

Water and Environmental Studies
Department of Thematic Studies
Linköping University

Drivers and Barriers for Corporate Social Responsibility in Multinational Corporations

A case study of Wärtsilä, Finland

Victoria Hallbäck

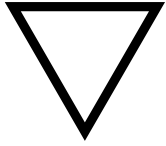
**Master's programme
Science for Sustainable Development**

Master's Thesis, 30 ECTS credits

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Supervisor: Anna Jonsson

2011

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Abstract

The aim of this thesis is to critically examine and analyze multi-national corporation's work with corporate social responsibility when it comes to environmental protection and sustainability. This study is therefore a case study, where empirical material about a multi-national corporation, the company of Wärtsilä, is studied. These include annual sustainability reports and other official material available, as well as qualitative interviews with eight employees at Wärtsilä. This material is then analyzed through the theoretical framework of Corporate Social Responsibility (e.g., Carroll, 1979) and through the theory of Corporate Citizenship (Mirvis and Googins, 2006). The results show that Wärtsilä has come far when it comes to integrating and improving its product environmental performance, but there appears to be inconsistencies between the information collected from the reports etc. and the information gathered from the interviews. These inconsistencies show that there is a need for further integration of the goals for environmental protection and sustainability, presented in the official material, into all levels and departments of the company.

Keywords: Corporate Social Responsibility (CSR), Corporate Citizenship, environment, Multi-National Corporations (MNCs), sustainable development

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1. Introduction

As more and more people understand what's at stake, they become a part of the solution, and share both in the challenges and opportunities presented by the climate crises.

- Al Gore¹

In 1962 Rachel Carson, a writer and marine biologist, published the book *Silent Spring*.² The book was a study of how the use of chemical pesticides affects the environment, which set off a wave of environmental consciousness through the industrialized world and resulting in a new emerging environmental activism. In the 1970s, this increasing environmental consciousness also started spreading to the bodies of Western governments, which resulted in various "command and-control" regulations to limit the environmental impacts of businesses.³ Still, companies chose to take care of environmental impacts of their business through remediation and litigation, rather than tackling environmental problems in the whole production chain, since financial performance was prioritized while environmental concerns were seen as distracting.

The actions of companies led to an increasing critique of the "command and-control" regulations in the 1980s, and both businesses and governmental regulators began to understand that preventing environmentally harmful pollution, emission and waste through the whole production chain was more effective, than only dealing with the hazardous end products. In this, companies have a responsibility to act to create a development which is sustainable for the environment and our society.⁴ This is since multinational corporations (MNCs) are seen as "prime drivers of the trend of globalization",⁵ by the exploitation and degradation of the environment for economic growth, and can therefore be held accountable for if sustainable development fails or succeeds.⁶

According to the World Business Council for Sustainable Development (WBCSD) the primary purpose of a business is to provide society with affordable goods and services to society and people, which are also continuously improved for an increasing world population. Today, this purpose also has to be related to the challenges present in our society, as climate change, poverty, pollution and so on. This means that companies cannot focus on the generation of short-term profit for its shareholders. Instead, they need to build up the community's trust for the company and "maintaining a healthy environment in which to do business"⁷ by taking corporate social responsibility (CSR). One dimension of CSR is the environmental responsibility.⁸

¹ Gore, Al. *Ascension Gateway – Climate Change Quotes*. Date of access: July 1' 2011.

² Carson, R. 1962.

³ Manzoni, J. et al. 2006, pp. 15-19

⁴ Ibid.

⁵ Grafström, M., Göthberg, P. & Windell, K, 2008, p.164

⁶ Ibid.

⁷ Manzoni, J. et al. 2006, pp. 6-9

⁸ Ibid.

This realization led to the emergence of various international environmental management standards in the 1990s, such as *Eco Management and Audit Scheme (EMAS)*⁹ and the standards from the *International Organization for Standardization (ISO)*, which set standards on company's environmental performance and will be explained more in detail in Results and Analysis. Further, it led to an increasing production of environmental technology and services¹⁰ and the "cradle to the grave" thinking was increasingly replacing, the "end of the pipe" thinking, both in the business world as well as in western governments. Legal environmental responsibility was now also extended to involve the whole production chain. Studies also show that companies can benefit in several ways by incorporating corporate social responsibility (CSR) into their business. For example, companies can make additional financial profit and "improving brand image".¹¹ Further, "CSR may provide the starting point that businesses need to begin moving toward sustainability",¹² according to Berkhout.

To improve the critical analysis of CSR within companies, the presence and use of tools and methods of analysis are important. Therefore, this study is a case study of the company of Wärtsilä where the framework of analysis by Mirvis and Googin's Corporate Citizenship¹³ has been chosen to attempt to analyze the company's CSR work, when it comes to environmental protection and sustainable development. As a global company in the business of producing gas and diesel engines for power plants and ships, Wärtsilä has a large responsibility for its activities and actions. Especially when it comes to the environmental responsibility, since the use of their products cause extensive emissions of green house gases (GHG) and other harmful substances from its engines and other environmental degradation.¹⁴ Wärtsilä is therefore also a suitable case of analysis.

Further, CSR has in recent years been subjected to criticism by scholars, NGOs etc., which focuses mainly on how to integrate CSR into a business "in ways that are efficient, effective and best able to satisfy other stakeholders".¹⁵ There are beliefs that the demands of CSR will overwhelm companies. Other criticisms include; that CSR suppresses the main purpose of a business, as a generator for wealth for society, favors businesses' by neglecting the real concerns of the society since it is mainly shaped by the companies themselves, the focus of CSR is too narrow and does not address all aspects of responsibility, and CSR does not achieve the objectives and goals that are expected from it. This is why it is also important to study the CSR work of companies, and the drivers and barriers it entails.¹⁶

1.1 Research aim

The overall aim of this thesis is to critically examine and analyze MNC's work with corporate social responsibility when it comes to environmental protection and sustainability: This is to find how, and why, MNCs adapt to restrictions concerning environmental protection, and sustainability and how they take environmental responsibility for their products. This is done by using Mirvis and Googin's theory of Corporate Citizenship, and by using the multinational company of Wärtsilä as a case of study. Therefore, this study is going to focus on the drivers

⁹ Egneus, H. & Helmersson, D. 2011

¹⁰ Blowfield, M. & Murray, A. P. 2008, pp.26-27

¹¹ Altman, W. 2007, pp.12-15.

¹² Berhout, T. 2005, pp.15-18.

¹³ Mirvis & Googins, 2006.

¹⁴ Wärtsilä Sustainability Report 2002, 2003, p. 43.

¹⁵ Blowfield, M. & Murray, A. 2008. p. 340

¹⁶ Ibid.

and barriers for environmental CSR, both inside as well as outside the company, while also analyzing the case through the framework of the Corporate Citizenship stages of Mirvin and Googin's.

1.2 Research questions

1. How has a MNC as Wärtsilä defined their corporate social responsibility when it comes to environmental protection and environmental sustainability?
2. What kind of internal drivers and barriers can affect the work for environmental CSR and sustainability at an MNC as Wärtsilä?
3. What kind of external drivers and barriers can affect the work for environmental CSR and sustainability at an MNC as Wärtsilä?
4. How can the theory of Corporate Citizenship be used to analyze a MNCs level of CSR when it comes to environmental protection and sustainability, and is it beneficial as an analyzing tool or method?

1.3 Scope, disposition and structure of thesis

This study is concentrated on the environmental CSR work of MNCs, and not the social or economic dimensions of CSR. The thesis is divided into six parts and the first part is the introduction, followed by the theoretical framework in chapter two. In chapter three the material and methodology is presented, while also presenting the critique of the methodology and the material. In chapter four the background description of the case study, namely the MNC Wärtsilä, is presented. Chapter five presents the results of the study and the analysis, while the results are discussed and conclusions drawn in chapter six.

2. Theoretical framework i CSR and environmental performance

This chapter starts with a part which explores earlier writings on the concept of CSR. After that, the theoretical framework used in this study is presented, i.e. Corporate Citizenship theory by Mirvin and Googins.

2.1 What is Corporate Social Responsibility?

There are several definitions of CSR, and what it includes, but the most widely used is probably the definition coined by the European Commission;

[CSR] is a concept whereby companies integrate social and environmental concerns in their business operations and in their interactions with their stakeholders on a voluntary basis.¹⁷

According to Blowfield and Murray,¹⁸ definitions of CSR may differ, but they still share common principles. For example, the definition made by the World Bank emphasizes the economic sustainability and does not mention environmental concerns, while the European Commission's definition include environmental concerns, but they both share the belief that companies have a responsibility for the public good.

