic and Regional Growth had responsibility for the platform and since 2012-03-13 there was information that the platform was under development (Swentec, 2012).

A new, private actor, the International Data Group 8 (IDG), is recently focusing on the ET sector in Sweden (IDG, 2012). Under spring 2012 IDG lunched a new brand Green Solutions from Sweden, consisting of: a searchable database and B2B Swedish Greentech Industry Guide 2012, a magazin “Green Solutions” and a newsletter “The Greentech Industry Guide”. The Swedish Greentech Industry Guide 2012 is based on Swentec’s platform. This Guide will focus on suppliers of environmental technology in Sweden while the Swedish Agency for Economic and

8. “International Data Group (IDG) is the world's leading technology media, events and research company. Since its founding in 1964, IDG has been committed to helping people acquire and use technology successfully. As a result, IDG brands have become the trusted source for advice and insight into technology news and trends around the world. Over the past 47 years, IDG has grown into a multi-billion dollar company, reaching technology audiences in more than 97 countries.” (http://www.greensweden.se/about) [2012.05.13].
Regional Growth will focus on visit plants and demonstration facilities. The magazine, “Green Solutions” was published earlier by a regional network for environmental technology Clean Tech Region, (IDG, 2012; Clean Tech Region, 2012). Furthermore, the IDG in cooperation with Miljöaktuellt is also launching a new news site on the environmental technology; E-technology (M-teknik) on the webpage of Miljöaktuellt (IDG, 2012). E-technology is divided into 11 subsectors (Miljöaktuellt, 2012), these are the same as of the Greentech Industry Guide (Green Solutions, 2012).

Other initiatives to support companies in the environmental technology sector at national level are: Swedish Environmental Technology (SET) and the Association of Swedish Environmental Technology (ASSET). SET is a network comprising of Swedish environmental technology companies. ASSET is an umbrella organization for regional and national associations of environmental technology industries in Sweden. ASSETS’ mission is to supplement the work of the member organizations in supporting affiliated companies and represent the member organizations to politicians, authorities, media and the public. ASSET is a member of the European Committee of Environmental Technology Suppliers Association (EUCETSA).

Companies in the environmental technology industry are also supported at the regional level. Examples of such regional initiatives are: Cleantech Inn Sweden (CINNS), Sustainable Business Mälardalen, Sustainable Business Hub, Ecotech Stockholm, Stockholm Miljöcenter, Ecoex, Business Göteborg and Cleantech Östergötland.

It can be added here that in the period 2011–2013 joint marketing initiatives to promote green technologies are also launched at Nordic region level. A report “Strategic global marketing of Nordic cleantech clusters and competencies” published 2012 recommends among others establishing of a Nordic cleantech portal and Nordic cleantech showrooms in all five capital airports (Andersson et al., 2012).

3.2.5 Research about environmental technology sector

In recent years, there has been an increasing trend towards technology-led response to environmental challenges. The ET and cleantech sectors produce marketable technical solutions that address global environmental

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9. Personal information, Arash Sangari, IDG [2012.05.11].
10. Covering the counties of Jämtland and Västernorrland. (http://www.cleantechregion.se/test.html) [2012.05.13].
needs. The potential of this market is down to its global scale, its long
term perspective and an ongoing demand for environmental innovation.
This makes it very different from most other industries (Jänicke and
Zieschank, 2008). This rapid growth also means that production in these
sectors is likely to create considerable environmental impacts. However,
environmental impacts of the ET and cleantech are not considered and
little is known about whether the ET sector is engaged in reducing the
environmental impacts of its own activities. There are few reports of
research that addresses this issue critically. Aragón-Correa and Rubio-
López (2007) listed six myths and misunderstandings about proactive
environmental strategies. One of these myths is that “Environmental
industries and investments are growing rapidly.” The growth rate of the
sector is not very important for the aims of this thesis. However, Aragón-
Correa et al. (2007, p. 360) highlight that “environ-mental activities may
imply environmental damage”. In addition, they state that “processes of
recycling are not always environmentally friendly” (p. 361).11

Most articles published in the field of ET examine different subsectors
and technical solutions and aspects within the subsectors. Where the ET
sector as a whole has been studied, the focus has been on mapping the
sector with regard to exports, turnover, employment, product, and on
assessing export market opportunities and competitiveness (Energy
Agency, 2011; Growth Analysis, 2011; Eberhardson and Wadeskog,
2010; Energy Agency, 2010; EAU, 2010; ECORYS, 2009; Andreasson et
al., 2008; Swentec, 2008; Swentec, 2007; Cerin et al., 2007; Mansfield
and Thomas, 2005). The structure, trends and constraints to growth of
this industry are also often considered. This also applies to the ET sector
at national, regional and global levels. Several studies have been
available since the late 1990s at EU level and from individual Members
States (EUROSTAT, 2009). There is also a growing number of reports on
liberalisation of environmental goods and services. However, relatively
little academic research examines the sector and its companies.

Early reports, such as Shrivastava (1995) provided definitions and
classifications of the environmental industry. Klassen and Whybark
(1999) studied the impact of the ‘ET portfolio’ on manufacturing and
environmental performance. Diener and Terkla (2002) expounded on
consolidation of the environmental industry, and Getzner (2002)

11. They list three arguments disclosing the ”recycling myth”: i) increase in recycling
may be in part because waste is now generated in much higher quantities; ii) processes of
recycling are not always environmentally friendly, effective, or viable (technically or
economically); iii) the role of a company as a generator of recycled wastes is often not
linked with a responsible role as a buyer of recycled materials.
investigated the quantitative and qualitative impacts of clean technologies on employment. In time, factors influencing clean technology adoption (González Del Río, 2005), transfer of ET (Greiner and Franza, 2003; Ramakrishnan, 2004) and green technologies in developing countries came to the attention of academics (Hasper, 2009; Guerin, 2009). Lehtinen et al. (2006) conducted an empirical study of drivers and constraints of SMEs in the Finnish environmental industry, Catulli (2008) reviewed the EGSS in the United Kingdom. In their mapping of the EGSS in Sweden Eberhardsson and Wadeskog (2010) has compared EGSS with non-EGSS in respect to CO₂ emissions and employment. According to this study there are indications that the EGSS is less intensive in terms of both, which can be sign of a different production mix.

In this thesis four subsectors of ET sector are surveyed. Different environmental issues are discussed in relation to these different subsectors in academia and the general public. For instance, whether recycling makes sense from an environmental perspective was a big issue. Recently, there has been increasing interest in environmental impacts, human exposure and recycling in relation to e-waste.

Renewables technologies provide obvious environmental advantages and socio-economic benefits in comparison to conventional energy sources. However there are discussions about environmental impacts of relying mainly on wind energy and bioenergy. “It should not be surprising that not all aspects of “clean” energy proposals are 100% “green”.” (Rosenberg, 2008, p. 641). Regarding wind power the debate is mainly about the lack of public acceptance of specific wind power projects and the impacts of installed wind farms such as impacts on landscape and wildlife (Warren et al., 2005; Rosenberg, 2008), and more recently on human health (Nissenbaum et al., 2012; NVV, 2012); not the aspects related to production of the wind turbines. The debate about impacts of wind turbines and benefits of wind power set environmentalists against each other, and has ‘the green on green’ nature (Warren et al., 2005). Furthermore, although the public generally expresses a positive attitude towards wind power, specific wind power projects often face resistance from the local population (Ek, 2005).

Regarding biofuels the production is in focus – environmental and social impacts arising from the production of biomass, such as the potential to threaten conservation areas, pollute water resources and decrease food security (Field et al., 2008, Escobar et al., 2009; Ladanai and Vinterbäck, 2010a). Moreover, even carbon savings from biofuels in Brazil are questioned – indirect land-use changes can outweigh carbon
savings from biofuels (Lapola et al., 2010). The EU’s sustainability criteria defined in Article 17 of the EU directive on promotion of the use of energy from renewable sources (DIRECTIVE20009/28/EC), Certification criteria for Sustainable Biomass of Energy (Ladanai and Vinterbäck, 2010b) and Sustainable Biomass for Energy-WBA Verification Scheme (WBA, 2012) developed by World Bioenergy Association (WBA) are examples of initiatives to produce biofuels in a sustainable manner. Additionally, Spetic et al. (2012) proposed sustainability related strategies in the Brazilian sugarcane–based ethanol industry. In the case of solar power, the materials required to produce solar panels are the subject of environmental concern (Tsoutsos et al., 2005).

Jaana Ijäs (2011) has studied expectations of Venture Capital (VC) investors regarding CSR reporting in her study ”What Do investors Want from Corporate Responsibility Reporting? Case Venture Capital Investors in the Nordic Cleanech Sector”. However, no studies on CSR activities specifically relating to environmental activities within the environmental industry sector were found in the literature reviewed.
This section introduces the theories that underpin the topics of papers on which this dissertation is based. Several theories have been put forward to explain why firms voluntarily undertake actions to improve their environmental performance beyond compliance and CSR action in general.

The explanations for environmental and CSR proactivity can be organized around two broad theoretical perspectives: externally driven perspectives drawing on institutional theory, and internally driven perspectives, drawing on the resource-based view (RBV) (see Oliver, 1997; Bansal, 2005; Menguc et al., 2010; Prajogo et al., 2012 for overview). The internal motives prompt firms to integrate EMS as a part of their organizational strategies to compete (Prajogo et al., 2012). The external motives lead firms to adopt environmental and CSR action as institutional isomorphism which aims to match to a competitor’s action. Furthermore, the forces that compel firms to adopt proactive environmental initiatives can also be seen as threats and opportunities (Khanna, 2002).

Research shows that great variability may exist in implementation of the same environmental management models or CSR reporting guidelines adopted due to institutional pressure that lead firms to be more isomorphic (see Yin and Schmeidler, 2009, for overview). Both institutional theories and resource-based views explain these differences under isomorphic pressure. Variability could be a result of a firm’s internal norms, values and cultures according the institutional theory (Oliver, 1991, 1997) and due to internal capabilities and resources according to the RBV (Barney, 1986; Christmann, 2000). The differences and varieties can also be explained by institutional automorphism, which means that companies imitate themselves when tackling new challenges in their organizational fields (Schwartz, 2006/ 2009).

Environmental and CSR activities and disclosure are often explained with theoretical arguments based on legitimation and stakeholder theory. To achieve or maintain legitimacy among different stakeholders, organizations engage in CSR activities. CSR activities constitute a
strategic response to pressure from stakeholders who may be adversely affected by company practise or can be considered a proactive attempt at pre-empting or at least mitigating this pressure and enhancing the reputation and value of the corporation (Jackson and Apostolakou, 2010). Communication of the CSR action plays a critical role. Effective communication raises stakeholder awareness of the company’s CSR action and can enhance its CSR credibility. Legitimacy theory, stakeholder theory and communication of CSR therefore constitute the theoretical framework of the thesis and are presented below. Figure 3 summarizes the overview of key drivers and influencing factors of corporate green strategy. Four main drivers are often mentioned in the literature: regulation, stakeholder pressure, economic opportunities and ethical motivation (see Bansal and Roth, 2000 for overview). Both firms’ characteristics (Schwartz, 1997; 2006/2009; Delmas and Toffle, 2010) and industry characteristics (Campbell, 2003; Gao et al., 2005; Brammer and Pavelin, 2008) influence environmental strategies at company level. This thesis contributes to an extended understanding of how the sector characteristics can influence firms’ environmental engagement.

![Figure 3](image)

**Figure 3**  Key drivers and influencing factors of corporate green strategy. Source: Elaboration of Bansal and Roth (2000), Delmas and Toffle (2010), Tutore (2010)
4.1 Legitimacy theory

Legitimacy theory is widely used as a framework to explain environmental and social behaviour of organizations (Harvey and Schaefer, 2001; Hooghiemstra, 2000). For instance, legitimacy theory influences the management strategies to use externally-focused reports to benefit organizations; such strategies improve the organization’s reputation, enhance borrowing capacity and fulfil community expectations (Deegan, 2002). On the other hand, firms strive for legitimacy, and the perception that this is more important than real environmental benefits is one reason for environmental management tools sometimes failing to achieve real improvements in environmental performance (Wolff, 1986; Cerin, 2004).

Legitimacy is essential for a firm’s survival and growth (Suchman, 1995; Scott, 1987) as it brings better access to resources (DiMaggio and Powell, 1983). Legitimacy is important to both new ventures and established organizations. Access to resources is less problematic for established organizations; past performance itself provides legitimacy and access to resources (Zimmerman and Zeitz, 2002). Suchman (1995, p. 574) defines legitimacy as a “generalized perception or assumption that the actions of entity are desirable, proper or appropriate within some socially constructed systems of norms, values, beliefs and definitions”. Legitimacy is when organizations perform according to the expectations of particular stakeholders (Deephouse and Carter, 2005). Strategic legitimacy theory suggests that legitimacy is to a certain extent controllable by organizations (Oliver, 1991), and that organizations are able to make strategic choices to alter their legitimacy status – and through corporate action, by adapting their activities and changing perception, maintain and increase their legitimacy (Aerts and Cormier, 2009).

In the relation with the natural environment, the term ‘environmental legitimacy’ is used by some scholars (Savage et al., 2000; Bansal and Clelland, 2004; Aerts and Cormier, 2009; Berrone and Gomez-Mejia, 2009). When firms successfully respond to pressures from different actors, often to avoid environmental misconduct (Berrone and Gomez-Mejia, 2009), environmental legitimacy is earned. When firms manage to conform to stakeholders’ environmental expectations, stakeholders grant legitimacy to the firms. Poor environmental performance endangers social legitimacy and seriously damages corporate prestige (Bansal and Clelland, 2004; Hart, 1995). Compared to poor performers, environmentally legitimate firms attract and retain better partners,
customers and employees (Sharma and Henriques, 2005; Buysee and Verbeke, 2003).

Several typologies of legitimacy have been proposed. Sociopolitical legitimacy, industry legitimacy and cognitive legitimacy are often mentioned as sources of legitimacy in the case of industry creation (e.g. Zimmerman and Zeitz, 2002). As many of the environmental technology and cleantech subsectors are new industries, these types of legitimacy are most relevant for this thesis and will be presented in the following sections along with the legitimacy gap.

4.1.1 Sociopolitical legitimacy

“Sociopolitical legitimacy refers to the process by which key stakeholders, the general public, key opinion leaders, or governmental officials accept a venture as appropriate and right, given existing norms and lows” (Aldrich and Fiol, 1994, p. 648). The sociopolitical legitimacy can be assessed by measuring public acceptance of an industry, government subsidies to the industry, or the public prestige of its leaders (Aldrich and Fiol, 1994). The sociopolitical legitimacy can be regulatory and normative.

**Sociopolitical Regulatory Legitimacy**

Sociopolitical regulatory legitimacy (Hunt and Aldrich, 1996), or regulatory legitimacy (Scott, 1995) is derived from regulations, rules, standards and expectations created by governments, certifying authorities, professional bodies and powerful organizations within the supply chain (Zimmerman and Zeitz, 2002). This legitimacy can be operationalized by consistency with law, obtaining certifications and provides legitimacy for the organization among a wide variety of stakeholders.

**Sociopolitical Normative Legitimacy**

Sociopolitical normative legitimacy (Hunt and Aldrich, 1996), or normative legitimacy (Scott, 1995) is derived from norms and values of society, such as profitability and fair treatment of employees, and the local network, or from a level of the societal environment relevant to the new venture, such as societal level or specific industry level (Zimmerman and Zeitz, 2002). At the industry level for example, professional norms are developed (DiMaggio and Powell, 1983).
4.1.2 Industry legitimacy

The entire industry can also be a source of legitimacy. “A new venture can use the industry’s standards, norms, practices and technology; the past actions of industry members; and so forth to acquire legitimacy. Industries have varying degrees of legitimacy, based on a variety of actions and consequences stemming from the collective action of industry members” (Zimmerman and Zeitz, 2002, p. 420ff). While some well-established industries such as the oil and chemical industry have a lower legitimacy, banking and medicine have a high level of legitimacy. Industry legitimacy can be viewed based on broader public acceptance toward the industry. Industry legitimacy is related to the degree to which the operations and business processes of firms in a given industry, and their products and services offered, are accepted as appropriate and useful by the broader public (Hannah and Freeman, 1989; Scott, 1995; Suchman, 1995).

Some relatively new industries come to be seen as the “industry of the future” and gain a high level of legitimacy, such as the IT industry for example (Zimmerman and Zeitz, 2002). However, a very new industry may provide its organizations little legitimacy and the new venture must work even harder to establish its own legitimacy, because there is little knowledge about the industry (Zimmerman and Zeitz, 2002). The new venture has to overcome scepticism both from those who are potential capital contributors and from those who are potential customers of the firm (Kenkel and Holcomb, 2009). Moreover, ‘industry legitimacy’ influences the effectiveness of a firm’s environmental communication initiatives (Aerts and Cormier, 2009).

4.1.3 Cognitive legitimacy

“Cognitive legitimation refers to the spread knowledge about a new venture” (Aldrich and Fiol, 1994, p. 648). According to Aldrich and Fiol (1994) cognitive legitimacy can be assessed by measuring the level of public knowledge about a new activity; when a new product, process or service is taken for granted the highest form of cognitive legitimacy has been achieved.

4.1.4 Legitimacy gap

The inconsistency between society’s expectations and actual or perceived behaviours of an organization is described as the ‘legitimacy gap’. Wartick and Mahon (1994) summarized three conditions where a
legitimacy gap may arise: i) when societal expectations of corporate performance change, but the organization operates in the same manner as it always has; ii) when corporate performance changes and the societal expectations of corporate performance remain the same; iii) when the organization’s operations and societal expectations either diverge or converge with a lead/lag relationship.

Legitimacy theory highlights that strategies are considered as an important means for management to influence relevant public perceptions of their organization. Based on Dowling and Pfeffers’ (1975) three legitimacy tactics, Lindblom (1994) developed four strategies that an organization can employ to influence public perception when faced with a threat to its legitimacy: i) education and informing its relevant public about changes in the organization’s performance and activities (corrective actions) in response to a recognition that the legitimacy gap arose form an actual failure of performance of organization; ii) changing the perception of the relevant public without changing the actual behaviour of the organization (i.e. without taking a corrective action) as a response when the organization sees that the legitimacy gap has arisen through misperception on the part of relevant public; iii) manipulation of perception by deflecting attention from the issue of concern to other related issues, e.g. through an appeal using an emotive symbol; iv) changing external expectations of performance as a response when an organization considers that the relevant public has unrealistic or incorrect expectations of its responsibilities.

Moreover, concepts such as corporate identity, corporate reputation, corporate image and corporate branding are related to the legitimacy. A framework which relates these concepts in a meaningful way (van de Ven, 2008) by seeing them as parts of a whole, a multiple-identity concept, was developed by Balmer and Greyser (2003). This multiple-identity concept comprises five identity types (actual, communicated, conceived, ideal and desired) which can co-exist comfortably to some extent within a company even if they are slightly different. However, any meaningful incongruence between two or more of the five identities can pose problems for a company with its relevant stakeholders, and organizations must manage their multiple identities to avoid potentially harmful misalignments (Balmer and Greyser, 2003), which can lead to a legitimacy gap.
4.2 Stakeholder theory

Stakeholder theory extends legitimacy arguments to consider not only society as a whole but also particular stakeholder groups (Deegan, 2002). Referring to the influence of companies on their stakeholders, Campbell (2003) argues that companies can only be seen as responsible when their actions do not consciously or intentionally cause damage to the stakeholders; and in the case of such damage, companies take steps to rectify their actions as they become aware of the damage.

“Stakeholders are persons or groups that have, or claim, ownership, rights, or interests in a corporation and its activities, past, present or future” (Clarkson, 1995, p. 106). Identification of the groups towards which the organization should be responsible has changed substantially. At one end of the spectrum the shareholder was considered the sole or principal stakeholder. This definition was based on arguments proposed by Friedman (1962) that the corporation’s foremost objective is to maximise the wealth of its owners. Freeman (1983) however, expands the definition of stakeholder to include a broader selection of constituents including adversarial groups such as interest groups and regulators (Roberts 1992).

Stakeholder theory asserts that the corporation’s continued existence requires the support of the stakeholders and their approval must be sought and the activities of the corporation adjusted to gain that approval. The more powerful the stakeholders, the more the company must adapt. Social disclosure is thus seen as part of the dialogue between the company and its stakeholders (Gray et al., 1995). Morsing and Schultz (2006) suggest three CSR communication strategies in relation to stakeholders: i) stakeholder information; ii) stakeholders response strategy; and iii) stakeholder involvement strategy.

It can be also added that some of typologies of environmental models and strategies identified in the literature specifically consider responses to stakeholder pressure (Sprengel and Busch, 2011). Based on these typologies Murillo-Luna et al. (2008) identified four corporate response strategies towards environmental issues: passive, attention to legislation, attention to stakeholders and total environmental quality. Furthermore, the European Commission explicitly links CSR to the stakeholder approach. Thus “… the stakeholder perspective of corporate environmentalism involves a recognition of stakeholders’ environmental concerns, which are translated into strategic actions designed to improve a firm’s environmental performance, as well as its relations with key external stakeholders” (Banerjee, 2002).
4.2.1 Environmental stakeholders

Identification of environmental stakeholders, defined as those with the ability to influence firms’ environmental policies, is crucial for the business organization. Garcés-Ayerbe et al. (2012) provide an overview of different classifications of environmental stakeholders. Table 8 shows the latest classification (Darnall et al., 2010), which is in line with the classifications of stakeholders in general, as primary and secondary stakeholders (Clarkson, 1995).

Table 8 Classification of environmental stakeholders.

<table>
<thead>
<tr>
<th>Primary stakeholders</th>
<th>Secondary stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value chain participants</strong></td>
<td><strong>Internal stakeholders</strong></td>
</tr>
<tr>
<td>Commercial byers</td>
<td>Management</td>
</tr>
<tr>
<td>Households</td>
<td>Non-management employees</td>
</tr>
<tr>
<td>consumers</td>
<td></td>
</tr>
<tr>
<td>Suppliers</td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted from Garcés-Ayerbe et al., 2012

Ottman (2011) in her book “The new rules of green marketing. Strategies, Tools, and Inspiration for Sustainable Branding” pointed out that companies now have to consider ‘new’ environmental stakeholders, including children and future generations, as well as the ‘traditional’ stakeholders (Table 9).

Table 9 Traditional and new environmental stakeholders.

<table>
<thead>
<tr>
<th>Traditional stakeholders</th>
<th>New stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retailers and end consumers</td>
<td>General public</td>
</tr>
<tr>
<td>Employees</td>
<td>Children and future generations</td>
</tr>
<tr>
<td>Plant neighbours</td>
<td>Educators</td>
</tr>
<tr>
<td>The press</td>
<td>Environmental and social activists</td>
</tr>
<tr>
<td>Suppliers</td>
<td>Civic and religious leaders</td>
</tr>
<tr>
<td>Financial institutions</td>
<td>Citizen journalists</td>
</tr>
<tr>
<td>Regulators</td>
<td>Other government groups</td>
</tr>
<tr>
<td>Suppliers</td>
<td></td>
</tr>
</tbody>
</table>

Source: Ottman, 2011
4.3 Communicating Corporate Social Responsibility

Along with growing international awareness of environmental and social impacts of business activities companies have been increasingly reporting activities to diminish these impacts. Morhardt (2010) provides an overview of selected papers analyzing corporate sustainability reporting from 1982 to 2009. Nowadays, expectations of sustainability consider not only the content but also the communication style (Beattie and Pratt, 2003; Hund et al., 2004) and companies have to communicate sustainability objectives and their CSR activities (Brønn and Vrioni, 2001; Mark-Herbert and Rorarius, 2010). Companies can reap a wide range of business benefits from their engagement in CSR (Du et al., 2010; Sen and Bhattacharya, 2001). Therefore, “not to communicate how good company is, it is a waste of resources” (Grankvist, 2012, p. 80). “Improving company disclosure of social and environmental information” is one of eight agendas for action 2011–2014 in the renewed EU strategy for Corporate Social Responsibility (EU, COM 2011b). Emerging concerns in the field of sustainability reporting are: focusing on positive aspects (Cerin, 2002; Hubbard, 2009a; 2009b) and on descriptive outcomes with little benchmarking (Hubbard, 2009a; 2009b), lack of information on efforts to improve future environmental performance (Marshall and Brown, 2003), and lack of critical perspectives in environmental management research (Ulhoi and Madsen, 2009; Åhlström et al., 2009; Schwartz and Tilling, 2009, 2010; Jensen et al., 2010). Environmental reporting can be used as a tool for ‘bypassing’, i.e. steering the agenda away from infuriating debates (Cerin, 2002, 2005). According to Ihlen and Roper (2011) corporations treat sustainability and sustainable development as given and unproblematic “…instead of addressing the fundamental problems of today’s practice or dilemmas of the concept”. Furthermore, the results from their survey show that companies are no longer using the metaphor of ‘journey’ (Milne et al., 2006) but of ‘arrival’ (Ihlen and Roper, 2011) which leaves them open to accusations of greenwashing.

The opportunities for companies to gain competitive advantage from their environmental activities increasingly depend on the ability to communicate performance and attitudes to stakeholders (Nielsen, 2001; Biloslavo and Trnavcevic 2009). Still, environmental issues remain difficult to communicate (Nielsen, 2001), and communication is a controversial aspect within CSR (Du et al., 2010). Research suggests that the more companies expose their ethical and social ambitions the more likely
they are to attract critical stakeholder attention (Ashforth and Gibbs, 1990; Vallentin, 2002). This situation, where public expectation that companies engage in CSR activities is growing, while excessively ‘loud’ communication about this engagement is not appreciated has been called the ‘Catch-22’ of communication CSR (Morsing et al., 2008). Accordingly, minimizing stakeholder skepticism and creating stakeholder awareness are key challenges of CSR communication (Du et al., 2010).

A company can inhibit stakeholder skepticism, enhance the credibility of its CSR message and generate goodwill by acknowledging both intrinsic and extrinsic motives in its CSR communication (Forehand and Grier, 2003). In intrinsic attribution of a company’s CSR motives, the company is viewed as acting out of a genuine concern, in extrinsic attribution the company is seen as attempting to increase its profit. One way of dealing with environmental skepticism of a company and ‘doing good while doing well’ is to minimize problems of sustainability that are relevant to their own industry (Jacques, 2006). The coherence between the organization’s work and its communications policy should be well balanced, otherwise the organization is vulnerable to accusations of greenwashing (Mark-Herbert and von Schantz, 2007; Evangelista and Ruão, 2011). The internet does not only provide new communications solutions for companies. In the mediated transparent society (Backer, 2001), with critical stakeholders, the internet is one of the greatest tools for promoting boycotts and failures of organizations with blogs and media critics such as CorpWatch Greenwash Awards (USA) and Sins of Greenwashing (UK) (Evangelista and Ruão, 2011).

Companies have to convey different aspects to be more effective in their CSR communication; for example channels for communication (Birth et al., 2008; Du et al., 2010), communication objectives (Birth et al., 2008), and message content (Du, et al., 2010). Companies use a wide range of channels for CSR communication, however three channels in particular are used – social reports, websites and advertising (Birth et al., 2008). Corporate websites are now a popular means of distributing critical corporate information, such as mission statements, annual reports, sustainability reports, press releases, and consumer information (Gröschl, 2011; Morhardt, 2010; Hynes and Janson, 2007; Williams, 2008). The Internet provides new modes of communication, such as communication with specific stakeholders, frequent updates and obtaining feedback (Branco and Rodrigues, 2006). Bolivar (2009) presented a comparison between hard-copy annual reports and web-based annual reports. However, communication about CSR policies and activities based on social and environmental reporting and websites is rather low profile.
compared to marketing communication instruments such as public relations, advertising and promotion (van de Ven, 2008). Clear communication objectives should be defined for each stakeholder, especially for clients, employees and shareholders (Birth et al., 2008). These objectives can be, for clients: reputation, product differentiation and customer loyalty; for employees: creation of publicity and good reputation through word-of-mouth, increasing employees’ satisfaction and commitment, attraction of future employees; for shareholders: supporting the overall financial communication objectives through increasing awareness that the company represents an actual opportunity for investing in a socially responsible way and through communicating the tangible advantages of the company’s CSR strategy (Birth et al., 2008).

4.3.1 CSR fit

In the decision about what aspect of CSR to communicate, CSR commitment, CSR impact, CSR motives and CSR fit are relevant (Du et al., 2010). For example long-term commitments are more likely to be seen as genuine concerns for societal/community welfare (Webb and Mohr, 1998), and low CSR fit, i.e. lack of logical connection of a social issue to a company’s business, is likely to reduce stakeholders’ positive reactions to the company’s CSR activities (Gilbert, 1989). In the case of congruence between a company’s CSR activity and its business, the company should highlight the CSR fit (Du et al., 2010) and use a rational communication strategy, focusing on the associations between the company and CSR (Sohn et al., 2012). In the case of lack of natural fit, the company should highlight the rationale for its social activities (Du et al., 2010) or use elaborational communication strategy, which focuses on the benefits of CSR activity, not on association with the firm (Sohn et al., 2012). The CSR fit often means the fit between a company and its CSR activities, although the fit between CSR activities and consumers is capturing an increasing amount of research interest (Lee, 2012).