The origins of corporate social responsibility go as far back as to when individuals started companies and employing labor. The modern definition of CSR, though, originates from 1970s, where especially Archie B. Carrolls theories have been prominent. Carroll divided CSR into four areas of responsibility; economic, legal, ethical and discretionary, where a company is expected to fulfill all these four responsibilities to comply with CSR.¹⁹ Economic responsibility is seen by Carroll as the basic foundation²⁰ since "the business institution is the basic economic unit of our society"²¹, but also mandatory. The legal responsibility should also be seen as mandatory, according to Carroll,²² since businesses also are obliged to follow the rules of the "social contract", or in other words, the social rules for a functioning society.²³ Ethical responsibility is "socially expected, while philanthropy [is] socially desired".²⁴ At this point corporate responsibility did not include environmental concerns or aspects of sustainable development.²⁵

Environmental responsibility and sustainability has gradually been integrated into the theory of CSR as attention for environmental concerns have grown, with the result of a shifting focus on sustainable development in the field of CSR.²⁶ Today the concept of CSR is integrated

¹⁷ Blowfield, M. & Murray, A. P. 13.

¹⁸ Ibid.

¹⁹ Ibid. pp. 58-59.

²⁰ Jamali, D. 2008. p. 215

²¹ Carroll, A.B. 197. p. 500

²² Jamali, D. 2008. p. 215

²³ Carroll, A.B. 1979. p. 500

²⁴ Jamali. D. 2008. P.215

²⁵ Blowfield, M. & Murray, A. 2008. pp. 58-59.

²⁶ Grafström, M., Göthberg, P., Windell, K. 2008, p.164

with sustainable development to the extent that it includes the same three pillars as sustainable development, e.g. the environmental, economical and the social, which all have the equal importance for CSR.²⁷ According to the WBCSD, companies are now learning to pick up on societal signals and taking advantage of the competitive advantages that comes from taking more responsibility as a company. For example, a company preserves natural resources, which their business might also depend upon, by protecting the environment. Further, a business can make profit by developing environmentally friendly technology, demanded by society.²⁸

2.2 Forces, or drivers, for CSR development

According to the study made by Mirvis and Googins (see Table 1), one company is generally not at only one stage of corporate citizenship, instead companies are ahead in some dimensions and behind in others. For example, a company might be at stage 4 when it comes to leadership, but at stage 3 when it comes to structure. This can be explained by different factors affecting different dimensions of the development. These factors can be divided into internal motivators, or drivers, and external pressures, or drivers.

External forces include the socio-economic and socio-political factors that influence a company. One external force is the expectations of the community and politics. For example, oil companies are influenced by NGOs that monitor their activities and their environmental performance. Laws and regulations, as well as the national origin of a company, affect companies to develop their corporate citizenship, through environmental laws for example.²⁹ Further, consumers and customers influence the CSR development since they can put pressure on how the company produces the service or goods they purchase, while also choosing which services or goods are produced.³⁰

The internal motivators, or drivers, include traditions and values, since the national origin is a factor since many companies from the same country has a certain business style, like the US-style capitalism for example. Further, the drivers for development can come from the bottom to the top, or vice versa. In some cases, the drivers can even come from the middle and flow up to the top management.³¹ Also, reputation and image are important internal drivers for the development of CSR, as well as strategic and competitive forces, since a good corporate citizenship is often expected by the national and international community. Therefore companies are influenced by governmental and local interests, and often choose to support or invest in the community. For example, IBM has contributed by developing non-profitable computer tools which can be used by volunteers worldwide.³² Founding purpose and time can also be an important factor, which means that a company can skip some of the stages of development if the company is founded at the start with principles of corporate citizenship. Examples of such companies are so called "cause companies", which were started at the time of the green movement, when customers were interested in products that are environmental friendly.³³

²⁷ SIS. 2005.

²⁸ Manzoni, J. et al. 2006, p. 9

²⁹ Mirvis & Googins, 2006, p.120

³⁰ Ibid, p.123

³¹ Ibid. pp. 121-122

³² Ibid. Pp. 120-121

³³ Ibid. Pp.119-120

Forces, or drivers, can either push or pull the development forward. Pull factors include; crises, legislation, scandals, or criticism from NGOs and other individuals, or groups, who watch the company's activities. In addition, reputation rankings, like the Dow Jones Sustainability Index, and other social expectations act as pulling factors. Even though, these pulling factors are of importance, the internal pushing factors are according to Mirvins and Googins "more predictive of sustained progress" in a company. This means, that the company's traditions and values are more important than the pull factors from outside society.³⁴ Below is a figure for internal and external drivers for corporate citizenship. The drivers are ordered according to importance, so the first drivers are the one considered most important, according to the study.³⁵

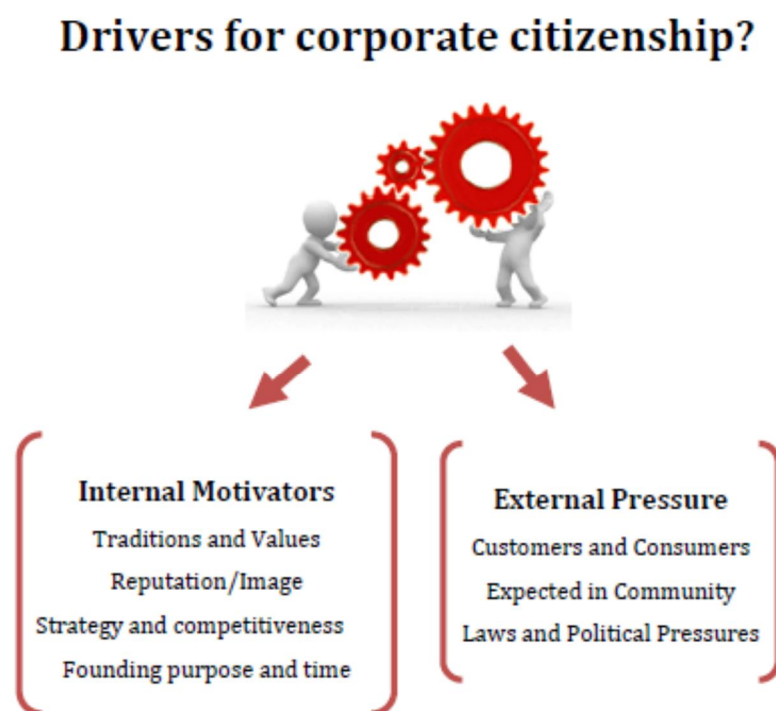


Figure 1: Possible drivers for corporate citizenship
Based on Mirvins, P. & Googins, B. 2006, p. 123

2.3 Obstacles for CSR development

The obstacles, or barriers, for CSR development in the article by Laudal include the *cost/benefit ratio*, and the *internal* and *external control*. The first barrier, the cost/benefit ratio, is when companies do not possess the financial resources for CSR development,³⁶ or when there are trade-offs between profit and ethical choices and actions. According to an article by Doane the outcome usually is that maximization of profit.³⁷ Further, the purpose of modern corporations is to create financial wealth to its shareholders.³⁸ At the same time, consumer

³⁴ Ibid. pp. 122-123

³⁵ Ibid. p. 122

³⁶ Laudal, T. 2011., pp 234-256.

³⁷ Doane, D. 2005, p 24.

³⁸ Vogel, D. 2006. p. 12.

and other stakeholders also influence corporate policies, through demanding products made by companies who consider, or do not consider, CSR.³⁹ The barrier of external control means that a company is unable to monitor the market environment, or does not have the proper knowledge for integrating CSR, while the internal control barrier means that there is an absence of strong leadership and management within the company to integrate CSR.⁴⁰

According to an article by Newell from 2005, there is also not enough checks and balances in the operation of companies when it comes to the several CSR approaches that exist. For example, the tools and strategies used to hold companies to account to such positive effect in Europe and North America by Northern-based NGOs and trades unions are not available to poorer and less well-mobilized communities⁴¹. One solution would be to have a third party which would verify standards and codes of conduct.⁴² Carroll also suggests that companies should develop both global corporate codes of conduct and subscribe to global codes that have been developed by independent international bodies, as the UN Global Compact and OECD Guidelines for Multinational Enterprises, and integrating ethical principles into strategies and the decision-making of the company.⁴³ On the other hand, Moskowitz claims that even though companies state that they integrate CSR into their business, company's CSR are historically in 95% of the cases only rhetorical, while only 5% consist of actions towards CSR development and improvement.⁴⁴

2.4 Corporate Citizenship

Theories of CSR are divided into instrumental, political and integrative theories. Regarding the theoretical framework of Corporate Social Responsibility (CSR), I have decided to concentrate on the theory of Corporate Citizenship, which focuses on a responsible use of business power in the political arena, since it is applicable to the environmental responsibility of a company, as well as measuring the CSR performance of a company. Further, the business is seen as a citizen of the society, with involvement in and responsibility for the society.⁴⁵

The theory used in this study is *the CSR theory of Corporate Citizenship* by Mirvis and Googins. The scientific material for the theoretical framework is mainly from the article *Stages of Corporate Citizenship* by Mirvin and Googins. They present a theory about how the Corporate Citizenship of companies, or firms, develops according to a pattern of different stages and dimension.⁴⁶ Further, the analysis is complemented by using Clarkson's RDAP-scale in the article *A Stakeholder Framework for Analyzing and Evaluating Corporate Social Performance*.⁴⁷

When it comes to the obstacles for CSR development the theory is based on the study of Laudal, in the scientific article *Drivers and barriers of CSR and the size and internationalization of firms*. Here the variation of drivers and obstacles, regarding the stages

³⁹ Ibid. p. 13

⁴⁰ Laudal, T. 2011, p.237

⁴¹ Newell, P. 2005, p.542.