The fit between a company and its CSR activities describes the relation of CSR activities to a company’s core business and competence. A company can run CSR activities with low and high fit. CSR fit may result from common associations that the company (brand) shares with a cause, such as: (i) product dimensions (e.g. herbal products brand sponsors the protection of rain forest); (ii) affinity with specific target segments (e.g. Avon the company for women fights breast cancer); (iii) established corporate image associated with a specific social domain (e.g.
Body Shop’s activities in environment protection); or (iv) personal involvement of the company or brand in a social domain (Menon and Khan, 2003).

Research shows that consumers often expect that CSR initiatives have a logical association with companies’ core activities (Healy, 1996; Cone 2007). According to Porter and Kramer (2002) CSR initiatives should be deeply rooted in or at least linked to business operations and core competences. However, Bueble (2008) states “…close fit does not equal a right fit for any company” and claims that for companies with negative reputation high close relatedness between business and the CSR activity can be harmful as it may spur consumer skepticism. According to results from a study performed by Ann Farguson, high-fit SCR programs only work when a company and its industry already enjoy a good reputation (Kaye, 2010).

There are also examples of classification of CSR activities with respect to their relationship to the core business of a company. Halme (2010) identified three Corporate Responsibility (CR) action types: i) close to existing core business (CR integration); ii) enlarging core business or developing new business and (CR innovation); iii) outside of firm’s core business (Philantropy). Grafström et al. (2010) divided CSR activities into two main groups: those focusing on philanthropy and those focusing on the core business and claimed that the use of both by companies is commonplace, while Peloza and Shang (2011) claimed that philanthropy is the dominant category of CSR activities.

4.3.2 Substantive action and symbolic action

CR actions communicated by companies do not always live up to their intentions (Schwartz, 2006/2009) and commitment to and implementation of environmental policies are two distinct constructions (Winn and Angel, 2000). One reason for this can be that the focus in the majority of environmental management models is on environmental management rather than on environmental performance (Kolk and Mauser, 2002), and that management tools such as ISO 14001 focus on continuous improvements without setting objectives or assessing strategic corporate options (Mark-Herbert and Rorarius, 2009). The considerable confusion that characterizes the notion and definition of sustainable development, especially when it comes to defining operational goals may be another explanation (Cerin, 2005). Moreover, there are two opposing views regarding the relationship between environmental disclosure and environmental performance. On the one hand there are scholars who
suggest a positive relationship (Al-Tuwaijri et al., 2004; Clarksson et al., 2008). Firms with good environmental performance display a willingness to inform the public about their environmental activities. On the other hand, other studies show that there is a negative relationship between the environmental performance and disclosure; corporations with pure environmental performance tend to improve their environmental disclosure (Hughes et al., 2001). Environmental measures do not always result in significant improvement of the firm’s environmental impacts (Zsóka, 2008).

It is also important to distinguish between ‘substantive action’ and ‘symbolic action’ (Savage et al., 2000; Campbell, 2007; Walker and Wan, 2012). According to the institutional theory “the appearance rather than the fact of conformity is often presumed to be sufficient for the attainment of legitimacy” (Oliver, 1991, p. 155). In order to manage their public image, organizations often engage in symbolic and rhetorical framing (Hirsch, 1986). In the context of environmental issues, symbolic environmental actions may ‘provide cover’ for poor emissions performance by appearing to take steps in the right direction (Russo and Harrison, 2005). Recognizing the importance of good environmental performance for stakeholders firms may acquire environmental legitimacy by focusing on the actions that are easiest to observe (Berrone et al., 2009). In terms of environment, substantive actions often require significant changes in core practices, such as pollution prevention or environmental innovation, which bring real improvements in the firm’s subsequent environmental performance and increase its environmental legitimacy (Berrone and Gomez-Mejía, 2009). Symbolic actions may only have a short-lived impact on legitimacy, while substantive actions have a positive influence in both the short and long terms. Furthermore, a company that merely adopts symbolic environmental initiatives decoupled from substantive action may jeopardize their legitimacy as it may be perceived as deceitful (Berrone et al., 2009). Effective management of environmental legitimacy, environmental credibility (Chynoweth and Kirshner, 1993; Linnanen et al., 1999), green credibility (Chen, 2008) and green reputation (Chen, 2008; Biloslavo and Trnavec, 2009) implies a balance between symbolic and substantive actions (Berrone et al., 2009).

Focusing on symbolic action (Walker and Wan, 2012) and/or dissemination of disinformation by an organization so as to present an environmentally responsible public image is referred to as greenwashing (Laufer, 2003; Ramus and Montiel, 2005). Greenwashing can be misleading with regard to the environmental practices of a company (firm-
level greenwashing) or the environmental benefits of a product or service (product-level greenwashing) (Delmas and Burbano, 2011). Delmas and Burbano (2011) highlight that greenwashing means that a firm engages in two behaviours simultaneously: poor environmental performance and positive communication about environmental performance, and provide a typology of firms based on environmental performance and communication, shown in Figure 4. Good environmental performers are called ‘green’ firms, and bad environmental performers are called ‘brown’ firms. Firms that communicate positively about their environmental performance are described as ‘vocal’ firms while those that do not are described as ‘silent’ firms. Accordingly, ‘vocal green firms’ are firms with good environmental performance that communicate positively about their environmental performance, while ‘silent green firms’ are those that do not communicate about their environmental performance. Brown firms that do not communicate about their environmental performance are ‘silent brown firms’, and those that communicate positively about their environmental performance are ‘greenwashing firms’.

<table>
<thead>
<tr>
<th>Communication about Environmental Performance</th>
<th>Environmental Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Communication</td>
<td>Good</td>
</tr>
<tr>
<td>Greenwashing Firms</td>
<td>Vocal Green Firms</td>
</tr>
<tr>
<td>Silent Brown Firms</td>
<td>Silent Green Firms</td>
</tr>
<tr>
<td>No Communication</td>
<td>Bad</td>
</tr>
</tbody>
</table>

Figure 4   Typology of firms based on environmental performance and communication.
Source: Delmas and Burbano (2011)

Walker and Wan (2012, p. 228) proposed a concept of ‘green-highlighting’, representing the combination of symbolic and substantive action, “where the firm discusses environmental responsibility in terms of
what they are doing currently or have done (substantive action), and what they plan to do in the future (symbolic action).” Accordingly, ‘green talk’ means only symbolic action, ‘green walk’ means substantive action, ‘green washing’ means talk minus walk and ‘green highlighting’ means talk plus walk (Walker and Wan, 2012). Greenwashing can be seen as the discrepancy between green talk and green walk, i.e. information not backed by substantive action (Walker and Wan, 2012).

With the transparency of the internet and the openness of social media it has forecast that there “will come a shift in green marketing from what you say to what you do” (Ottman, 2011, p. xi), and the difference between green marketing and green company will disappear. Ottman claimed further that she “personally believe that much so-called greenwashing is unintentional and even understandable in fast-growing industry still finding its sea legs. Green marketers today largely operate without the light of a strong governmental sun or established self-governance” (Ottman, 2011, p. xiv).

4.4 Firm size

The literature has revealed a positive relationship between the size (turnover) of companies and the magnitude of disclosure (see Tagesson et al., 2009 for overview). The literature provides several reasons for this relationship. Large organizations have a more pronounced effect on a society and engage more than small companies in legitimizing behaviour (Wolff, 1986). Accordingly, the media and the public generally demand more information from large corporations than from smaller ones (Gray et al., 1995; Scott, 2003). Larger firms have greater societal visibility (Etzion, 2007; Jiang and Bansal, 2003) which may intensify stakeholder requests (Garcés-Ayerbe et al., 2012). Large corporations, because they have a larger number of stakeholders that influence the corporation (Hackston and Milne, 1996; Knox et al., 2005), are under greater pressure to be environmentally responsible, and the stakeholders of large corporations often have expectations that the companies go beyond compliance (Sandhu, 2010). This is one of the explanations for why large firms are more environmentally responsive, adopt proactive environmental strategies and disclose environmental information to a greater extent than smaller firms. Furthermore, small firms have fewer resources to accumulate and generate certain information, do not see any competitive advantage in making environmental improvements (Simpson et al., 2004; Revell and Blackburn, 2007), and tend to perceive their
environmental impacts as low and ignore them, taking a passive stance (Buil-Carracas et al., 2008)

However, the study by Darnall et al. (2010) show that smaller firms are more acutely affected by perceived pressure from both internal and external stakeholders. “While smaller firms may rarely be subject to some stakeholder pressure, when they are, these pressures (however modest) appear to be regarded as quite threatening and therefore encourage the smaller firm to respond with greater vigour” (Darnall et al., 2010, p. 1088). These results are consistent with previous scholarship suggesting that resource-poor organizations are more likely to respond to stakeholder pressures (Aragón-Correa, 1998; Lefebvre et al., 2003; Rutherford et al., 2000). Environmental reporting can be seen as a tool for firms to frame debates with stakeholders (Kolk and van Tulder, 2005).

4.5 Industry effect

The industry sector is one of the factors that influence firms’ environmental engagement and disclosure. This is especially true in the case of environmentally sensitive industries and controversial industries that have been studied in the literature. Jackson and Apostolakou (2010) highlight that CSR is more extensive in sectors where firms have a strong negative impact upon stakeholders.

Environmentally sensitive industries

The literature shows that environmental activities to reduce companies’ environmental impacts are more common in ‘environmentally sensitive’ industries such as chemicals, forestry, oil and gas, and pharmaceuticals (KPMG, 1999; Campbell, 2003; Gao et al., 2005; Brammer and Pavelin, 2008)12. The underlying assumption is that companies belonging to these industries are perceived as environmentally damaging and face greater pressure than other companies from their stockholders related to environmental concerns (da Silva Monteiro and Aibar-Guzmán, 2010; Bowen 2000). A lack of environmental information disclosure could be interpreted by stakeholders as an indicator of bad environmental performance (da Silva Monteiro and Aibar-Guzmán, 2010), and they therefore have incentives to disclose environmental information. The significant environmental impact of the sector also motivates companies
to engage with environmental management. However, Cerin (2005) highlights the risk that dirty firms that report could become over represented in sustainability indexes, which are based on companies’ own disclosure and communication. “This may give rise to the paradoxical effect that people concerned with environmental and social issues are lured to invest through ethical funds and indexes in companies that emit more greenhouse gases per turnover that those companies in ordinary funds” (Cerin, 2005, p. 32).

Controversial industries
In relation to CSR in general, and not only when environmental activities are in focus, the ‘controversial industries’ (Blanco et al., 2012; Du and Vieira, 2012) or ‘extremely exposed industries’ (Palazzo and Richter, 2005) have a special status. An industry can be controversial owing to the goods or services that it provides and/or how its members conduct themselves in the process of achieving business objectives (Du and Vieira, 2012). Some industries, such as tobacco, alcohol and gambling are controversial because their products are viewed as sinful by society based on social norms, their addictive nature, or potential undesirable social consequences resulting from their use or abuse (Cai et al., 2012; Hong and Kacperczyk, 2009; Yoon et al., 2006). An industry can become controversial when there are industry-wide practices that violate stakeholder interests or social expectations, such as morally corrupt or unethical behaviours, socially or environmentally irresponsible practices, and product harm crises (Cai et al., 2012; Klein and Dawar, 2004).

Companies in controversial industries, such as tobacco companies should not imitate mainstream ideas on CSR (Palazzo and Richter, 2005). Corporations try to demonstrate that they operate on all three levels of CSR (Palazzo and Richter, 2005, p. 397) that are commonly identified: i) the instrumental level, referring to a corporation’s ability. Corporations make use of the skills and competences that are necessary to deliver products or services to the standard expected by their customers; ii) the transactional level, referring to a corporation’s integrity. The corporation complies with the legal and moral rules of their societal context. Its transactions are transparent, its behaviour is fair. It keeps its promises and acts with consistency; iii) the transformational level, referring to a corporation’s benevolence. The corporation demonstrates that it is willing to transcend self-interest for the sake of the common good. It contributes to the well-being of society.

Companies in controversial industries should abstain from any attempt to link their business to the common good and instead pursue an
integrity-based CSR approach on the transactional level of their operation. The efforts to publicize themselves as good citizens that contribute to the well-being of society are as likely to threaten their credibility as to increase their legitimacy.
5 Results

This chapter addresses each of the research questions and is divided into two sections. The first section addresses the greening of industry with a focus on production and product dimensions; the second section addresses the environmental initiatives within the ET sector.

5.1 Greening of industry with focus on production and product dimensions

This section reports results on greening of industry. Green activities communicated by Sustainability Sector Leaders are presented first (Research Questions A), followed by a proposed model of the main fields of the environmental profile (Research Questions B) and discussion on the definition of green and green-green business (Research Questions C).

5.1.1 Green activities communicated by Sustainability Sector Leaders (Paper IV)

This section is based on Paper IV. The paper considers the online communication of corporate social responsibility and sustainability issues, with a focus on the environmental dimension, by companies named as the 2009–2010 “Global Supersector Leaders” by the Dow Jones Sustainability Index (DJSI) as of April 11, 2010 (see Table 10). Headings from websites are presented in italics.
Table 10  

<table>
<thead>
<tr>
<th>Company</th>
<th>Sector</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bayerische Motoren Werke AG (BMW)</td>
<td>Automobiles and Parts</td>
<td>Germany</td>
</tr>
<tr>
<td>2. Australia and New Zealand Banking Group</td>
<td>Banks</td>
<td>Australia</td>
</tr>
<tr>
<td>3. Xstrata PLC</td>
<td>Basic Resources</td>
<td>UK</td>
</tr>
<tr>
<td>4. DSM NV</td>
<td>Chemicals</td>
<td>Netherlands</td>
</tr>
<tr>
<td>5. Panasonic Electric Works Co Ltd</td>
<td>Construction and Materials</td>
<td>Japan</td>
</tr>
<tr>
<td>6. Itausa-Investimentos Itau</td>
<td>Financial Services</td>
<td>Brazil</td>
</tr>
<tr>
<td>7. Unilever</td>
<td>Food and Beverage</td>
<td>Netherlands</td>
</tr>
<tr>
<td>8. Roche Holding AG</td>
<td>Health Care</td>
<td>Switzerland</td>
</tr>
<tr>
<td>9. TNT N.V.</td>
<td>Industrial Goods and Services</td>
<td>Netherlands</td>
</tr>
<tr>
<td>10. Swiss Re</td>
<td>Insurance</td>
<td>Switzerland</td>
</tr>
<tr>
<td>11. Pearson Plc.</td>
<td>Media</td>
<td>UK</td>
</tr>
<tr>
<td>12. Total S.A.</td>
<td>Oil and Gas</td>
<td>France</td>
</tr>
<tr>
<td>13. adidas AG</td>
<td>Personal and Household Goods</td>
<td>Germany</td>
</tr>
<tr>
<td>14. GPT Group</td>
<td>Real Estate</td>
<td>Australia</td>
</tr>
<tr>
<td>15. Kingfisher Plc</td>
<td>Retail</td>
<td>UK</td>
</tr>
<tr>
<td>16. Nokia Corp.</td>
<td>Technology</td>
<td>Finland</td>
</tr>
<tr>
<td>17. Telefonica S.A.</td>
<td>Telecommunications</td>
<td>Spain</td>
</tr>
<tr>
<td>18. Sodexo</td>
<td>Travel and Leisure</td>
<td>France</td>
</tr>
<tr>
<td>19. Cia Energetica Minas Gerais (CEMIG)</td>
<td>Utilities</td>
<td>Brazil</td>
</tr>
</tbody>
</table>

5.1.1.1 Production and product dimensions

The results show that all companies make the distinction between production and product related environmental issues. These issues are referred to in different ways in environmental and sustainability reports of companies and in the environmental information on their website. As shown in Table 11, a variety of general keywords (such as sustainable production, green company respectively product stewardship, green products) but even core business specific are used.

Looking at the environmental issues in the content tables of sustainability reporting (see Appendix 5), six of the 18 companies have production and product related sections, mostly as subsections to a main section such as “Environment” or “Our challenges”, or in some cases as a main section, “Our products and services” and “Our stores and operations”.

59
Table 11: Examples of general and core business specific keywords with regard to production and product related environmental issues.

<table>
<thead>
<tr>
<th>Keywords</th>
<th>Production related environmental issues</th>
<th>Product related environmental issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Sustainable production</td>
<td>Product responsibility</td>
</tr>
<tr>
<td></td>
<td>Eco-efficiency in manufacturing</td>
<td>Product stewardship</td>
</tr>
<tr>
<td></td>
<td>Environmental facilities</td>
<td>Environmental products/services</td>
</tr>
<tr>
<td></td>
<td>Environmental footprints</td>
<td>Substance and material management</td>
</tr>
<tr>
<td></td>
<td>Green company</td>
<td>Green products</td>
</tr>
<tr>
<td></td>
<td>Clean factory</td>
<td>Green services</td>
</tr>
<tr>
<td></td>
<td>Climate neutral company</td>
<td>Eco products</td>
</tr>
<tr>
<td></td>
<td>Green house neutral company</td>
<td>Energy-efficient product and services</td>
</tr>
<tr>
<td></td>
<td>Direct impacts</td>
<td>Cleaner products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental sound products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Design for environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental conscious products</td>
</tr>
<tr>
<td>(our own) (green, recourse -friendly,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>environmentally sound , sustainable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(impacts of):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(day-to-day) Operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>our own:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental footprint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecological footprint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecofootprint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon footprint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 footprint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental performance of our plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable business practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core business specific 13</td>
<td>Green buildings</td>
<td>Greening the fleet</td>
</tr>
<tr>
<td></td>
<td>Green IT</td>
<td>Energy saving alternative vehicle concept</td>
</tr>
<tr>
<td></td>
<td>Paperless technologies</td>
<td>Sustainability portfolio</td>
</tr>
<tr>
<td></td>
<td>Digitized processes</td>
<td>Responsible business lending</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green investments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Portfolio of digital products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Packing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The remade phone concept</td>
</tr>
</tbody>
</table>

5.1.1.2 Environmental impacts: Focus on consumers

A number of the companies state that they do not have a large environmental impact. Some of them highlight their contribution to improving the environment through their clients and consumers who use the company products, i.e. they focus on the environmental profile of their products. Others express an intention to show leadership and

13. This table was published in Paper IV. The published version included the core specific business key words for product related environmental issues under the production related environmental issues heading and vice versa. This has been corrected in this table.
therefore reduce their own environmental impacts, i.e. stress their production related profile.

Companies are also attempting to engage customers through education initiatives. These are often related to the core business. For example a multinational energy company “help [...] customers use energy more efficiently” and “encourage [...] customers to adopt energy – saving driving” or, a company operating in the property sector developed the Tenant Ecological Footprint calculator.

Companies can also help consumers and clients to be more environmentally friendly through the eco-profile of their products. For example producer of telecommunications equipment provides eco-services for their phones; a company in retail sector promotes eco-products through marketing campaigns, price promotions, sections in catalogues for eco-products and other initiatives. In another example, corporate clients of a company providing express delivery and mail services “can opt for CO₂ neutral postage and there is a website www.groenepost.nl on which they can determine the emissions emitted in sending their consignments”.

5.1.1.3 Employee engagement
Companies have taken different initiatives to raise environmental awareness and encourage employees to become more environmentally friendly, or as Kingfisher formulates it “to be champions of sustainability”. These initiatives support environmentally friendly behaviour both ‘across business’, for example through an environmental company intranet or Green teams, online training and special projects and ‘at home’ and ‘in private life’. TNT educates and supports its employees in taking energy saving measures at home. More than half of the companies (10 of 18 companies) have an employee related heading on the website, such as Employees, Our people, People, Approaches to employees, People and Culture.

5.1.1.4 Supply chain engagement
The majority of companies are dedicated to changing the way their suppliers operate. 13 of the 18 companies (72 %) provide information about their engagement of suppliers as a section in the sustainability report (11 of the 18 companies) and/or as a heading on the website. Supplier related headings such as Supply Chain, Approaches to supply chain, Customers and suppliers, Our suppliers and partner are found on the websites of 5 of the 18 companies.
5.1.1.5 Environmental Projects and Sponsorship

The previous sections have demonstrated that companies are engaged with mitigation of environmental impacts of their operations and products. Furthermore, companies have undertaken a variety of environmental initiatives, both core business related and non-core business related to support local and global communities. Examples of core business related initiatives are eco-friendly lighting lessons for elementary school pupils by a company that develops and manufactures electrical contractors’ materials and home appliances, support of nature conservation as in the Plant a Billion Trees campaign by a publishing company. Companies also support environmental activities in fields unconnected to their core business, such as tree-planting, natural conservation activities and clean-up activities near business sites or supporting a biodiversity project in Kenya.

Another finding from the survey is that sponsorship in different fields is an important part of companies’ approach to corporate responsibility and that in some cases sponsorship includes environmental issues. Companies are reporting on these initiatives in their sustainability reports. Two companies stood out as they clearly identified the “eco” dimensions of their sponsorship on their website. Similar to sponsorship, employee volunteering in different areas, including the environment, is another approach to corporate responsibility.

5.1.1.6 Stakeholder engagement

One third of the companies (six of 18) have a stakeholder related heading such as Stakeholder Engagement, Stakeholders dialog, Stakeholders. Eight of the companies have a related section in the sustainability report (see Appendix 5). Notably, with one exception, the companies that have stakeholder related headings on the website are not the same as those that have a stakeholder section in the report. In addition, one company has the heading Materiality issues. According to GRI G3 Sustainability Reporting Guidelines (2000–2006) ‘material issues’ “are topics and indicators that reflect the organization’s significant economic, environmental, and social impacts, or those that would substantively influence the assessments and decisions of stakeholders."

5.1.1.7 CSR on the website

The results show that the vast majority of companies have a primary link to CSR/ sustainability issues. Table 12 indicates different terms used both as headings and as names for reports. These results are in line with
findings by Hubbard (2009b) that sustainability reports lacked consistency in name or format.

<table>
<thead>
<tr>
<th>Heading</th>
<th>No.</th>
<th>Report names</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate responsibility</td>
<td>6</td>
<td>Sustainability</td>
<td>6</td>
</tr>
<tr>
<td>Sustainability</td>
<td>5</td>
<td>Corporate responsibility</td>
<td>7</td>
</tr>
<tr>
<td>Responsibility</td>
<td>2</td>
<td>CSR</td>
<td>1</td>
</tr>
<tr>
<td>CSR</td>
<td>1</td>
<td>Environment and society</td>
<td>1</td>
</tr>
<tr>
<td>Corporate citizenship</td>
<td>1</td>
<td>Triple</td>
<td>1</td>
</tr>
<tr>
<td>Environment and Society</td>
<td>1</td>
<td>Our impact on society</td>
<td>1</td>
</tr>
<tr>
<td>CR and Environment</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Only two companies have the heading under the *About us* umbrella website, however one of them also has *Corporate Responsibility* as a Quicklink on its homepage.

5.1.2 Corporate environmental profile (Paper IV)

This section is based on *Paper IV*. The results of survey of Global Supersector Leaders show that all companies are aware of production and product related environmental issues. The results also show that the environmental profile of a company can include environmental engagement, both with and without links to the core business, in the local community or in society, as initiatives to encourage responsible environmental behaviour among employees, consumers and the public. The model of corporate environmental profile can therefore consist of production and product oriented initiatives, i.e. environmental initiatives within core business operations and initiatives that go beyond core business operations - which can be divided in two groups, environmental education and environmental projects and sponsorship. Environmental initiatives outside the scope of core business operations are often linked to the core business or to the main environmental impacts of the core business. For example, a company with food related core business support projects or education in food and the environment, or a company whose production or products involve using large amounts of water support water related environmental projects or offer education on what individuals can do to save water in their daily lives.

Furthermore, environmental initiatives may be targeted at community, national or international levels, as well as targeting employees, customers and the general public. Figure 5 provides a model of the main fields of the environmental profile based on the results of this survey and the literature.
5.1.3 Green and green-green business (Paper II, Paper IV)

Results show that the distinction between product and production related environmental initiatives is important for understanding environmental engagement of companies within “environmental sectors” such as the ET sector and that that all companies ranked as Sustainability Sector Leaders make the distinction between production and product related environmental issues. Therefore this thesis suggests that the distinction between ‘green’ and ‘green-green’ business should be based on the production and product orientation (Table 13).

**Table 13 Green and green-green business.**

<table>
<thead>
<tr>
<th>Environmental profile of production</th>
<th>Environmental profile of product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green business</td>
<td>X</td>
</tr>
<tr>
<td>Green business</td>
<td></td>
</tr>
</tbody>
</table>
| Green-green business               | X                               | X

In this defining scheme companies that are ‘green-green’ are companies with both production and product related environmental profiles – i.e. companies that both operate in an environmentally friendly manner and
provide environmentally friendly products. ‘Green’ companies have either production or product related environmental profile.

5.2 Environmental technology

This section reports results on the environmental initiatives within the ET sector. Companies’ environmental work according to results from the questionnaire is presented (Research Question D), followed by the environmental information found on websites (Research Questions E). Finally the way companies, networks and industry associations treat and communicate the production and product related environmental aspects (Research Question F), including the influence of the environmental profile of the sector on the environmental engagement of companies in the ET sector (Research Question G) is described.

5.2.1 Companies’ environmental work according to questionnaire (Paper I)

This section is based on Paper I which raises the question of production and product related differences in the environmental work and marketing of companies in the ET sector. Swedish companies listed in Sustainability Sweden (SS 2007) were surveyed.

5.2.1.1 Production and product related environmental objectives

This questionnaire-based study of environmental engagement among Swedish SMEs in the ET sector was relatively limited, with only 53 respondents. The survey found that a large majority (83%) of the respondents set environmental objectives, but only half of these companies set environmental objectives for both their processes and products (Table 14). A quarter only set environmental goals related to products and a quarter only set targets for processes and activities. One participant did not indicate whether their environmental objectives were related to products or to activities or both.
Table 14  Environmental objectives relating only to company processes, only to company products, and relating to both processes and products.

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
<th>No. of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company has environmental objectives</td>
<td>83</td>
<td>44</td>
</tr>
<tr>
<td>Regarding only processes</td>
<td>26</td>
<td>11</td>
</tr>
<tr>
<td>Regarding only products</td>
<td>26</td>
<td>11</td>
</tr>
<tr>
<td>Regarding both processes and products</td>
<td>49</td>
<td>21</td>
</tr>
</tbody>
</table>

5.2.1.2 Production and product related environmental aspects in marketing

It is often claimed that there is increasing competition between companies with respect to their environmental profiles. A question about competition and environmental practices was therefore included in the questionnaire. The companies were asked whether environmental aspects were important in their marketing. The results of the survey (referred to as ETS 2007, as in the Paper I) were compared to results of an extensive survey on environmental work in Swedish SMEs published by the Nutek14 (the Swedish Agency for Economic and Regional Growth) in 2003 (Nutek, 2003), as shown in Table 15. The results show that there was a significant increase in the number of companies that considered environmental aspects to be very or quite important in their marketing compared to the previous survey. The companies in the environmental sector also placed more importance on the environmental aspects of their products than of their activities, which is in line with the sector providing more environmentally friendly products. Three companies placed higher attention on the environmental aspects of their activities than of their products.

Table 15  Environmental aspects in marketing.

<table>
<thead>
<tr>
<th></th>
<th>Nutek 2003</th>
<th>ETS 2007 Percentage of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Company activities</td>
<td>Company product</td>
</tr>
<tr>
<td>Very important or quite important</td>
<td>31</td>
<td>75</td>
</tr>
<tr>
<td>Not important or less important</td>
<td>69</td>
<td>25</td>
</tr>
</tbody>
</table>

5.2.2 Environmental information on websites (Paper II)

This section is based on *Paper II*. The main research question is the same as in *Paper I* – are the companies in the ET sector implementing environmental work? While the survey in *Paper I* was questionnaire based and relatively limited (only 53 respondents) the survey in *Paper II* took a broader approach and was internet based. It was directed at Swedish companies that were listed at Swentec, as of March 13, 2009. The investigation was performed in two steps. First, the presence of environmental related information on websites was investigated. In the second step all environment related information on company websites are analyses in detail with focus on the product and production dimensions. The results from the first part of survey are presented in this section. Results from the second part are presented in sections below, 5.2.3.1–5.2.3.3.

As shown in Table 16, only 21% to 45% of companies publish information about their environmental work (environmental policies, goals, certifications) on their website. Even Environmental Training and Information companies show a relatively low level of engagement with their own environmental issues. The Waste Management and Recycling segment has the next highest rate. The new generation of ET segments shows even less of this information, with the Solar Energy” segment showing the least of all the companies surveyed.

Nearly all companies have a website with information about their products or at least contact information. However, quite a small proportion of companies publish environment related information on their website (between 25% and 51%).
Table 16  Environmental information on websites.