⁴² Ibid.

⁴³ Carroll, A. 2004. p.118

⁴⁴ Vogel, D. 2006, p. 12

⁴⁵ Garriga, E. & Melé, D. 2004. p.63

⁴⁶ Mirvis, P. & Googins, B. 2006.

⁴⁷ Clarkson, M.B.E. 1995.

in the transformation process from a small and medium-sized enterprise (SME) to a multinational enterprise,⁴⁸ were studied.

2.4.1 Stages of Corporate Citizenship

According to a study made by Mirvis and Googins, the development stage of corporate citizenship on where the company is, decides the CSR performance of the company. Further, they argue that about 10 percent of leaders at companies do not understand the meaning of corporate citizenship. And if a company, and its leaders, can be clear about what stage of the corporate citizenship they are at and the challenges that face in the development of corporate citizenship, it can help the leaders to steer the company in the right direction. This can mean to frame strategic choices about where to go, aid in setting benchmarks and goals, and perhaps speed movement forward.⁴⁹

Further, the companies citizenship is shaped by forces as; the socio-economic, environmental and institutional. How a company responds to market forces depends on the motives of its leaders, how they design their agenda of citizenship, and the firm-specific learning.⁵⁰ This means that some companies can be seen as companies with a conscience⁵⁰, that have a more developed corporate citizenship and creates of the good work they do. Table 1 shows the five stages of corporate citizenship, which also includes seven different dimensions, which are important for CSR.⁵¹

Table1: Stages of Corporate Citizenship

Posture	Stage 1 Elementary	Stage 2 Engaged	Stage 3 Innovative	Stage 4 Integrated	Stage 5 Transforming
Citizen Concept	Jobs, Profits and Taxes	Waking up	Stakeholder involvement	Sustainability or Triple Bottom Line	Change the game
Strategic Intent	Legal Compliance	License to operate	Accountability/Responsability	Integration in core business values	Market creation and social change
Leadership	Indifference of top management	Supportive	Management driven	Champion, in front	Visionary, a head of the pack
Structure	Marginal integration	Some integration	Integration of expertise and know-how	Integration from top to bottom	Extensive cooperation
Issues Management	Defensive	Reactive	Responsive	Proactive	Defining
Stakeholder Relationships	Unilateral	Interactive	Mutual Influence	Partnership	Multi-organizational alliances
Transparency	Defensive protection	Public relations	Public reporting	Assurance	Full disclosure

⁴⁸ Laudal, T. 2011.

⁴⁹ Mirvis, P. & Googins, B. 2006. pp. 104-105

⁵⁰ Ibid. pp. 105-107

⁵¹ Ibid. pp.104-105

With *Citizen Concept* (CC), Mirvins and Googins mean how the company defines corporate citizenship and the comprehensiveness of the definition. The definition should incorporate the total actions of the company, according to the theory. *Strategic Intent* (SI), on the other hand, stands for the company's purpose of being a corporate citizen, and the goals of that citizenship. If the leaders are supporting the citizenship, and if they are leading the effort, is analyzed in *Leadership* (L). For example, if the company's leaders have enough knowledge about the citizenship and if they act according to that. *Structure* (S) stands for the management of citizenship, i.e. if corporate citizenship is integrated into the management structure of the company. *Issues Management* (IM) analyzes how the company deals arising issues concerning corporate citizenship, or in other words how responsive the company is to new policies, programs etc. *Stakeholder Relationships* (SR) means how a company engages its stakeholders, as the society and NGOs. Finally, *Transparency* (T) means how open is a company about its financial, social, and environmental performance.⁵²

The idea of the development stages of corporate citizenship is that all development has a pattern of activity. These activities, or responses, for movement are triggered by challenges, which demand a new strategy. The challenge at this stage lies in gaining credibility, since society demands more responsibility from companies today. In other words, a business needs to be aware of the societal expectations of corporate citizenship to be able to move to the next step of development.⁵³

The first stage is the *Elementary*, and is recognized by these elements, when it comes to corporate citizenship; low interest and awareness of what corporate citizenship is about,⁵⁴ or one could say that the company is acting passively to CSR.⁵⁵ This means that the company sees its responsibility solely by providing jobs, making profit and paying taxes (CC, S). Also, there is a one-way, or unilateral, interaction with stakeholders (SR) and an indifference of top management (L). When it comes to the SI, these companies usually centers on simple compliance with laws and industry standards⁵⁶ and does not act until they are criticized or pressurized by stakeholders or authorities,⁵⁷ while handling matters of compliance in these firms through their legal departments or public relations (IM). When it comes to T, the company protects its business defensively, and does not desire to share information with the outside community.⁵⁸

Engaged is the second stage of corporate citizenship, where companies wake up and recognizes CSR, usually due to external drivers, like NGOs (CC), and must also integrate responsibility in the business to be licensed to operate (SI). At this stage, leaders are putting more attention on environmental issues,⁵⁹ but according to Clarkson the company does as little as possible to meet any requirements. This means that the company, and its management, might try to reduce environmental and social risks to safeguard the reputation of the company or its brands (L, S), and reacting by drafting policies with higher standards of conduct (IM).

⁵² Ibid. pp.107-118

⁵³ Ibid.

⁵⁴ Ibid.

⁵⁵ SIS, 2005, p. 11

⁵⁶ Mirvis, P. & Googins, B. 2006. p.109

⁵⁷ Clarkson, M.B.E. 1995, p. 109

⁵⁸ Mirvis, P. & Googins, B. 2006. p.109

⁵⁹ Ibid.

Sometimes, experts are brought in to increase the knowledge of important issues, and the communication with stakeholders becomes a two-way communication (SR), which also increases T. The challenge here lies in building the capacity for change by, for example, educating staff to handle issues concerning CSR. This will also result in involving management, creating programs and communication with stakeholders.⁶⁰

The third stage is *Innovative*, which means that companies are progressive and start to broaden their citizenship to include influences from stakeholder as well (CC, SR). For example, companies, through their management and leaders, start to monitor and report their environmental performance, realizing that the company is *irresponsible* to both stockholders and stakeholders and would be held *accountable* for its performance⁶¹ (SI). To reach this stage, and create needed programs and policies, a lot of innovation and external know-how is used, from expert forums and *leading-edge companies* for example, which is managed and driven by the leaders of the company (L, S, IM). Further, companies also start reporting their corporate citizenship progress, in form of reports and so on (T).⁶²

This might be a result of the possible positive effects of CSR, like new services, technological innovations and products for example. Taking responsibility might, in other words, strengthen the company's position in the national or global market.⁶³ The challenge at this stage, and to reach the next stage of development, is to cope with *extensive differentiated activity* that comes with integrating CSR into the business, which means that the company needs to *create coherence*.⁶⁴

In stage four, *Integrated*, the company management is, in front and as *a champion*, integrating corporate citizenship and sustainability into from top to bottom of the business, or by a holistic approach called *the triple-bottom line* (CC, L). The company's purpose of being a corporate citizenship is also integrated into the core business values, instead of being a separate entity of the management (SI, S). Examples of this integration includes; *setting targets, establishing key performance indicators, and monitoring performance*.⁶⁵ For example, this could involve making and publishing Sustainable Development, or Sustainability, Reports, or by EMS certificating the company to assure that the company is taking responsibility (SR, T). This way the company is now also proactive by continuously following up on the company's sustainability and environmental performance⁶⁶ and takes future issues in consideration, and tries to incorporate sustainability into all connections with stakeholders. A result of this action is *a close relationship with customers, suppliers and other stakeholders who gives the company benefit*.⁶⁷ (IM, SR). The challenge at this stage is to deepen the commitment of responsibility even further, which requires new methods and models, as well as cooperation.⁶⁸

⁶⁰ Mirvis, P. & Googins, B. 2006. pp.110-112

⁶¹ Ibid, pp. 11-114

⁶² Ibid.

⁶³ SIS, 2005. p. 11

⁶⁴ Mirvis, P. & Googins, B. 2006. pp.112-113

⁶⁵ Ibid, pp.114-116

⁶⁶ Ibid.