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Number of companies</th>
<th>Available website</th>
<th>Environmental information on website</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>only environmental benefits with products</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Bioenergy fuel</td>
<td>108</td>
<td>101</td>
<td>45%</td>
</tr>
<tr>
<td>Solar energy technology</td>
<td>26</td>
<td>24 (92%)</td>
<td>21%</td>
</tr>
<tr>
<td>Wind energy technology</td>
<td>18</td>
<td>16 (89%)</td>
<td>31%</td>
</tr>
<tr>
<td>Environmental training and information</td>
<td>43</td>
<td>39 (91%)</td>
<td>26%</td>
</tr>
<tr>
<td>Waste management and recycling</td>
<td>156</td>
<td>149 (96%)</td>
<td>34%</td>
</tr>
<tr>
<td>Total</td>
<td>331</td>
<td>307 (93%)</td>
<td>37%</td>
</tr>
</tbody>
</table>

5.2.3 The production- and product related dimensions (Paper II, III and V)

5.2.3.1 Companies (paper II)

The results displayed in Table 17 show that 32% of the companies surveyed (33% of companies in Waste Management and Recycling (WM&R), 17% in Solar Energy Technology (SET) and 25% in Wind Energy Technology (WET) distinguish between production and product related environmental impacts; i.e. not all companies with environmental information on their website make this distinction. The rate companies that clearly distinguish between production and product related an environmental impact is even less as some companies have unclear information about their products and activities in their environmental policies and management, and another group limit environmental information to their products.

One of the companies surveyed did not have any environmental headings on their main webpage, but provided environmental declarations for their products. These declarations comprised of production and product related information such as ‘production’ and ‘product information’ (9 WM&R). There were a few companies with “production” as a headline: Production, (23 SET), Production system (25 SET) and Process (67 WM&R). The website of (43 WM&R) was structured around Production and Products, while (83 WM&R) provided very detailed...
descriptions of the different stages of the production process: “development”, “pre-production”, “production” and “postproduction”.

Table 17 Production and product dimensions.

<table>
<thead>
<tr>
<th>Environmental information on website (process and/or product)</th>
<th>Waste Management and Recycling</th>
<th>Solar Energy Technology</th>
<th>Wind Energy Technology</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production and product dimension clearly differentiated</td>
<td>26 %</td>
<td>17 %</td>
<td>19 %</td>
<td>25 %</td>
</tr>
<tr>
<td>Production and product dimension differentiated, but not clearly</td>
<td>7%</td>
<td>33%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Production and product dimension not differentiated in the environmental policies and information</td>
<td>1%</td>
<td>4 %</td>
<td>6 %</td>
<td>1 %</td>
</tr>
<tr>
<td>Production and product dimension not differentiated –only environmental benefits with product</td>
<td>5%</td>
<td>4 %</td>
<td>-</td>
<td>5 %</td>
</tr>
</tbody>
</table>

In some cases (7% of companies) it is difficult to interpret whether general statements about environmental impacts and goals relate to product or production related environmental aspects. In other cases this distinction is made very clearly. For example (3 WM&R) describes its environmental engagement as “Environmental focus for customers and our own processes” with headlines such as Green processes for Technologies serving the environment, i.e. the products of the company and Green operations for “Our own environmental performance”, i.e. their own production activities. This example also illustrates that the use of the term ‘process’ can be imprecise. It is not always obvious whether the term ‘process’ refers to the ‘product of the company’ or ‘the production of the products of company’. This confusion applies not only to the ET sector but to all companies that deliver products in the form of a ‘process’. One solution can be to use the term ‘manufacturing process’, as (21 SET) does.

Notably, there are certified companies among those that do not differentiate between production and product related environmental impacts. In addition, the results show that 16% of companies have a certified environmental program. With a few exceptions the companies implement certified environmental management systems according to ISO 14001. One company (132 WM&R) has an environmental diploma according to the standards of Gothenburg City Authority and another...
company has a label of its own. There is also an example of a company which has two levels of EMS – Gold Level for sites with significant numbers of employees, and Bronze Level for smaller sites (3 WM&R). In the case of companies with several sites, and particularly where there are sites in different countries it is not always clear which site the certificate refers to, especially in the case of German or French certificates.

5.2.3.2 Environmental profile of the sector as motivation for companies environmental engagement (paper II)

The ET sector delivers products with prominent environmental profiles. This might be expected to also indicate a high degree of engagement with production related environmental profiles. However, the above results show that only between 21% and 45% of companies list information about their environmental work on their websites. The present survey reveals that some companies surveyed explicitly express the environmental profile of the sector as motivation for environmental engagement in their own operations.

In contrast to this position, a few companies clearly state in their environmental policies and environmental management documents that they contribute to a better environment through costumers using their products. This is manifested in descriptions that include both ‘customers’ and ‘own products’.

5.2.3.3 Use of the environmental profile on company websites and in presentations at Swentec (paper II and background material)

Table 18 shows the use of environmental profiles in presentations at Swentec and on company websites. Surprisingly, with only one exception in the 200 companies investigated, the production related environmental profile is not a part of the companies’ presentations on the Swentec website, and only a few companies include this information in the ‘direct presentation’ on their main web page. Where it is presented, this information is presented as text – ‘X is certified according to ISO 9001 and ISO 14001’, as a picture of the certificate, or under the heading ISO 14001. Surprisingly, even the first recycling company in Sweden to be ISO 14001 certified does not highlight this fact on its main webpage.
Table 18  Use of the environmental profile on company websites and in presentations at Swentec.

<table>
<thead>
<tr>
<th></th>
<th>Waste Management and Recycling</th>
<th>Solar Energy Technology</th>
<th>Wind Energy Technology</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number companies</td>
<td>156</td>
<td>26</td>
<td>18</td>
<td>200</td>
</tr>
<tr>
<td>Available websites</td>
<td>96 %</td>
<td>92 %</td>
<td>89 %</td>
<td>94 %</td>
</tr>
<tr>
<td>Direct environmental headings (e.g. Environment, Environment and Quality)</td>
<td>17%</td>
<td>8 %</td>
<td>19 %</td>
<td>16 %</td>
</tr>
<tr>
<td>Environmental Certification</td>
<td>16 %</td>
<td>13 %</td>
<td>13 %</td>
<td>16 %</td>
</tr>
<tr>
<td>Environmental profile of company in presentation on Swentec</td>
<td>0,7%</td>
<td>-</td>
<td>-</td>
<td>0,5 %</td>
</tr>
<tr>
<td>Cleantech terms in presentation</td>
<td>0,7%</td>
<td>-</td>
<td>1 %</td>
<td>1 %</td>
</tr>
<tr>
<td>Only Swedish language version of website</td>
<td>13%</td>
<td>-</td>
<td>-</td>
<td>10 %</td>
</tr>
</tbody>
</table>

Only 17% of companies had headings that referred to environmental issues on their main web page. 21% had links to pages with headings about environmental issues. Several of these companies describe themselves as ‘environmental companies’ on their website (e.g. 11, 32 WM&R), while the terms ‘cleantech’ or ‘clean technology’ are rarely seen. Only one company (24 WM&R) mentions ‘cleantech’/‘clean technology’ in its presentation at Swentec. A few companies, such as (23 SET) and (29 WM&R) use ‘clean technology’ related terms on their websites. The majority of companies surveyed belong to the traditional subsector of ET (WM&R), which may partly explain the relatively low frequency of ‘clean technology’ related terms in the company information.

In general, the companies provide substantial information about their environmental work. The vast majority of companies with environmental policies link to relevant documents or present the policy in some other way on their website. However, some companies only mention the existence of an environmental policy and do not provide further details. The majority of companies that provide information about certification provide a picture of the certificate. A few companies (49, 61, 92 WM&R) only show the certificate and do not provide any additional information about environmental work. One company mentions their implementation of a certified management system in general terms, without providing any details – “we have certified management systems for environmental, quality and work environment” (104 WM&R).

This survey found that the majority of companies have information on their website in English and other languages. Several companies have a full version in English, while the others provide only limited information in English. In the case of concern or group companies, there are global or international websites and local sites in different countries. Fewer than
10% of the companies investigated have a Swedish-only website. In fact there are several examples of Swedish companies with English-only websites. Significantly, none of the companies within the clean technology subsectors (SET; WET) had a Swedish-only website.

5.2.3.4 National and regional networks (paper III)
Companies in the ET industry are supported at both national and regional levels. This undersection is based on online survey of 7 regional and 3 national networks supporting the ET sector, conducted in Paper III, see Table 19. Suppliers of environmental technology are listed at 9 of the 10 organizations investigated. The Association of Swedish Environmental Technology (ASSET) is an umbrella organization for regional and national associations of environmental technology industries in Sweden and has no affiliated companies supplying environmental technology.

Table 19 shows that presentations of members by these organizations vary from links to members’ websites, to other more informative presentations. Three of the nine organizations with affiliated companies only put up contact information and links to members’ websites. The more informative presentation of members varies from unspecified information to form with specified headings. Presentations of companies listed at Swentec are limited – the form comprises of two headings: Area of operation and Key products. Ecotech Stockholm and Ecoex Business Göteborg are examples of organizations that have several headings in their members’ presentations.

Only 3 of the organizations present product related environmental aspects in their form for company presentations. Of these, two (Ecotech Stockholm, Ecoex Business Göteborg) have the headings Environmental benefits with technique/products/services under Product description, and one (Cleantech Inn Sweden) mentions environmental benefits of products in the presentation (“CINNS About XX”). Production related environmental aspects are even less frequently mentioned – in only two cases. Ecotech Stockholm has a heading Certification in the members’ presentation gallery, while production related environmental aspects are mentioned by SET among its vision and goals. Company descriptions, even when there are no clear environmental related headings may include certifications and other environmental management information. Educational initiatives in the form of demonstrations and technical visits are made available by 4 organizations.
Table 19 National and regional initiatives supporting growth of environmental technology in Sweden, with focus on environmental related aspects of product and production as well as environmental education initiatives.

<table>
<thead>
<tr>
<th>National initiative</th>
<th>Language</th>
<th>Members presentation</th>
<th>Product</th>
<th>Production</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swedish Environmental Technology Council (Swentec)</td>
<td>Swedish, English</td>
<td>Find Swedish Cleantech: Sustainable built environment, Industrial solutions, Plants, Suppliers</td>
<td>Partly: Description of examples of Sustainable built environment, Industrial solutions and Plants, where environmental benefits are highlighted</td>
<td>Demonstration</td>
<td></td>
</tr>
<tr>
<td>Swedish Environmental Technology (SET)</td>
<td>Swedish, English</td>
<td>Form: information about company, environmental benefits with products, and certifications</td>
<td>About SET/ Vision and goals “Assist companies seeking environmental Certification”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Association of Swedish Environmental Technology (ASSET)</td>
<td>Swedish, very limited in English</td>
<td>Links (not suppliers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional initiatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleantech Inn Sweden (CINNS)</td>
<td>Swedish, English</td>
<td>Form: “CINNS About XX” (only in Swedish) “XX Managing Director’s Brief”</td>
<td>“CINNS About XX”</td>
<td>Demonstration</td>
<td></td>
</tr>
</tbody>
</table>
5.2.3.5 Industry associations (paper V and background material)

This section is based on Paper V. The paper investigates the character of ecopreneurship in the environmental technology sector, with focus on environmental responsibility and environmental leadership at both the company and sector level. The industry associations are important for the creation of legitimacy at industry level. Table 20 presents the industry associations, their vision, other information available on their websites as of April 2011, and important issues and problem areas identified during interviews with representatives of the organizations. For example, the Swedish Recycling Industries Association published “Long-term policies and priority areas 2012” (ÅI, 2012).
<table>
<thead>
<tr>
<th>Subsector</th>
<th>Vision / Goal</th>
<th>Issues</th>
<th>Problem areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Energy Association of Sweden (SEAS)</td>
<td>The vision</td>
<td>*Financial frameworks</td>
<td>*Short term economic instruments</td>
</tr>
<tr>
<td></td>
<td>(direct transformation from solar radiation to heat and electricity) plays an important role in a sustainable Swedish energy system and Swedish companies are among the leaders in Europe.</td>
<td>*Planning goals for solar thermal energy and solar electricity (as planning goals for wind power)</td>
<td>*Net charge</td>
</tr>
<tr>
<td></td>
<td>Information on website:</td>
<td>*Access to internet connection</td>
<td>*Political disinterest</td>
</tr>
<tr>
<td></td>
<td>Press releases</td>
<td></td>
<td>*Difficulty of maintaining the market within the energy market</td>
</tr>
<tr>
<td></td>
<td>Opinion articles</td>
<td></td>
<td>*The industry is small, has low visibility (industry structural problems)</td>
</tr>
<tr>
<td></td>
<td>Documents</td>
<td></td>
<td>”Sector with small companies”; “many companies are struggling to survive”</td>
</tr>
<tr>
<td></td>
<td>Support and contributors</td>
<td></td>
<td><strong>Standard/Certification:</strong> Quality Certification of installers</td>
</tr>
<tr>
<td>Solar Energy Association of Sweden (SEAS)</td>
<td>The vision</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(direct transformation from solar radiation to heat and electricity) plays an important role in a sustainable Swedish energy system and Swedish companies are among the leaders in Europe.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>Aims</td>
<td>*Financial frameworks</td>
<td>*Local resistance</td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>Swedish Wind Energy’s main aim is to promote the development of the market for wind power in Sweden.</td>
<td>*The permit process</td>
<td>*The permit process</td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>Our goal is to ensure that wind power is developed to its full potential and contributes to long-term sustainability for Sweden.</td>
<td>*Best wind conditions</td>
<td>*The municipal veto</td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>Our overall goal is that wind power is seen as a natural part of the Swedish countryside and produces 30 TWh by 2020.</td>
<td>*Opinion and acceptance</td>
<td>*Organized resistance to wind power (like the one against climate change)</td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>Information on website:</td>
<td>*Technology</td>
<td>*Swedish Armed Forces requirement of a 40 km wind power free radius around military bases</td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>Press releases</td>
<td>*Logistics and transport</td>
<td></td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>Reports</td>
<td>*Transforming the planning goals for wind energy to development goals; political and economic considerations should determine where and how development should take place (30 TWh wind power by 2020: 20 TWG on land and 10 TWh offshore)</td>
<td><strong>Standard/Certification:</strong> Code of conduct for wind farm operators</td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>Newsletter (monthly)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swedish Wind Energy</td>
<td>*Optimal incentives towards a renewable energy market: general technology-neutral, standardization, such as the electricity certificate, no direct steering instruments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Swedish Bioenergy Association of Sweden (Svebio)</td>
<td>Svebio’s vision and mission statement</td>
<td>*The development at branch level is good but the individual companies can have problems</td>
<td></td>
</tr>
<tr>
<td>The Swedish Bioenergy Association of Sweden (Svebio)</td>
<td>Svebio’s vision is to be the leading representative and to set a good example internationally for developing bioenergy in a sustainable society. Svebio should promote and develop the use of bio-energy in an economically and environmentally optimal way, nationally and internationally on a sound basis.</td>
<td>*The market is unstable</td>
<td></td>
</tr>
<tr>
<td>The Swedish Bioenergy Association of Sweden (Svebio)</td>
<td>Information on website:</td>
<td></td>
<td>*Biofuel is high tech, but fuels are fairly cheap and margins are small</td>
</tr>
<tr>
<td>The Swedish Bioenergy Association of Sweden (Svebio)</td>
<td>Press releases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Swedish Bioenergy Association of Sweden (Svebio)</td>
<td>Documents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Swedish Bioenergy Association of Sweden (Svebio)</td>
<td>Photos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Swedish Bioenergy Association of Sweden (Svebio)</td>
<td>Bioenergy in the media</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsector</td>
<td>Vision / Goal</td>
<td>Issues</td>
<td>Problem areas</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------</td>
<td>--------</td>
<td>--------------</td>
</tr>
<tr>
<td>The Swedish Recycling Industries' Association (ÅI) Formed 1998</td>
<td><strong>Our business idea</strong> To gather all Swedish recycling companies of good repute and with high environmental profile in one organization. <strong>Information on website:</strong> Press releases Opinion articles Response Reports Newsletter (monthly, from 2008)</td>
<td><em>Open market for food waste from businesses</em> <em>Opening up the household waste market for more players and competition</em> <em>To promote recycling over energy recovery (recycling certificate)</em></td>
<td><em>Household waste (lack of competitive procurement, priority of municipal waste companies)</em> <em>Municipal monopoly of &quot;comparable to household waste&quot; from companies, organizations, Competition on equal terms</em></td>
</tr>
</tbody>
</table>

Economic actors and entrepreneurs are the central agents of change in the process of transformation that is needed to solve environmental challenges. The growing recognition of environmental issues has provided entrepreneurs with new opportunities, resulting in the emergence of ecopreneurs. The initiatives to decrease product and production related environmental impacts are used in this paper to identify green-green ecopreneurships characterised by environmental leadership. The literature review shows that there are different approaches to categorizing ecopreneurs and sustainability entrepreneurs. A key dimension is the values and motives of entrepreneurs, with a dichotomy between opportunistic ecopreneurs and those driven more by nonprofit value.

Environmental technology and cleantech are commonly accepted as being green businesses as these sectors deliver environmentally preferable products and services. According to the results there is a strong awareness about this environmentally friendly profile within subsectors of environmental technology industry, both within industry associations and within companies. However, this awareness does not always lead to a broader, green-green view of the environmental leadership. In many cases the industry associations and the companies within the environmental technology sector represent a more opportunistic approach towards environmental issues. The interviews with companies show an opportunistic approach towards environmental issues such as for example:

To be honest, the environment is not always in focus, the business is in focus. And even if our customers are environmentally oriented, as long as it costs money, they are not. It is a reality.

It is my strong belief that the environment is driven by policy decisions and rules. There is no market which through its own interest is driving environmental issues. Unfortunately, it’s business. And business must be influenced by political decisions.
Only one of the industry associations explicitly addresses environmental impacts of members (The Swedish Recycling Industries’ Association). Another addresses environmental aspects of the products of members (Solar Energy Association of Sweden). As shown in Table 21 all industry associations have information about environmental benefits from the products and services delivered by the subsector. Two organizations mention environmental impact throughout their own operations: Swedish Wind Energy and the Swedish Recycling Industries’ Association. But of these, only the Swedish Recycling Industries’ Association addresses environmental leadership of the sector in a broad, green-green manner, i.e. including environmental impacts of members.

Table 21 Environment related information on the webpages of national industry associations within solar energy, wind energy, bioenergy, and recycling. The website heading where the information is provided is in italics.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Environment related information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Energy Association of Sweden (SEA)</td>
<td>About Solar Energy&lt;br&gt;Become Member&lt;br&gt;Ethics and products:</td>
</tr>
<tr>
<td></td>
<td>&quot;Materials used in products or systems which are manufactured, sold or used should be selected</td>
</tr>
<tr>
<td></td>
<td>according to the principle to provide as little environmental impact as possible with respect</td>
</tr>
</tbody>
</table>
|                                                   | the prevailing economic conditions."
|                                                   | "So-called phase-out substances according to the definitions of the Swedish Chemicals Agency    |
|                                                   | www.kemi.se may not be present in products or systems that are manufactured, sold or used...." |
| Swedish Wind Energy                                | About wind power<br>Environmental policy                                                      |
|                                                   | "The industry association Swedish Wind Energy works daily to promote and facilitate the        |
|                                                   | expansion of wind energy in Sweden. Through our efforts, we are making a positive impact on    |
|                                                   | the future. Wind energy creates no emissions into the atmosphere and, consequently, does not    |
|                                                   | contribute to climate change. Wind energy also increases our self-sufficiency and reduces the    |
|                                                   | need to import fossil and other fuels. But our commitment goes still further – we are also     |
|                                                   | taking internal steps to reduce environmental impact throughout our operations”                  |
| The Swedish Bioenergy Association (Svebio)         | Values                                                                                         |
| The Swedish Recycling Industries’ Association (ÅI)  | "Benefits to society” (product related)                                                       |
|                                                   | "ÅI:s environmental impacts”                                                                   |
|                                                   | "Environmental impacts of members”                                                              |
|                                                   | Ethical guidelines                                                                             |
|                                                   | "Environment: Two years at the latest from the acceptance of this obligation - the company    |
|                                                   | should have introduced ISO 14001, EMAS or its equivalent.”                                        |
|                                                   | "Plan for Energy Efficiency: The company adopts an action plan for efficiency enhancing        |
|                                                   | measures. The aim is to reduce consumption of non renewable energy and emissions greenhouse   |
|                                                   | gases.”                                                                                         |
|                                                   | Climate benefits of recycling                                                                 |
|                                                   | "In the building of a sustainable society, recycling represents one of the most important      |
|                                                   | factors and makes one of the major contributions. We believe that this is a binding obligation.|
|                                                   | Recycling must take place with responsibility and knowledge. The members of the Recycling      |
|                                                   | Industries’ Association will therefore draw up their environmental objectives and policies on    |
|                                                   | the basis of this document.”                                                                      |
6 Discussion of research findings

6.1 Corporate environmental profile

The proposed model of environmental profile is in line with a broad understanding of greening of industry, including activities of company, suppliers and customers (Paton, 2000). The main division of categories of environmental activities is the division between activities related to core business and those outside of core business. This division is also crucial for categorizing CSR activities in general (Halme, 2010; Grafström et al., 2010; Peloza and Shang, 2011) as core business related and as philanthropy. Based on results from the study on DJSI Global Supersector Leaders’ environmental initiatives it can be added that the philanthropy activities may or may not be linked to the core business, to either product or production; i.e. the philanthropic activities can have high or low fit (Haley, 1996; Becker-Olsen et al., 2006; Du et al., 2010), as shown in Figure 6. In this case these activities have a high CSR fit they are in line with Porter and Kramer’s (2002) recommendation that CSR initiatives should be deeply rooted in or at least linked to business operations and core competences.

<table>
<thead>
<tr>
<th>CSR ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core business related</td>
</tr>
<tr>
<td>Product related</td>
</tr>
<tr>
<td>High fit</td>
</tr>
</tbody>
</table>

Figure 6 Core business related CSR activities and philanthropy. Source: Elaboration of Grafström et al. (2010), Peloza and Shang (2011)
It should be borne in mind that the proposed model is based on an overview of environmental initiatives of recognized global sustainability leaders. These global companies have both greater pressures and the resources to develop and implement a broad scope of environmental engagement. The prerequisites of SMEs are not the same. There is considerable evidence that the extent of voluntary disclosures increases with corporate size (Tagesson et al., 2009; Galani et al., 2012). SMEs primary focus is on production and product related environmental initiatives associated with their core business operations.

Furthermore, different industry sectors have different impacts in the various dimensions of environmental profile. Direct impacts from production of products, in the supply chain or in-use impact of product are sector dependent, and these impacts influence the environmental initiatives taken by companies. The focus of the environmental profile of companies in different sectors can and should differ. For example in an industry sector with little or no in-use impact of the product, the focus remains on direct, production and own activities related impact. For example ANZ Banks focuses on the environmental impact of their activities and their environmental footprint (Appendix 4). As Winsemius and Guntram (2002, p. xvi) state “there is no single correct environmental strategy applicable to all companies: there are ‘a thousand shades of green’”.

6.2 Green and green-green business

The results show that the distinction between green and green-green business based on the production and product orientation can be useful for better understanding corporate greening. The production and product related definition of ‘green-green’ business is in agreement with the division of ‘environmental initiatives’ proposed by Gilley et al. (2000), and the division of ‘green innovation’ (Chen et al., 2006). ‘Green-green’ organizations, i.e. companies that both operate in an environmentally friendly manner and provide environmentally friendly products, can be considered as ‘genuine green’ businesses (Shrivastava, 1995), ‘extreme green’ companies (Yakhou and Dorweiler, 2004), and as examples of ‘political economic organizations’ (Söderbaum, 2008). ‘Green-green’ dimensions of business greening, i.e. production and product related environmental profiles, can be used in methods to identify ‘environ-
mental leaders’, as requested by Runhaar et al. (2008) in their call for methods for identifying environmental leaders.

Theories on the ‘progression approach’ in environmental management and ‘path dependence’ between environmental strategies (Hart, 1995) do not seem to apply to the ET sector. According to path dependence between environmental strategies or the progression approach to environmental strategies the companies tend to undertake production related activities such as pollution prevention at the beginning of their environmental engagement; product oriented environmental initiatives come later on. The results of this study show that a majority of companies in the ET sector that have product-oriented environmental strategies lack process-oriented environmental initiatives.

Furthermore, the results do not favour Isaak’s (1998) definition of ecopreneur and green-green companies as companies that are established with environmental considerations at their centre from the outset. Companies in the ET sector, especially those from the new generation of the environmental industry, are generally considered as ‘ecoinnovators’ and ‘ecopreneurs’, even though their engagement in environmental improvements in their own processes and activities is not in place from the beginning.

The production and product related definition of ‘green-green’ business proposed in this thesis is in line with the broad understanding of the concepts of ‘green products’ and ‘green manufacturing’ presented in section 3.1. Results in this thesis on environmental initiatives of DJSI Global Supersector Leaders show that environment initiatives of all companies consist of both product and production environmental issues.

6.3 Environmental profile of the sector – does it encourage or inhibit companies' environmental engagement?

Nearly all companies have a website with information about their products or at least contact information. However, a relatively small proportion of companies publish environmental related information on their website. Depending on the subsector, between 25% and 51% of companies publish environmental related information (i.e. about their own environmental work and/or about the environmental benefits from
their product). The proportion of companies that only publish information about environmental benefits of their products varies between 0–6%, depending on the sector. Even Environmental Training and Information companies show a relatively low level of engagement with their own environmental issues. The Waste Management and Recycling segment has the next highest rate. The new generation of ET segments shows even less of this information, with the Solar Energy segment showing the least of all the companies surveyed. This may be explained by the differences in the maturity of these two segments. The Waste Management and Recycling segment, as the traditional ET, is the most mature, and companies in this sector are likely to have been in operation for a longer time. These companies have probably had more time and opportunities to engage with their own environmental activities. Companies in the Bio-energy Fuel segment had the most information, probably because of the relatively large environmental impacts and intensity of the risk in this segment.

The relative low share of information about environmental engagement within the environmental industry (both at company and industry level) may indicate that companies are leveraging environmental business opportunities, without substantial awareness about their own environmental impacts. As mentioned above, the cleantech sector is market driven. There may also be other explanations for the low level of environmental disclosure by companies within ET. The size effect may be one explanation. As mentioned in section 4.4, there is a positive relationship between the size (turnover) of firms and the magnitude of disclosure. A large majority (80%) of companies within the ET sector are classified as SMEs with less than 10 employees (Energy Agency, 2011). According to the literature, the main reasons for non-disclosing SMEs are the lack of cost effectiveness of disclosure and the perception of lack of awareness about environmental impacts.

The sector effect may provide another explanation. According to the previous literature mentioned in section 4.5, a positive relationship has been observed between environmentally sensitive industries and the level of environmental disclosure. Environmentally sensitive industries need to impart a higher level of (environmental) legitimacy to the relevant public than companies operating in industries that have acceptable levels of environmental impact. The companies within ET cannot be categorized as environmentally sensitive industry, which conflicts with the low level of environmental disclosure of companies within this sector. In the case of ET, i.e. a sector delivering environmentally benign products, the environmental legitimacy at industry level, i.e. ‘greenness of the sector’,
is not always motivating. On the contrary, the results of this research project show that many companies consider themselves as automatically green, without reflection on production related environmental issues. It may also be that other actors in society and company stakeholders assume that companies within the ET sector work actively to reduce environmental impacts of their activities and production processes and do not demand environmental action from companies within the ET sector. The research in this thesis shows that the sector characteristics can have both positive and negative influences on the environmental strategy of companies.

Furthermore, companies and industry associations as new industries need to increase the cognitive legitimacy and therefore provide comprehensive information about products and environmental benefits of the products/technology rather than about their own environmental initiatives. Moreover, the industry associations have a significant amount of different information on their websites, such as press releases, opinion articles and responses which can be seen as tools for influencing the stakeholders and gaining the industry legitimacy. The initiatives for standardisation and certification as within solar and wind power energy are in line with “standardization strategies” (Lawrence, 1999) used to gain socio-political, regulatory and normative legitimacy.

Discussing negative screening of companies such as wine companies or tobacco companies, De Colle and York (2008) argue the product a company produces cannot be a basis for assuming that a company is or is not responsible. By analogy with negative screening, it can be argued that companies that offer products with positive effects should not be automatically screened positive and assumed to be socially responsible or green. The way these products are produced and the impacts of production should be also considered. Such considerations are in place at industry level in the case of biofuels production.

Moreover, one would assume that there would be high expectations of green operations from companies in sectors with high environmental profiles. In relation to environmental and CSR action previous research highlights mostly environmentally sensitive and controversial sectors. Companies within environmentally sensitive sectors have to implement and communicate environmental initiatives in order to gain legitimacy. Companies within controversial sectors such as tobacco should not strive for the highest, common-good linked level of CSR engagement, and should instead pursue an integrity based CSR approach with a focus on transparency, compliance with legislation and regulations and keeping promises. Companies within environmentally friendly sectors (such as ET
or ecotourism) should strive for the highest level of CSR, common-good linked and based on green-green environmental leadership.

Previous research shows that environmental engagement is seen by most companies as a tool for competitive advantage and by companies within environmentally sensitive industry as a tool for demonstrating environmental responsibility. For the companies within environmentally friendly and driven sectors, environmental leadership should be a driver for environmental engagement, in addition to competitive advantages and responsibility. Companies within the ET sector with actual (product) green identity are at risk of the legitimacy gap, as result of there being a discrepancy between companies’ actual identity and stakeholders’ perceived identity of the companies as green-green.