⁶⁷ SIS, 2005. p. 11

⁶⁸ Mirvis, P. & Googins, B. 2006. pp.114-116

Stage five is called the *Transformative* stage and is where companies are trying to "change the game of business" (CC), by creating "new markets by fusing their citizenship and business agenda".⁶⁹ In other words, these companies go as far as trying to make society better in some way through marketing and selling their products, since they are motivated by a higher purpose of social responsibility and want to make the world a better place (SI).⁷⁰ Companies at this stage usually have visionary leaders (L), extensive cooperation with other organizations, businesses and stakeholders to solve problems and issues, for example (S, IM, SR), and full disclosure of the business (T).⁷¹

⁶⁹ Ibid. pp 107-118

⁷⁰ Ibid.

⁷¹ Ibid, pp.116-118

3. Methodology and Material

This chapter presents the scientific approach used in this thesis, the scientific and empirical material used, and the approach for the analysis of the empirical material. Further, it contains a critique of the methodology and material.

3.1 Scientific Approach

In scientific research, qualitative or quantitative methods can be used. The quantitative method is used when the data of analysis are numerical, as statistics, to explain the frequency of a certain societal phenomenon or compare different units of data, for example.⁷² Qualitative method, on the other hand, focuses on the object of the study,⁷³ and aims to raise and explain the essential content⁷⁴ of the studied material. In this study a qualitative approach is appropriate, since the aim is to study an object, Wärtsilä and environmental CSR work, and to analyze and evaluate material to answer the research question. Further, the study is deductive, since the aim is not to develop a new theory, but to try an existing theory on the empirical material used.⁷⁵

This study is a case study of a company's environmental CSR, since one case is intensively and closely studied, e.g. the company of Wärtsilä.⁷⁶ Further, using a case study approach is suitable since the aim of this thesis is to understand why and how contemporary, real-life (organizational) phenomenon occurs, where researchers have minimal control.⁷⁷ Also, this study will include the main components of a case study, according to Tomas W. Lee, e.g.; one or more research questions, a theoretical proposition or framework, units of analysis, a logic linkage between the collected data and the theoretical proposition or framework, and criteria for evaluating the theoretical propositions.⁷⁸ The theoretical proposition, or framework, is described in chapter 2.

3.2 Empirical material

The main empirical materials used are written documents from Wärtsilä and interviews with Wärtsilä employees. The written documents were collected from the company's website⁷⁹ and the information summarized in chapter 4, while analyzed through the theoretical framework in chapter 5. To obtain a deeper understanding of Wärtsilä's CSR work I decided to complement the qualitative analysis of texts with, standardized, qualitative interviews⁸⁰ with employees who work at Wärtsilä.

⁷² Esaiasson, P. et al. 2007, p. 223

⁷³ Holme, I.M. & Solvang, B.K. 1997, p.15

⁷⁴ Esaiasson, P. et al. 2007, p. 238

⁷⁵ Alvesson, M. & Skoldberg, K. 1994, p.25

⁷⁶ Esaiasson, P. et al. 2007, pp. 121-122.

⁷⁷ Lee, T. 1999, p. 54.

⁷⁸ Ibid. p. 58

⁷⁹ Website of Wärtsilä: www.wartsila.com

⁸⁰ Trost, J. P. 2005, p.19.

3.3 Interview material

Altogether eight interviews with employees at Ecotech and Environmental Services, which will be described further in chapter 4. Further, I have chosen to interview four employees from the Research & Development (R&D) department since they are responsible for developing the products according to the environmental and sustainability goals set by the management. The interview subjects have been chosen through a so called "snowballing selection"⁸¹, through contact with a Wärtsilä employee who has recommended suitable respondents and forwarded their contact information. The "in person"- interviews have been limited to Wärtsilä in Vasa, Finland, and I decided to interview a total of ten respondents, for practical reasons. Six interviews were done in person at Wärtsilä in Vasa, while two were done by telephone and e-mail. Three respondents unfortunately declined. Further, most of my respondents work in the department of Ecotech, since that is the unit of environmental and sustainability expertise at Wärtsilä. The other respondents are engineers who develop the technology for emission reduction of the products at the company. Further interviews were done in conference rooms at Wärtsilä Finland, and some were done in English, while some in Swedish.

The first interview was with an engineer (**engineer 1**) working at *Wärtsilä Product Centre EcoTech*, or just EcoTech, which is a new global unit introduced in Wärtsilä in 2009. This unit was established in order for Wärtsilä to maintain "a leading position in developing the environmentally sound technologies it offers to its customers",⁸² by setting all the environmental know-how, and expertise, of the company under one single division. Before the establishment of EcoTech, employees with environmental expertise were spread out all over the company, but are now gathered under one umbrella.⁸³

The Ecotech unit is responsible of helping customers to meet the terms of stricter environmental regulations and rules. For example, the unit is working on developing a new selective catalytic reactor (SCR) unit system to be used in gas engines, a nitrogen oxide reducer SCR unit, as well as carbon dioxide (CO₂) storage and capture technology.⁸⁴ At Ecotech, the interviewee's responsibility is to follow, and report to the EcoTech and Wärtsilä, on the legislation concerning marine engines, since the company must be able to plan the production according to future environmental legislation. Further he is responsible for the communication between EcoTech and the development of engines, since engines need to be compatible with emission reducing equipment.⁸⁵

The second interview was with an engineer (**engineer 2**), who has two positions at Wärtsilä, which are both managing positions within EcoTech as well as within the company as a whole. His main focus, or the operative work, is at EcoTech, while he describes his work as more of a hobby.⁸⁶ The third interviewee (**engineer 3**), also works in two departments, i.e. the department of Ship Power which is a "provider of ship power solutions", with both ship owners and shipyards as customers, while also working within the department of EcoTech.⁸⁷ The Ship Power department offers diesel and gas engines and automation systems, but also

⁸¹ Esaiasson et al. 2006, p. 216

⁸² Pakarinen, R. 2009, pp. 45-47.

⁸³ Ibid.

⁸⁴ Ibid.

⁸⁵ Engineer 1, 2011.

⁸⁶ Engineer 2, 2011

⁸⁷ Wärtsilä Annual Report 2010, 2011. pp.22-23

products, as scrubbers, which reduce emissions of nitrogen oxide (NO_x), sulphur dioxide (SO_x) among others. Further, the company offers engines which are flexible fuel solutions. This means that an engine can run on different kinds of fuels, depending on customer needs.⁸⁸

The fourth interview was with another engineer at EcoTech Product Centre (**engineer 4**). His responsibilities include; R&D, global technologies and products for efficiency improvement and emission control for marine and plant power applications, two-stroke engines, and "the merchant ship segment". Further, three engineers from R&D (**engineer 5, 6 and 7**) were interviewed. The R&D department's assignment is to provide the Wärtsilä Power Plants and Ship Power departments with innovation for better technology. The Power Plant department offers its customers decentralised, fuel and operationally flexible, energy efficient and "environmentally advanced energy solutions". The power plant engines can run on many different kinds of gases, liquid fuels and renewable fuels.⁸⁹ Producing engines that are flexible and efficient, aids customer to reduce their emissions of green house gases (GHGs), and other harmful emissions, as SO_x and particle matter (PM).⁹⁰

The last interview was with an engineer (**engineer 8**) who works at Environmental Services, which is a department launched in 2010, with the mission to offer "environmentally-related services, products and solutions" to the customers in the marine and the energy market. The aim of the service is to strengthen Wärtsilä's "position as a leading provider of environmental retrofit solutions to already existing installations".⁹¹ By providing these solutions, Environmental Services are able to help their customers to reduce emissions to water and air, as well as meeting current and future emission regulations.⁹² Most of the service is focused on so called "retro-fit", which means that emission reducing, and other environmental products, are installed on already existing engines, according to engineer 8.

3.4 Qualitative Analysis of Texts

I have chosen to use qualitative analysis of texts for this thesis, since the aim of this thesis is "understanding and finding patterns in" the documents concerning Wärtsilä's environmental CSR efforts.⁹³ This means that significant documents, like *Wärtsilä's Sustainability Reports*, which are available on the company's website,⁹⁴ are studied and analyzed to find aspects and variables of importance for this thesis.⁹⁵ The information about Wärtsilä is mainly from Wärtsilä's Annual Reports from the years 2000 to 2010,⁹⁶ which include their Sustainable Development and Environmental Reports. The sustainability part of the reports covers economic, environmental and social performance, as well as the performance of the company's products.⁹⁷ Further, the information from the reports has been complemented by information from the company's website.⁹⁸

⁸⁸ Ibid. pp. 27-30

⁸⁹ Wärtsilä Annual Report 2010, 2011. p.32

⁹⁰ Ibid. p.35

⁹¹ Website of Wärtsilä: www.wartsila.com

⁹² Ibid.

⁹³ Trost, J. 2005, p. 14.

⁹⁴ Website of Wärtsilä: www.wartsila.com

⁹⁵ Esaiasson, P. et al. 2007, p. 237.

⁹⁶ Website of Wärtsilä: www.wartsila.com

⁹⁷ Ibid.