Customers and other stakeholders may expect that green products are also produced in a green manner. Moreover, as competition in the sector intensifies, the environmental profile of companies in terms of ‘green production’ is likely to gain more importance as a competitive advantage. According to Ijäs (2011), who studied Venture Capital Investors in the Nordic Cleantech Sector, over half of the Venture Capitalists use CR reports to support their investment decisions and regard environmental information as the most important aspect of CR reports, followed by economic, social and ethical information.

Product related legitimacy of the sector should also prompt environmental legitimacy at company level and companies within the environmental industry should consider themselves as environmental leaders and should have a goal of being ‘green-green’.
7 Concluding Remarks

The aim of this thesis has been to understand how product and production related environmental activities are treated in companies in general and particularly in the ET sector and how the environmental profile of this sector influences environmental engagement at company level.

All companies labelled as DJSI Global Supersector Leaders 2009/2010, discussed in Paper IV, make the distinction between production and product related environmental issues and use a variety of general keywords (such as sustainable production, green company; product stewardship, green products) and core business specific terms (such as paperless technologies, digitalized processes; energy saving alternative vehicle concept, green investments). Within the ET sectors, results show that not all companies and industry associations treat product and production related aspects distinctly. Furthermore, some companies and industry associations limit environmental information to present environmental benefits of their product. There is a need to improve the awareness of product and production related environmental aspects. This is an important aspect of the discussion in this thesis. The thesis makes a contribution in this respect, through a proposed model of environmental profile and defining green and green-green business.

The literature does not provide an agreed-on definition of greenness. This thesis highlights that companies can be green by i) greening the production and operations and/or ii) by greening their products. These dimensions of greening can be used for describing the environmental profile of companies, and for defining green-green business, environmental leaders and ecopreneurs. Environmental profiles and activities of companies should involve reducing both the environmental impacts of their activities and of their main products and services. Companies that are ‘green-green’ are companies with both production and product related environmental profiles - i.e. companies that both operate in an environmentally friendly manner and provide environmentally benign products. ‘Green’ companies have either production or product related environmental profiles.
‘Green-green’ dimensions of business greening, i.e. production and product related environmental profiles, can be a basis for defining ‘environmental leaders’ and be used in methods for identifying environmental leaders. The distinction between product and production related environmental activities can also be relevant for defining ecopreneurs. Furthermore, the opportunities for companies to gain competitive advantage from their environmental activities increasingly depend on their ability to communicate performance and attitudes to stakeholders. This can be a difficult task because the environmental issues are difficult to communicate. The distinction between product and production related environmental initiatives as well as the other dimensions of the proposed model of the corporate environmental profile presented in Figure 5 in this thesis can support companies in their communication of environmental performance and environmental activities and can be useful for minimizing scepticism of stakeholders and gaining legitimacy.

Awareness about production and product related aspects of environmental profile are especially important for environment-driven companies, for example in the environmental industry and cleantech. This sector delivers environmentally friendly products, i.e. the sector is characterized by product related environmental profiles which constitute the legitimacy of this sector. However, companies in this sector do not necessarily work with production related environmental activities. This product related environmental profile and legitimacy of the sector can influence companies’ environmental strategy, both positively and negatively. It can provide a motivation and an obligation to engage in the environmental issues related to the companies’ activities, i.e. interest in the production related environmental profile, and lead to a lack of interest in companies’ own environmental work.

The companies within the ET sector that do not publish any environmental information on their websites are, due to the product related environmental profile, referred to as ‘silent green firms’ and may gain advantages by transforming themselves into ‘vocal green firms’. Further competitive advantages may be gained by companies within the ET sector that are also engaged in work with production related environmental aspects by communicating their environmental engagement using the distinction between green and green-green firms: ‘vocal green-green firms’. Companies in the ET sector have significant potential to increase their use of both production and product related environmental profile information in their presentations on platforms such as Swentec and their own websites.
The companies in the ET and cleantech sector deliver environmentally superior products. These companies should also aim to produce their products in an environmentally friendly manner, i.e. operate as ‘green-green’ businesses, for the following reasons: i) ‘competitive advantage’; ii) ‘environmental responsibility’; and iii) ‘environmental leadership’.

There are a number of initiatives to encourage growth of the ET sector. The growth of the sector will not only contribute to declining environmental impacts of users of technology, goods and services delivered by the sector. The production of the products of the sector will also impact the environment. These initiatives should therefore include environmental management issues in general, and focus on production processes and products. Existing networks for companies in the sector would be a good initial platform for this task.

Finally, I present a short reflection on my personal values (Myrdal, 1978; Söderbaum, 1999) and my role in this research project. I have a strong interest in and concern about sustainability issues, especially ecological dimensions of sustainability. With growing global population and consumption business has a crucial role in the transition towards sustainable human progress. I hope the results from this study will not only contribute towards better understanding of environmental initiatives of companies and their industry associations, but also have practical implications for and contribute to promotion of ‘green-green greening’ of companies.
8 Future work

This thesis has concentrated on production and product related aspects as bases for describing greening of industry in general and for understanding the environmental profile of companies within ET. This study can be extended with further studies on production and product dimensions in environmental work, both in companies in general, in companies in different sectors and within ET. For example, questions about differences between large companies and SMEs in their production and product related dimensions in environmental management systems and about differences between how companies present their environmental profile according to different guidelines used for environmental management can contribute to better understanding of environmental engagement and environmental communications of companies. A follow up survey of reporting and communicating environmental issues of companies ranked by DJSI as Global Supersector Leaders as well the companies surveyed in this research project, Global Supersector Leaders 2009/2010, to present a 10-year comparison and description of development in the field is also planned.

The environmental engagement and communication of environmental issues within the ET sector was studied in this thesis with questionnaires, online surveys and interviews. To gain further understanding of the environmental activities and communication of these activities within companies, case studies should be performed. The reasons why companies do and do not get involved with production related environmental activities, the view of companies within the ET sector as ecopreneurs, ways of communicating environmental engagement other than through the web, and how and why companies are communicating their environmental and CSR activities in business-to-business communication efforts are examples of relevant research questions following on from the present study.

Furthermore, the ‘use side’ of the ET sector, for example how to encourage adaptation of goods, services and technologies delivered by the ET sector, both intermediate and at final consumption, is also a
potential subject for further investigation, as this thesis emphasizes the ‘supply side’ of the sector.

Finally, study of the relations between corporate greening, the ET sector and environmental innovations at both theoretical and empirical levels can also contribute to better understanding of corporate greening.
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MiljöRapporten. (2012). CSR-trender del 1. NR 11-12/2012. [In Swedish].


Swentec, The Swedish Environmental Technology Council (2007). Hur kan svensk export av miljöteknik till Kina öka? [In Swedish]. [2009.03.01].


Questionnaire about Corporate Responsibility within Environmental Technology and Services sector

1. Company Details

I am □ male    □ female  Age:_______years

How many staff is employed by the company? Answer:_______

Date when your company was founded ? Answer:_______

Which subsector in the environmental technology and services sector is the company working with? (several boxes can be ticked)

- Water and Wastewater Treatment
- Air Pollution Control
- Waste Management
- Recycling
- Contaminated Land Remediation
- Energy Management/Efficiency
- Renewable Energy
- Noise Control
- Cleaner Technologies and Processes
- Others ________________________
What is the company’s main sphere of activities? (several boxes can be ticked)

- The supply of own products
- The supply of consulting services (i.e. life cycle assessment, assistance with environmental management systems)
- System Construction
- The supply of services (i.e.- environmental monitoring)
- Others _______________________

Is the company a member of any environmental and/or environmentally related network? Which one?

_____________________________________________________

Is the company’s primary market:

- Local
- National
- International
- Combination of national and international

2. Workplace Policies

1. Do you encourage your employees to develop real skills and long-term careers (e.g. via a performance appraisal process, a training plan)?
   □ Yes  □ No  □ In part  □ Don’t know  □ Not Applicable

2. Is there a process to ensure adequate steps are taken against all forms of discrimination, both in the workplace and at the time of recruitment (e.g. against women, ethnic groups, disabled people, etc.)?
   □ Yes  □ No  □ In part  □ Don’t know  □ Not Applicable

3. Do you consult with employees on important issues?
   □ Yes  □ No  □ In part  □ Don’t know  □ Not Applicable

4. Does your enterprise have suitable arrangements for health, safety and welfare that provide sufficient protection for your employees?
   □ Yes  □ No  □ In part  □ Don’t know  □ Not Applicable

5. Does your enterprise actively offer a good work-life balance for its employees, for example, by considering flexible working hours or allowing employees to work from home?
   □ Yes  □ No  □ In part  □ Don’t know  □ Not Applicable
3. **Environmental Policies**

Is the company actively setting and achieving environmental objectives?  
☐ Yes  ☐ No

These environmental objectives concern:
☐ environmental aspects relating to **company activities**?  
☐ environmental aspects relating to company **products (goods /services)** (during use and disposal)

Which tools are used by the company in its environmental work?  
(several boxes can be ticked)
☐ ISO 14001  
☐ EMAS  
☐ Eco labelling  
☐ Life Cycle Assessment  
☐ Other tool: ________________________________________________
☐ No special tool

How important are following drivers for setting environmental objectives regarding **company activities**:  

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<thead>
<tr>
<th>Drivers</th>
<th>Less important</th>
<th>Not important</th>
<th>Quite important</th>
<th>Very important</th>
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<td>Coercive legislation</td>
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<td>Future legislation</td>
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<td>Active commitment</td>
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<td>Reduced resource consumption</td>
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<tr>
<td>Demands on subcontractors</td>
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How important are following drivers for setting environmental objectives regarding **company products (goods /services)**:  

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<th>Drivers</th>
<th>Less important</th>
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<th>Quite important</th>
<th>Very important</th>
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<td>Coercive legislation</td>
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<td>Future legislation</td>
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<td>Active commitment</td>
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<tr>
<td>Demands on subcontractors</td>
<td>☐</td>
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<td>☐</td>
</tr>
</tbody>
</table>
Are environmental aspects relating to *company activities* important in company’s marketing? (as sales argument)…………………………

Are environmental aspects relating to *company products* (*goods/services*) important in company’s marketing? (as sales argument)…………………………

6. Have you tried to reduce your enterprise’s environmental impact in terms of:
   * energy conservation?
     □ Yes    □ No    □ In part    □ Don’t know    □ Not Applicable
   * waste minimisation and recycling?
     □ Yes    □ No    □ In part    □ Don’t know    □ Not Applicable
   * pollution prevention (e.g. emissions to air and water, effluent discharges, noise)?
     □ Yes    □ No    □ In part    □ Don’t know    □ Not Applicable
   * protection of the natural environment?
     □ Yes    □ No    □ In part    □ Don’t know    □ Not Applicable
   * sustainable transport options?
     □ Yes    □ No    □ In part    □ Don’t know    □ Not Applicable

7. Can your enterprise save money by reducing its environmental impact (e.g. by recycling, reducing energy consumption, preventing pollution)?
   □ Yes    □ No    □ In part    □ Don’t know    □ Not Applicable

8. Do you consider the potential environmental impacts when developing new products and services (e.g. assessing energy usage, recyclability or pollution generation)?
   □ Yes    □ No    □ In part    □ Don’t know    □ Not Applicable
9. Does your enterprise supply clear and accurate environmental information on its products, services and activities to customers, suppliers, local community, etc?
☐ Yes  ☐ No  ☐ In part  ☐ Don’t know  ☐ Not Applicable

10. Can you think of ways in which your enterprise could use the sustainability of its products and services to gain an advantage over competitors (e.g. recyclability of products, energy efficiency, etc)?
☐ Yes  ☐ No  ☐ In part  ☐ Don’t know  ☐ Not Applicable

4. Marketplace Policies
11. Does your company have a policy to ensure honesty and quality in all its contracts, dealings and advertising (e.g. a fair purchasing policy, provisions for consumer protection, etc)?
☐ Yes  ☐ No  ☐ In part  ☐ Don’t know  ☐ Not Applicable

12. Does your enterprise supply clear and accurate information and labelling about products and services, including its after-sales obligations?
☐ Yes  ☐ No  ☐ In part  ☐ Don’t know  ☐ Not Applicable

13. Does your business ensure timely payment of suppliers’ invoices?
☐ Yes  ☐ No  ☐ In part  ☐ Don’t know  ☐ Not Applicable

14. Does your company have a process to ensure effective feedback, consultation and/or dialogue with customers, suppliers and the other people you do business with?
☐ Yes  ☐ No  ☐ In part  ☐ Don’t know  ☐ Not Applicable

15. Does your enterprise register and resolve complaints from customers, suppliers and business partners?
☐ Yes  ☐ No  ☐ In part  ☐ Don’t know  ☐ Not Applicable

16. Does your company work together with other companies or other organisations to address issues raised by responsible entrepreneurship?
☐ Yes  ☐ No  ☐ In part  ☐ Don’t know  ☐ Not Applicable
5. Community Policies
17. Does your company offer training opportunities to people from the local community (e.g. apprenticeships or work experience for the young or for disadvantaged groups?)
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

18. Do you have an open dialogue with the local community on adverse, controversial or sensitive issues that involve your enterprise (e.g. accumulation of waste outside your premises, vehicles obstructing roads or footpaths)?
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

19. Does your enterprise try to purchase locally?
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

20. Are your employees encouraged to participate in local community activities (e.g. providing employee time and expertise, or other practical help)?
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

21. Does your enterprise give regular financial support to local community activities and projects (e.g. charitable donations or sponsorship)?
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

6. Company Values
22. Have you clearly defined your enterprise’s values and rules of conduct?
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

23. Do you communicate your enterprise’s values to customers, business partners, suppliers and other interested parties (e.g. in sales presentations, marketing material or informal communication)?
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

24. Are your customers aware of your enterprise’s values and rules of conduct?
25. Are your employees aware of your enterprise’s values and rules of conduct?
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

26. Do you train employees on the importance of your enterprise’s values and rules of conduct?
☐ Yes ☐ No ☐ In part ☐ Don’t know ☐ Not Applicable

Completed questionnaire should be returned to:
Bozena Guzian, Mälardalen University
Department of Public Technology
P.O. Box 883, 721 23 Västerås

Thank you very much for your cooperation!

Bozena Guzian
Bozena Guzian
Lecturer and Ph.D. student
Mälardalen University
Department of Public Technology

+46 (0) 21 -15 17 06;
+46 (0)731 -580 563
bozena.guziana@mdh.se

What do you think about this questionnaire?

Is the questionnaire difficult to complete:
☐ Yes ☐ No

Are the questions relevant?
☐ Yes ☐ No

Do you have any other comments you would like to share?
________________________________________
________________________________________
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Interviews with the companies

- Briefly describe yourself and your company. (How and when was the company founded? What is the turnover?)
- Why did you start the company?
- What factors have influenced the company’s development, positively and negatively?
- What factors will be important in the company’s future development?
- Is the company a member of a trade organization, and why?
- What is the company’s business strategy?
- What is the company’s sales pitch?
- What is the company’s target in 5 years? (What factors are important in the company’s future development?)
- Does the company engage with environmental issues, and how? (This is an open question that can be answered e.g. through our products, we have environmental certification, we set our own environmental targets, we have an environmental policy). If the company does not mention their own environmental work in response, follow up with:
- What are your thoughts on the company’s own environmental impact?

Subquestions:
- If so, what does the company do?
- How long has the company been engaged with environmental issues?
- Has the company adopted an environmental policy, environmental goals, etc.? 
- How do you measure the results of the company’s environmental commitments?
- Has the company introduced environmental management systems? Are they certified?
- Does the company set environmental requirements for its customers/suppliers?
- Does the company communicate its own work with environmental issues with clients and/or suppliers? If so, how does it do so?
- Does the company publish information about its environmental work on its website?
- Why are the company’s initiatives to reduce its own environmental impact important to it (or not)?
- Do you ask customers about their environmental engagement? If so, what type of customer are they, private citizens, public figures, ...?
- Are you subcontractors for a larger company? If so, do you have environmental standards to follow as subcontractors?
- How would you describe your personal approach to environmental issues?
- What do you do to minimize your personal environmental impact?
Appendix 3

Interviews with the industry associations

About the organization
- Briefly describe yourself and your background. Why did you decide to work in this field/job? (Note: the person may be an entrepreneur)
- Why was the organization founded? What are its main objectives today? What are the important issues that drive the organization? What are the major changes the organization is having to deal with? Has the organization been or is it a leader in a particular area?

About the members
- Who are the members? Are there different groups of members?
- How does the organization work for its members?
- How active are members in the issues and tasks facing the organization?
- What difficulties are the members facing?

About the industry
- How developed is the industry? (So far, going forward, strengths, weaknesses)
- Important factors - and actors - affecting the industry development (so far, going forward, obstacles, opportunities, what are the rules and values, etc. governing the marketplace?)
- How does the organization influence the development of the industry? (improvement in market conditions, and then?, improvement of various institutional conditions - and then?). Opportunities, obstacles, strengths, weaknesses in advocacy work?
- Does the organization cooperate with other actors in advocacy work?
- Questions about environmental technologies? Drivers and barriers to environmental technology?

About environmental issues
- How does the industry engage with environmental issues? (different actors in the industry sector - what are they doing?)
- How does the organization engage with environmental issues? Does the organization cooperate with other actors in advocacy work in the environmental area?
- Does the organization help members address environmental issues? If so, how does it do this?

### Appendix 4

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<td>* In your world. ANZ Corporate Responsibility Review 2009. “</td>
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<td>* external verification &amp; recognition 2010</td>
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<td>* How an automobile is born</td>
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<td>**Sustainability Report 2008.”</td>
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<td>“Xstrata PLC Sustainability Report 2008.”</td>
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<td>“Packaging is essential for the protection of our products. Our goal is to reduce the environmental impacts of our packaging while retaining its overall effectiveness.” “the footprint of our existing product portfolio” “innovative products”</td>
<td>“while developing a new product, then impact on risk for the environment must be analyzed, evaluated and assessed carefully.” — “impacts and costs of both our products and our operations” “to maximise the eco-efficiency of our operations” “continues improvement program for production processes (process development).”</td>
<td>“Greening the fleet” “Green services” “Operational vehicles” “continue to investigate and use technological innovation in fuel and vehicles” — TNT’s operational activities” “impact of its operations” — “TNT’s CO2 footprint” ‘Green buildings’ “Sustainable electricity”</td>
<td>“Sustainability portfolio” “innovative solutions that help address particular sustainability issues” “Sustainability criteria play an important role in Swiss Re’s portfolio of direct real estate investments” — “minimize the direct impacts of its operations on the environment and society” “our own carbon footprint” (Our positions and objectives) “Swiss Re has been fully greenhouse neutral since 2003”</td>
<td>“Portfolio of digital products” Paper purchasing policy “paperless” methods of publishing to continues to grow” “We’ve made more of our products and services available on paperless form for readers, educators and students” — “minimize the direct impacts of its operations on the environment and society”</td>
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</tbody>
</table>

**Corporate responsibility:**

- Corporate responsibility strategy
- Corporate responsibility reports
- Partnerships
- Environment
- Our responsibility
- Planet ME

**About us:**

- TNT at glance
- Organisation
- Our business
- History
- Awards
- Partnership
- Sponsorship
- Corporate responsibility

**Responsibility:**

- Our strategy
- What we’re doing
- Our progress and plans
- Health & safety
- Ethics
- Environment 2008
- Policies and downloads
- Report archive
- Contacts

---

**Website:**

- Sustainability principles
- Stakeholder Engagement
- Business Ethics
- Employees
- Patient
- Society
- Safety, Health & Environment
- R&D

**Environmental sustainability:**

- Sustainable agriculture sourcing
- Climate change
- Packing
- Eco-efficiency in manufacturing

**Safety, Health & Environment:**

- SHE Management
- SHE Organization
- SHE Performances
- Safety Data Sheet

**Annual Report 2009 Section:**

- “Corporate Responsibility.”

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**Sustainable Development Overview 2009. Creating a better future every day.”**
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<td>“developing energy-efficient products and services”</td>
<td>“Green products”</td>
<td>“Product &amp; services”</td>
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<td>“develop new, environmentally responsible solutions across the developing ‘cleaner’ products”</td>
<td>“Environmentally sound products”</td>
<td>“initiatives to mitigate impacts of products and services”</td>
<td>“Making our products sustainable”</td>
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<td>“implementing Our Social and Environmental Responsibility in Our Operations”</td>
<td>“Product creation: Design for Environment (DfE)”</td>
<td>“GPT uses the NABERS rating tool across its office and industrial/business park assets”</td>
<td>“Eco products”</td>
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<tr>
<td>“Managing Our production facilities”</td>
<td>“The company’s/business own operations”</td>
<td>“GPT is committed to achieving 4.6 NABERS Energy rating and 3.6 NABERS Water rating across the Office Portfolio, and 4.9 NABERS Energy rating and 5.0 NABERS Water rating across the Industrial Portfolio by 2012”</td>
<td>Our stores and Operations</td>
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<tr>
<td>“our operation’s environmental footprint”</td>
<td>“production process”</td>
<td>“Material use” (in products)</td>
<td>“our business operations”</td>
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<tr>
<td>“improve the energy efficiency of our processes”</td>
<td>“company’s own environmental footprint”</td>
<td>“environmental impact of GPT’s operations”</td>
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<td>&quot;of energy management in our businesses”</td>
<td>“Green Company Initiatives”</td>
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<tr>
<td>“environmental management system (EMS) at each of our main Production sides worldwide”</td>
<td>“Green company”</td>
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</table>

**website:** Environment & Society:
- * Our Commitment
- * Meeting energy demand
- * Managing Our Impacts
- * Contributing to HOST Country Development
- * Operating in Challenging Environments
- * Indicators and Reporting
- * Expert info


**website:** Sustainability:
- * Overview
- * Vision and Governance: (Sustainability Statement)
- * Stakeholders
- * Supply Chain
- * Environment
- * Community Involvement
- * Employees
- * Performance Data
- * Awards and Recognition
- * Reporting
- * Statements
- * Glossary
- * Contact

**Environment:**
- * Managing Impact
- * Case Studies

“Team talk. Sustainability review 2009. "

**website:** Corporate responsibility:
- * Overview
- * Our Portfolio
- * Environment
- * People and Culture
- * Our Communities
- * Economic Impacts and Governance
- * Global Reporting Index
- * Celebrating Success * Contact us

**Environment:**
- * Energy and Emissions
- * Water
- * NABERS Ratings
- * Material issues
- * Waste
- * Biodiversity Management
- * Compliance
- * GPT Ecological Footprint
- * Calculator

“Annual Report 2008 Section: Corporate responsibility.”

**website:** Responsibility:
- * About future homes
- * Our goals
- * Our performance
- * Our data and targets
- * Videos and audio casts
- * Summary CR report
- * Assurance- Our recognition
- * CR news
- * Charity
- * Resources
- * Contact us
- * Feedback

“* Our goals:
- Our products and services
- Our stores and operations
- Our customers -
- Our economic growth

“Corporate responsibility performance 2008/09. Futures homes.”

**About Future homes:**
- * Chief Executive introduction
- * Our goals and policies
- * Our performance
- * Our CR measurement
- * Our CR training
- * Our stakeholder engagement
- * Our recognition
- * Our investor ratings

* Our performance:
- Our people
- Our community
- Our suppliers and partner

“Corporate responsibility performance 2008/09. Futures homes.”
16. Nokia Corp. - Technology

“the environmental sustainability of all our products”
“The remade concept phone”
“Product design”, “managing our materials and substances”, “Nokia Substance List”
“Nokia products and services”
------
“manufacturing”
“manufacturing process”
“Nokia operations” “Nokia facilities”
“our own CO2 footprint”

17. Telefonica S.A. telecommunications

“business activities”

18. Sodexo - Travel & Leisure

“Providing green services”
“an innovative range of Green Facilities Management Services”
“reducing the carbon footprint of our food menus”
“local, seasonal or sustainable grown product”
------
“our business activities”
“Sodexo’s operations all over the world”
“the impacts of our actions”
“water footprint of selected offices and sites”

19. Cia Energetica ...(CEMIG) - Utilities

“In addition to its commitment to the protection of the environment, CEMIG invests in programs for the conservation of energy and on research into new alternative energy sources, such as, thermal solar and photovoltaic power, wind power and energy produced from natural gas.”
------
“the reduction, compensation for or elimination of environmental impacts produced by the Company’s operations”
Environmental projects CEMIG and Environment: Environmental policy

website: Corporate responsibility:
* Our vision
* Our commitment
* Our approach
* Our customers
* Our products
* Reporting
* Performance
* Business benefits
* Stakeholder engagement
* Have your say

website: CR & Environment:
* Go to Corporate Social Responsibility Report
* See country report website:

Sponsorship:
- Sport
- Music
- Arenas
- Culture
- Technology
- Corporate Responsibility:
  -- Environment
  -- Social Action
  -- Health
  -- Disability
  -- History

website: Corporate citizenship:
* The Better Tomorrow Plan
* Our philosophy
* Our challenges
* Human rights
* Diversity
* Business Integrity
* Our 3 priorities
* Key Performance Indicators
* SRI rankings
* Awards
* Publications

Our 3 priorities:
- Nutrition and Health
- Local communities
- Environmental Protection:
  -- Climate Change
  -- Water
  -- Waste management
  -- Environment management

website: Ethics Principle

website: Sustainability:
* Sustainability Report
* CEMIG Policy
website: Social project
website: Global Compact
website: Environmental projects:
* CEMIG and the Environment
* ManedWolf Satellite Monitoring Project
* Reserves, Research Stations and Nurseries
* Licensing
* Generation Programs
* Distributions Programs
* Material Management: materials recycling

“Sustainable Development Overview 2009. Creating a better future every day.”

Annual Report Section 2009: Corporate Responsibility.”

“Sure we can. Corporate responsibility report 2008.”

“Sustainability report 2008.”

<table>
<thead>
<tr>
<th>Company</th>
<th>Product</th>
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<th>Environment</th>
<th>Stakeholder Engagement</th>
<th>Internet</th>
<th>Reported Problems</th>
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<tr>
<td>1. BMW Sustainability value Report 2008 BMW</td>
<td>Product responsibility/ Technologies for sustainable mobility; Recycling</td>
<td>Group-wide environmental protection</td>
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<td>Link to website in the document; References to: other publication; UN Global Compact, Sustainability indicators, GRI Index</td>
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<td>2. ANZ In your world, ANZ Corporate Responsibility Review 2009</td>
<td>Our environment/ responsible lending practices Our performance/ Responsible products, services and decisions</td>
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<td>Our environment</td>
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<td>Links to websites</td>
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<td>3. Xstrata PLC Sustainability report 2008</td>
<td>Product stewardship</td>
<td>Environment</td>
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<td>Stakeholder engagement</td>
<td>Download full report Heading for selected section (Environment)</td>
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<td>4. DMS NV Triple P Report 2009</td>
<td></td>
<td>Planet/ Non compliance and fines</td>
<td>Focus on stakeholders</td>
<td></td>
<td>What still went wrong; Planet/Non compliances and fines</td>
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<td>5. Panasonic Electric Works 2009. CSR/Corporate guide</td>
<td>Approaches to the Environment, Workplaces, and Action as a Corporate Citizen</td>
<td>Environment</td>
<td></td>
<td></td>
<td>Relatively short (26 pages) but takes long time to download</td>
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<td>6. Itausa-Investimentos Itau</td>
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<td>Sustainable living/ Packing Sustainability living/ Sustainability agriculture</td>
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<td>This overview summarizes out most significant impacts. Our online sustainable development report is our principal means of reporting.</td>
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<td>8. Roche Annual Report 2009; section: Corporate Responsibility</td>
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<td>Safety, security, health and environmental protection</td>
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<td>9. TNT. Sure we can. Corporate Responsibility Report 2008</td>
<td>Greening the fleet</td>
<td>Environment</td>
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<td>10. 2008 Swiss Corporate Responsibility Report. Committed to sustainable value creation</td>
<td>Creating solutions to sustainability challenges</td>
<td>Reducing our own environmental footprint</td>
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<td>11. Pearson Live and learn: Our impact on society 2008</td>
<td>Our main challenges/meeting/Helping our customers save energy and reduce their environmental footprint</td>
<td>Our business principles/implementing our social and environ. Responsibilities our operation Our main challenges/Managing our Production Facilities; Managing and Reducing our environmental impacts</td>
<td>Listening to Our Stakeholders</td>
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<td>Go to the online version + Learn more</td>
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<td>12. Environment and society 2008. Our corporate social responsibilities. Total</td>
<td>Environment/Product creation; Green products</td>
<td>Environment /Green company; own sites; greener computing</td>
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<td>Click TO LEARN MORE (Information on the content cite)</td>
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<td>13. Adidas Group. Team talk. Listening to what people are concerned about is at the heat of being responsible company.</td>
<td>Environment/Product creation; Green products</td>
<td>Environment /Green company; own sites; greener computing</td>
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<td>Visit also this 2009 sustainability review online PDF Performance data 2009 PDF of Progress and targets 2009 video</td>
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