⁹⁸ Website of Wärtsilä: www.wartsila.com

The general information about emissions and their environmental impacts are mainly from Encyclopedia Britannica online⁹⁹ While the information regarding environmental management systems (EMS) is mostly from a handbook, Corporate Social Responsibility - Guidance for the implementation of Corporate Social Responsibility, written by the Austrian Standards Institute (ASI) and translated to Swedish by the Swedish Standards Institute (SIS), CSR i Socialt ansvarstagande för företag. The handbook aims to provide companies with principles, systems and aids and provides guidelines as well as recommendations for the implementation of a management system for Corporate Social Responsibility.¹⁰⁰

The interviews are structured according to Kvale's seven stages of qualitative interviews, which are; thematisation, design, interview, arrange, analysis, results, report.¹⁰¹ Thematisation means that a research aim is formulated, e.g. it clarifies what areas are of interest. The aim of the interviews is to better understand the internal corporate processes of working with environmental sustainability and protection by interviewing employees at Wärtsilä who work with these issues. Step two is the design, where the plan for the study is described. In my study, this means that I will make an interview guide (see Appendix 1), while step three is the interview itself. After the interview, the data collected in the interviews are arranged and translated into a way that it can be analyzed in step five, which means that the interviews were transcribed from the tape recordings. In step six the validity and reliability of the results are questioned, which is presented in 3.3, followed by reporting the results in the thesis according to the theoretical framework chosen for this study in chapter 5.¹⁰² Further, all respondents were offered informative consent, by sending the interview questions before hand, offering the opportunity of anonymity if he or she desired,¹⁰³ as well as a copy of the thesis, before it is published.¹⁰⁴

3.5 Critique of methodology and material

One possible criticism is the informative consent. Sending the interview questions before hand might have been preventing impulsive answers, but at the same time I believe it ensured that the employees at Wärtsilä agreed to an interview. Further, the anonymity did not pose much of a problem, but it is a possibility that it had an influence of the openness of the answers.

One possible critique of the empirical material is that the information used is not only from the most recent Sustainability Report. This is since the information and focus of the Annual Sustainability Reports changes from year to year. Another critique is that respondents cannot be completely objective when answering questions, since they have an obligation to the company to safeguard its reputation and not to reveal any business secrets. Though, this problem is difficult to avoid when employees are questioned about the employer.

The use of the Corporate Citizenship theory can also be criticized, since there are numerous other studies and theories of CSR and its citizenship. For example, Matten et al. criticizes, in the article *Behind the Mask: Revealing the True Face of Corporate Citizenship*, the theories,

⁹⁹ Encyclopedia Britannica. *History*, 2011.

¹⁰⁰ Website of Austrian Standards. *Corporate Social Responsibility*, 2011.

¹⁰¹ Trost. J. 2005, p.94

¹⁰² Ibid. pp. 29-30

¹⁰³ Ibid. p. 40

¹⁰⁴ Ibid. p.94

and other traditional corporate citizenship theories, of not contributing to the understanding of CSR. This is since CSR can only be understood from a political angle, where political forces and functions affect the direction of the development of corporate citizenship.¹⁰⁵

¹⁰⁵ Matten, D. et al. 2003, pp.109–120.

4. The Case

This chapter describes the history and the organizational structure of Wärtsilä, Finland, which was chosen since it is a large MNC, and therefore has large impacts on the society and the environment. Further, it is also interesting as a case, since it is an MNC which has other companies as customers, i.e. does not sell to the private sector.

4.1 History of Wärtsilä

Wärtsilä was first founded under the name of Värtsilä in 1834 in Tohmajärvi, Finland. At that time it was a saw mill, which was replaced by an iron mill in 1851, and received the name Wärtsilä in 1907. The first production of diesel engines started in 1938, and has then continued its expansion and is today a company that produces power solutions to both energy markets and to the marine industry worldwide. Further, the company provides service after the product has been sold and installed. For example, Wärtsilä produces and supplies engines and automations systems for ships, and also offer a 24/7 service and upgrading of the technology.¹⁰⁶

Today Wärtsilä operates in 70 countries and in 160 locations, with a total of about 18 000 employees worldwide. The headquarters is located in Helsinki, Finland,¹⁰⁷ but has local sites on every continent.¹⁰⁸ Production is concentrated on diesel engines for ships, with complementing drive systems, and power plant equipment and offshore installations.¹⁰⁹ Further Wärtsilä is, according to their sustainability reports, the leading supplier in the world of medium- speed main engines for the marine industry.¹¹⁰

4.2 Organizational structure

The governing bodies of the Wärtsilä group consist of the *Annual General Meeting (AGM)*, the *Board of Directors (BOD)*, and the *President and CEO Board of Management (BOM)*. The AGM, which is a general meeting of the shareholders, has the ultimate decision power of the company.¹¹¹ The BOD has five to eight members, and is responsible of managing and structuring the operations of the company, while also deciding non policies, goals and strategies of major importance.¹¹² The members should also be independent of the company and at least two of the directors representing this majority shall be independent of significant shareholders of the company.¹¹³ Further, the board appoints committees annually to prepare decisions that are handled by the board. The Audit committee monitors the reporting process of financial statements, supervises the financial reporting process and monitors the efficiency of the internal control, internal audit and risk management systems, among other things.¹¹⁴

The Board of Management (BOM), which is managed by the CEO and the President, include the Group Vice Presidents heading the Ship Power, Power Plants, Services businesses and Wärtsilä Industrial Operations. The members of the BOM are appointed by the BOD, and

¹⁰⁶ Website of Wärtsilä: www.wartsila.com

¹⁰⁷ Annual Report 2009 , 2010.

¹⁰⁸ Website of Wärtsilä: www.wartsila.com

¹⁰⁹ Annual Report 2009 , 2010.

¹¹⁰ Wärtsilä Annual Report 2007, 2008, p.5

¹¹¹ Wärtsilä Annual Report 2009, 2010, p. 30

¹¹² Ibid, pp. 30-48

¹¹³ Ibid.

¹¹⁴ Ibid.

their responsibilities include; considering strategic issues related to the Group and businesses,¹¹⁵ investments, policy of product, structure and the corporate steering system of the Group and supervising the company's operations.¹¹⁶

The auditing of the Group is both internal and external. The internal auditing is done by the Internal Audit Unit, which reports analysis of the company's processes and operations, as well as the quality and effectiveness of the supervision methods, to the CEO and President of the BOM. The external auditing, on the other hand, is done by an external firm that audits the consolidated and parent company's financial statements and accounting records, and the administration of the parent company.¹¹⁷ The findings of the external auditing firm are reported to the shareholders and to the board's Auditing Committee.¹¹⁸

4.3 Impact on the environment

Air emissions are the main impact on the environment, when it comes to Wärtsilä's products, which include the emissions of CO₂, SO_x, NO_x, PM, carbon monoxide (CO), methane (CH₄), and other hydrocarbons.¹¹⁹ According to the scientific material, the utilization of internal combustion engines, i.e. machines which use energy produced from the combustion of a fuel and an oxidizer, which usually is air, has several impacts on the environment.¹²⁰ This is partly because the compounds present in the fuel or the oxidizer, like carbon and nitrogen, oxidizes during the combustion process, creating oxides which are harmful for the atmosphere. Also, other harmful particles are released as a result of the combustion process, as soot particles for example.¹²¹

CO₂ and CH₄ are greenhouse gases, which mean that they, by absorbing infrared radiation emitted from the surface of Earth and radiating it back to Earth, contribute to the greenhouse effect and climate change.¹²² CO₂ is the most significant of all GHG and has increased heavily as a result of anthropogenic activities, mostly from burning fossil fuels, while methane is the second most important GHG. Still, methane is more potent as a GHG, since the radiative forcing produced per molecule is greater¹²³ than of the carbon dioxide molecule. Methane is produced through anthropogenic activities as combustion of biomass and through livestock farming.¹²⁴

SO_x, which in the case of Wärtsilä's engines includes sulphur dioxide (SO₂) and sulphur trioxide (SO₃), is produced when fuel containing sulphur is combusted.¹²⁵ SO_x emission causes acid precipitation, or acid rain, which has several negative effects the environment. For example, it weakens trees, depletes soils,¹²⁶ and changes the chemical composition of lakes, rivers and oceans. Another type of emissions which causes acidification is the NO_x emissions,

¹¹⁵ Ibid, pp.36-37

¹¹⁶ Ibid.

¹¹⁷ Ibid, p.44

¹¹⁸ Ibid.

¹¹⁹ Hellén, G. 2010

¹²⁰ Lafayette Proctor II, C., 2011

¹²¹ Hellén, G. 2010

¹²² Jackson, S. 2011.

¹²³ Encyclopædia Britannica, "greenhouse gas." 2011.

¹²⁴ Ibid.

¹²⁵ Encyclopædia Britannica, "sulfur oxide." 2011.

¹²⁶ Butler, T. & Likens, G. 2011.

which are released into the atmosphere as a result of any combustion process. Still, the main sources of NO_x emissions are exhaust from ships and automobiles.¹²⁷

PM is solid and liquid particles of sulfates, nitrates, organic and black carbon, mineral dust and sea salt. When these particles are mixed with a gas, usually air, they create aerosols. Sulfates, nitrates, black and organic carbon, are released from their engines during combustion, depending on the fuel used. The aerosols can, depending on composition, reflect or absorb the Sun's energy, and therefore are able to affect Earth's climate and cause climate change.¹²⁸ CO and hydrocarbons also has a radiative forcing effect, although it is indirect. This is since CO elevates the concentrations of tropospheric ozone (O₃), CH₄ and other GHG, which leads to climate change.^{129 130}

The emissions to the air, as a result of the combustion process, depend on the use of fuel. For example, the choice of using of gas or HFO as fuel has large impacts on the emissions of NO_x, SO_x and PM, as shown in the figure 2.

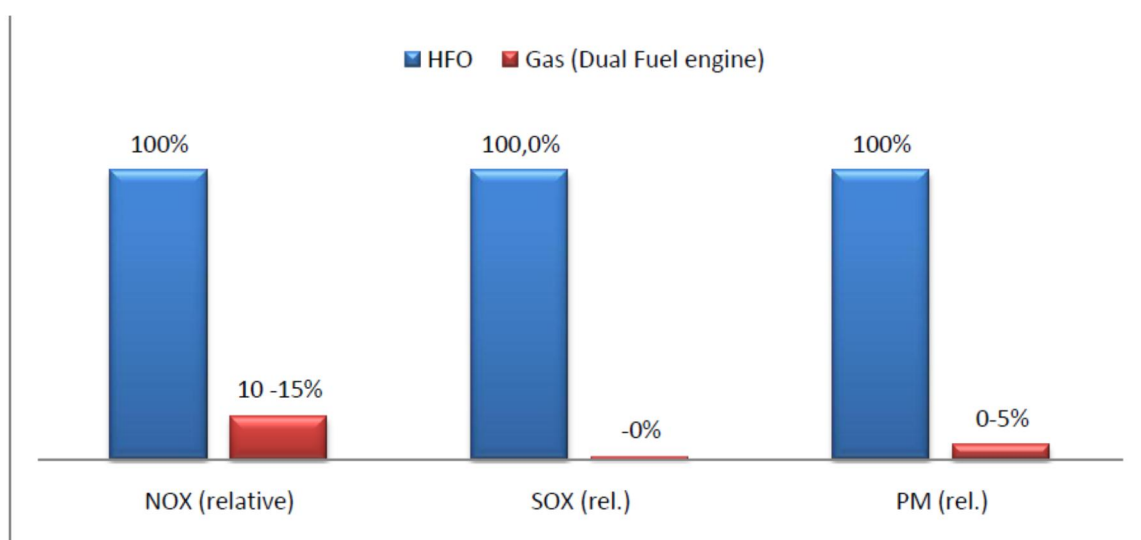


Figure 2: Comparison of typical specific NO_x, SO_x and PM i influence of fuel type

Source: Wärtsilä Annual Report 2009, 2010, p. 70

According to a power point made by Engineer 1, an engineer at Wärtsilä, two kinds of internal combustion engines are produced by the company; gas engines and diesel engines.¹³¹ Gas engines can run on different kinds of gas, like natural or landfill gas,¹³² so the emissions therefore depend on the gas used in the combustion. For example, natural gas combustion results in the emissions of CO₂ and CH₄, since natural gas is a gaseous hydrocarbon.¹³³ Still, gas engines has a much lower environmental impact than engines run on other fossil fuels, since they are more effective and emissions are lower, according to the information on

¹²⁷ Bernes, C., 2011.

¹²⁸ Hardin, M. & Kahn, R. 2010.

¹²⁹ White, J.C. *et al.* 1989, p. 106.

¹³⁰ Forster, P. *et al.* 2007, p. 135.

¹³¹ Hellén, G., 2010.

¹³² Bioenergiportalen.se, "El med gasmotor". 2011.

¹³³ Atwater, G. & Riva, J, 2011.

Wärtsilä's website.¹³⁴ In Wärtsilä's engines a range of fuels are used, as; light fuel oil, heavy fuel oil, crude oil, natural gas and coal bed gas, or methane in other words. Also, biofuels, as palm oil, coconut oil and biodiesel can be used in some engines¹³⁵ since about 2004.¹³⁶

According to the information in the encyclopedias, diesel engines, as the name suggests, run on diesel fuel, which is ordinarily a petroleum fraction obtained from crude oil after the more volatile portions used in gasoline are removed.¹³⁷ But diesel fuels also include bio diesel, for example, which is fuel based on animal fat or vegetable oil.¹³⁸ All forms of diesel fuel result in emissions when combusted, like emission of CO₂, NO_x and SO_x, but the quantity of emissions is again dependent on the choice of diesel fuel.¹³⁹

Diesel fuel from petroleum is manufactured in different grades, "light-middle", "middle" and "heavy", according to the performance needed to run an engine. The combustion of petroleum based diesel fuel results in high emissions of SO_x, since the fuel consists of a large amount of sulphur (S). The "heavy" grade fuels usually have the highest content of S, while the "light-middle" fuels have a lower content of S.¹⁴⁰ Interest of using bio diesel has grown in recent years, since CO₂, SO_x and soot particle emissions from bio diesel fuel combustion are much lower than the emissions from petroleum based diesel fuel. On the other hand, nitrogen oxide emissions are higher from bio diesel combustion than from petroleum based diesel.¹⁴¹

In Wärtsilä's products, the main materials used are different kinds of metals, as aluminum, steel, bronze and iron, but sand, rubber, concrete and different chemicals are used. This causes strains on an already ebbing quantity of natural resources. Further, different fuels to run the engines and lubrication oils are used. The use of these materials creates waste, which demands proper waste disposal and might in some cases even be environmentally harmful or toxic. Water consumption is also an important environmental impact, since water is scarce in many parts of the world. Also, the waste heat from the engines and power plants cause warming of the atmosphere, which can lead to climate change.¹⁴²

4.4 Technical solutions & results

The emissions from a gas or diesel engine are dependent on the type of fuel used, as mentioned before, efficiency of the engine and the use of environmental technology, such as emission reducing equipment. In the Sustainable Development Report, Wärtsilä has presented several actions to reduce the emissions of GHG. To reach these goals, the right technological solutions must be sought. The use of external cleaners is not mentioned in these actions though, but will also be included in this chapter since they are an important mean of reducing emissions.

¹³⁴ Website of Wärtsilä: www.wartsila.com

¹³⁵ Wärtsilä Annual Report 2006, 2007, p. 91

¹³⁶ Ibid. p. 107

¹³⁷ Encyclopædia Britannica, "diesel fuel." 2011.

¹³⁸ Nationalencyklopedin, "dieselolja". 2011.

¹³⁹ Egneus, H. & Helmersson, 2011.

¹⁴⁰ Encyclopædia Britannica, "diesel fuel." 2011.

¹⁴¹ Egneus, H. & Helmersson, 2011.

¹⁴² Wärtsilä Annual Report 2010, 2011, pp.115-117

4.4.1 Engine Optimization

To reduce GHG emissions and the use of natural resources Wärtsilä optimizes their engines to be as fuel efficient by focusing on the development of gas engines, multifuel engines and the conversion of old engines.¹⁴³ Increasing efficiency of engines reduces the costs and emissions, except for NO_x, through the product's lifecycle.¹⁴⁴ Figure 3 is an example of the development of fuel efficiency of Wärtsilä's diesel engines. A major re-design of Wärtsilä's engines in 1995 is one reason for the improvements.

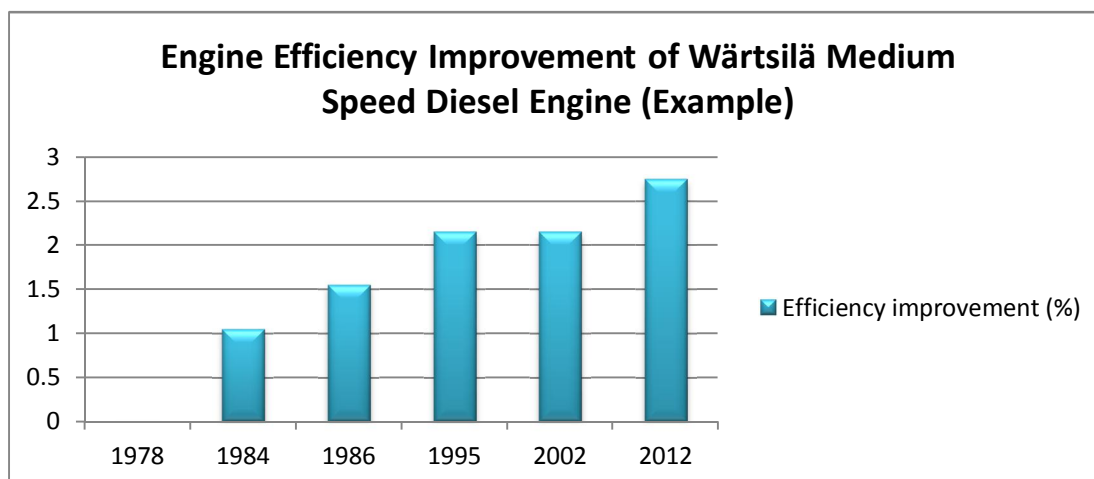


Figure 3: Example 2 of engine fuel efficiency development

Source: Various internal documents, Wärtsilä, 2011

To improve engines efficiency several techniques, or solutions, have been developed. One solution involves changing the design of the engine, by developing combustion chambers capable of withstanding higher cylinder pressures and temperatures.¹⁴⁵ Another technique is recovering heat from the engines, as waste heat recovery, combined cycle or combined heat and power, which can then be changed into electrical power or used directly as heat. When it comes to the marine engines, it is also possible to upgrade the efficiency of the propeller, for example, to increase energy efficiency.¹⁴⁶

As mentioned previously, gas engines have lower emissions than engines run on diesel fuels. This is why one action by Wärtsilä to reduce GHG emissions is to produce gas engines. To further decrease the emissions of GHGs Wärtsilä engineers have developed the dual-fuel engine (DF engine), also called Multi-fuel engines, which means that a single engine can be run by various kinds of fuels.

The fuels that these engines can run on include; natural gas, heavy and light fuel oil,¹⁴⁷ and liquid biofuel.¹⁴⁸ Wärtsilä's DF engine has two different injection systems, one for the liquid fuel and one for the gas fuel, as shown in the picture below. The engine can be switched from

¹⁴³ Wärtsilä Annual Report 2010, 2011.

¹⁴⁴ Wärtsilä Annual Report 2009, 2010, p. 19.

¹⁴⁵ Ibid p. 98

¹⁴⁶ Ibid.

¹⁴⁷ Wärtsilä. *Power Plant Product Catalog*, 2011, P.18

¹⁴⁸ Website of Wärtsilä: www.wartsila.com

gas to liquid mode instantly, and vice versa. Further, the engine tolerates big variations in the quality of the fuel.¹⁴⁹

Conversion services for engines are also offered by Wärtsilä. When it comes to emissions, this is handled by the Environmental Services. One way to reduce emissions from an existing installation is to convert the engine from running on diesel or HFO to running on natural gas. Other solutions are the installation of external cleaning techniques, like catalysts and scrubbers, which are described in 6.4.3.¹⁵⁰

4.4.2 Fuel Cell Development

Wärtsilä has developed fuel cell technology since 2000,¹⁵¹ which is a device that converts chemical energy into electricity. This is done through an electrochemical reaction in the fuel cell, between the fuel and an oxidizer. Fuel cells have a long life span, since it is constantly supplied by fuel and the oxidizer, which makes it a sustainable option for energy production. Further, fuel cells are highly efficient and do not emit NO_x.¹⁵²

The fuel cell design used by Wärtsilä is the solid oxide fuel cells (SOFC),¹⁵³ which is a fuel cell which can be driven on many different kinds of fuel, like hydrogen, biogas and methanol.¹⁵⁴ According to the test results, the Wärtsilä fuel cell engines, WFC20, has no measurable levels of PM, NO_x and SO_x. Also the CO₂ emissions are very low when using biogas as fuel, mostly landfill gas. The first fuel cell unit was installed in Vasa, Finland, to provide electricity for households in 2010, which runs on gas from a landfill in the area. According to the company it has been a success and according to the Director of Fuel Cell at Wärtsilä, it provides an excellent platform for us to continue our work on fuel cell solutions for the future.¹⁵⁵

4.4.3 Use of External Cleaning Techniques

Different external cleaning techniques can be used for different emission types, according to the sustainability report from 2006. For PM emissions, one alternative is to choose a fuel of lower ash and sulphur content, or using an electrostatic filter. When it comes to NO_x emissions, it can be reduced by humidifying the combustion air to lower the temperature of the combustion, a technique called WetPac. Further, NO_x emissions can be reduced by using a Selective Catalytic Reduction technique (SCR). For reducing CO and hydrocarbon emissions catalysts are also used, but here the CO and hydrocarbons are oxidized, where CO turns into CO₂ and hydrocarbons into water vapor.¹⁵⁶

SO₂ emissions can also be reduced by using fuel with lower sulphur content, since sulphur content of the fuel is directly proportional to the sulphur oxide emissions generated. Another method is Fuel Gas Desulphurization where the gas is cleaned from SO₂ in a washer tower. In the washer towers sodium hydroxide (NaOH) or limestone can be used to remove the SO₂.¹⁵⁷ For the marine side, there are other alternatives that can be used, like gas scrubbers

¹⁴⁹ Ibid.

¹⁵⁰ Website of Wärtsilä: www.wartsila.com

¹⁵¹ Wärtsilä Annual Report 2009. 2010, p. 107

¹⁵² Schumm, B., 2011.

¹⁵³ Wärtsilä Annual Report 2009. 2010, p.107

¹⁵⁴ Nagel, F., 2008.

¹⁵⁵ Website of Wärtsilä: www.wartsila.com

¹⁵⁶ Wärtsilä Annual Report 2006. 2007, p.109

¹⁵⁷ Ibid. p.109

and blending of fuels for example.¹⁵⁸ Scrubbers have gained popularity in the last years, since legislation has become stricter on SO₂ emissions and there is a need to install SO₂ reducing technology on old ships, according to engineer 3. Further, scrubbers reduce the SO₂ to 0%, according to lab tests done at the company, and they are also competitive. Blending fuels means that the fuels are blended in such a way that it has the sulphur content to match the requirement in the area of operation.¹⁵⁹

4.4.4 Material and water use, waste and heat emissions

There are several ways of decreasing the use of material, for example it is important to use material with a long product life, recycle material, using more environmentally friendly material and the modernizing of engines. Customers can also contribute by recycling components and catalysts, make sure that the engines are optimized, maintained and operated correctly and by educating the personnel in the issue. Waste can also be reduced by using these methods, but there also needs to be a proper waste disposal present. Further, customers can evaluate the potential used of the end products.¹⁶⁰ On ships, sealing systems can be used to make sure that oil does not leak into the ocean. To reduce the use of water, many of the company's engines are cooled with air, instead of water and developing methods to reduce NO_x without using water.¹⁶¹ Waste heat can be reduced with heat recovery technology and the heat can then be used to heat the rest of the ship or the power plant.¹⁶²

¹⁵⁸ Ibid. p.105

¹⁵⁹ Wärtsilä Annual Report 2006. 2007, p. 105

¹⁶⁰ Wärtsilä Annual Report 2008, 2009, P. 73

¹⁶¹ Wärtsilä Annual Report 2004, 2005, p.33

¹⁶² Wärtsilä Annual Report 2008, 2009, P. 73

5. Results and Analysis

In this chapter the results from this study is presented. First the internal drivers for environmental CSR, i.e. the company's responsibility for and adaption to environmental sustainability, are presented. Secondly, the external drivers for environmental CSR are presented, as legislation for example, followed by a presentation and analysis of the obstacles for environmental CSR work at the company.

5.1 Wärtsilä and sustainable development i Internal Drivers and barriers

Wärtsilä has recognized that they have a responsibility for the common good,¹⁶³ both nationally as well as globally¹⁶⁴ and defines their corporate social responsibility through their *Code of Conduct*, which is comparable with the definition of CSR made by the European Commission and will be further discussed in 5.1.1. They both include a responsibility for social and environmental concerns where the company is active,¹⁶⁵ as well as integrating these concerns when communicating with stakeholders.¹⁶⁶

When it comes to the three responsibility areas of CSR, Wärtsilä has incorporated three of them in their corporate values and principles, i.e. the social, economic and environmental, and created frameworks, strategies and goals to follow these values and principles, for example by identifying the environmental impacts of the products whole lifecycle (see figure 4).¹⁶⁷ One step to adapting their products to new policies and legislation concerning environmental protection and sustainability at Wärtsilä has been to integrate the responsibility and development into the structure and management of the company, as the introduction of the department of EcoTech¹⁶⁸ and Environmental Services for example.¹⁶⁹ The focus of environmental responsibility means that the company strives to operate on the terms of the environment and managing natural resources in a responsible matter. Other objectives include; combating climate change, and protecting soil, water and air. Further, the company is required to identify the lifecycle environmental impacts of its products and to reduce these impacts through proactive research and development.¹⁷⁰

¹⁶³ Blowfield, M. & Murray, A. 2008, p.13

¹⁶⁴ Ibid.

¹⁶⁵ Website of Wärtsilä: www.wartsila.com

¹⁶⁶ Engineer 2, 2011.

¹⁶⁷ Wärtsilä Annual Report 2008, 2009, p.71

¹⁶⁸ Pakarinen, R. 2009, Pp. 45-47.

¹⁶⁹ Website of Wärtsilä: www.wartsila.com

¹⁷⁰ Wärtsilä Annual Report 2008. 2009, pp.71-72

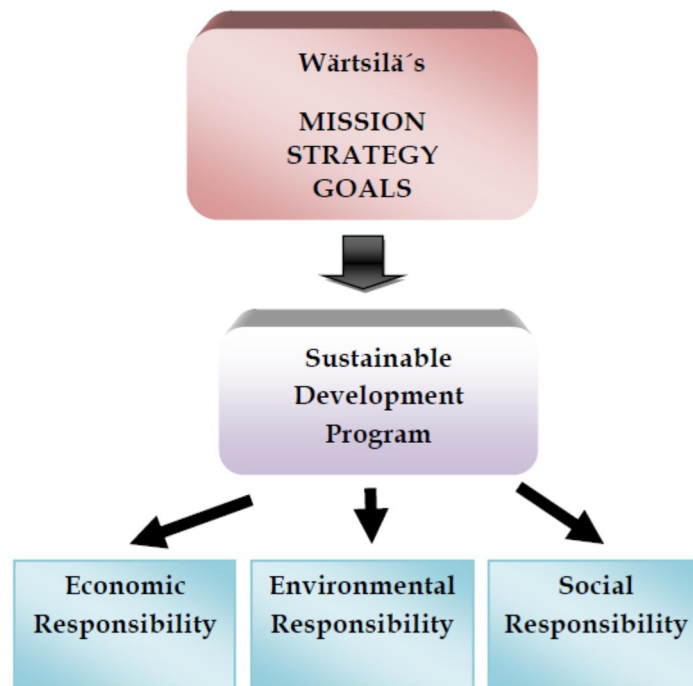


Figure 4: Wärtsilä and Sustainable Development

Based on figure in *Wärtsilä Annual Report 2008*. 2007, p.84

According to the empirical material in the background chapter of the emerge of environmental responsibility and sustainable development, governments started limiting businesses environmental impacts in the 1970s,¹⁷¹ but according to one of the respondents (Engineer 5) emissions from engines did not gain much attention in the 1970s, except for some minor restrictions on the emissions of visible smoke. This can be explained by the lack of regulation, of NO_x and SO_x emissions for example, for the whole production chain present at that point of time.¹⁷² It was simply accepted to pollute if it was cleaned up, or was not visible.¹⁷³ Still, efficiency improvements of the engines had already started at Wärtsilä, which reduces for example CO₂ emissions and fuel use, but this can probably be explained by the striving for reducing operational costs of the engines, rather than reducing emissions, since the emissions of NO_x emissions rose instead.¹⁷⁴

In the 1980s preventing environmental impact through the whole production chain became an objective of environmental legislation.¹⁷⁵ At this point Wärtsilä started developing engines which could be run with natural gas, which results in lower emissions than using diesel and heavy fuel oils.¹⁷⁶ Also, techniques were developed for recovering heat from engines to use directly as heat, or to be changed into electricity through the use of gas turbines, which also

¹⁷¹ Blowfield. M. & Murray, A. 2008, pp. 26-27

¹⁷² Blowfield. M. & Murray, A. 2008, pp. 26-27

¹⁷³ Engineer 5, 2011.

¹⁷⁴ Wärtsilä Annual Report 2010. 2011, p.104

¹⁷⁵ Blowfield. M. & Murray, A. 2008, pp. 26-27

¹⁷⁶ Website of Wärtsilä: www.wartsila.com

reduces fuel use and therefore also emissions.¹⁷⁷ Still, not much happened until the 1990s when legal environmental responsibility was extended.¹⁷⁸ This is also when EMSs started emerging, like the ISO 14001 series, which will be discussed in 5.3.3.¹⁷⁹ In the 1990s Wärtsilä started producing dual-fuel engines and developed techniques for recovering waste heat on ships.¹⁸⁰ Dual-fuel engines reduce SO_x, NO_x and CO₂ emissions significantly compared to steam and twin 2-stroke engines. At the same time, this is only an example and generalizations are difficult to do from these examples, since the reduction of emissions correlates with the fuel used in the engines.

When asked about the future, most respondents expect an increase in the use of renewable fuels, like bio fuels for example. Wärtsilä is also looking at the possibility of using windmills for back-up at power plants, according to an Engineer 6. At the same time, one of the engineers and Engineer 1 thinks that the use of bio fuels is going to be fractional, since there is not much available, and that natural gas is the future. Engineer 1 adds that natural gas can only be used on engines operated on land or close to the coast, since gas tanks for ships operating on the open oceans are too large. And since many natural gas reserves have been found, he expects the price of gas to stay low. Further, emissions of GHGs are low, and the emissions of methane are marginal when compared to landfills and agriculture, according to Engineer 1.¹⁸¹

The diesel engine is 'going to live a long time', according to engineer 1, and diesel fuels are going to get better, e.g. cleaner, which is going to result in reduced emissions. There is also going to be an increased recycling-thinking, where energy in the form of heat is used for heating or for running an engine for example. Further, 'the company with the best environmental performance are going to be the winner' according to one engineer, and Wärtsilä has a good position there¹⁸² with technology which can run on different renewable energy sources, like bio fuels and wind power.¹⁸³

When it comes to the development of fuel cell technology, some interviewees seem skeptical about its future success. In the interviews, Engineer 2 is positive towards the development of fuel cell technology, and thinks that there are possibilities for the use of the technology in the future, even though it needs more work before it can be introduced to the market. He also points out, that this is voluntary work which does not give any profit to the company at this point. Engineer 1 agrees, and says that the technology is not yet competitive enough and needs many years to be developed before it can be used. Engineer 5 on the other hand, believes that there is not a large market for fuel cell technology. Instead he believes that the diesel engine is going to be around for a long time.

When interviewing employees at Wärtsilä, the common idea of the company is that it is anticipatory, proactive and a forerunner in the business. Engineer 5 says that the company has always tried to foresee future laws and regulations and been a part of the process by attending international forums at IMO for example. According to Engineer 2, the focus at Wärtsilä is to develop and bring technology to the market which is better for the environment and

¹⁷⁷ Wärtsilä Annual Report 2009. 2010, p. 112

¹⁷⁸ Blowfield, M. & Murray, A. 2008, pp. 26-27

¹⁷⁹ Elvingson, M. 2011.

¹⁸⁰ Wärtsilä Annual Report 2009. 2010, p. 112

¹⁸¹ Engineer 1, 2011

¹⁸² Engineer 7, 2011

¹⁸³ Engineer 2, 2011

surroundings, instead of developing technology which is fast and cheap. This notion is also passed on to the customers, according to Engineer 2.

The internal drivers at Wärtsilä are, according to the respondents, the environmental strategies created by the management, which are created annually on the basis of new and future environmental legislation. For example, these strategies are based on the current and future focus of emissions to air from power plants driven by engines (see figure below). The input derives from sales units, the field, customers etc, which is synthesized by the management into goals and guidelines.¹⁸⁴ Within every department, the internal drivers include; good solutions for the customers, reliability of products and low operational costs.¹⁸⁵

According to Engineer 4, innovativeness is also a powerful driver within the company and within the different departments, to enable better environmental performance with the same money. Engineer 2 agrees and says that the will to be first and the ability for innovation of Wärtsilä engineers is a strong internal driver. Also one Engineer 7 agrees, and says that we are engineers, and want to explore. Go beyond. Where can we go? Where is the limit? Here Engineer 7 adds that economic profit is a strong internal driver.

Strategy and competition has therefore been one of Wärtsilä's strongest weapons, and they have sought to become the greatest producer of environmental friendly technology for the power plant and ship industry.¹⁸⁶ When it comes to traditions and culture, it is more difficult to draw any conclusions. Some interviewees point out the will for innovation that exists within the company and there seems that engineers function as drivers for change, from the bottom to the top, but there is no clear message on this point. When it comes to reputation and image, Wärtsilä is working hard to appear as a company with the best environmental technology available on the market, and therefore this drives the environmental performance forward.¹⁸⁷

5.1.1 Code of Conduct

The analysis of the empirical material shows that the company uses different tools for integrating sustainable development in the company. These tools for sustainability are summarized in the figure below, where Wärtsilä's *Code of Conduct* can be seen as the source of integrating sustainability, and the tools are the means of fulfilling the goals included in the *Code of Conduct*. These tools include; reporting, environmental work groups, dialogue with stakeholders, EMS, Voluntary Commitments and R&D.¹⁸⁸ These are explained more in detail in figure 5.

¹⁸⁴ Engineers 6, 2011

¹⁸⁵ All interviews, 2011

¹⁸⁶ Engineer 2, 2011

¹⁸⁷ All interviews, 2011

¹⁸⁸ Website of Wärtsilä: www.wartsila.com

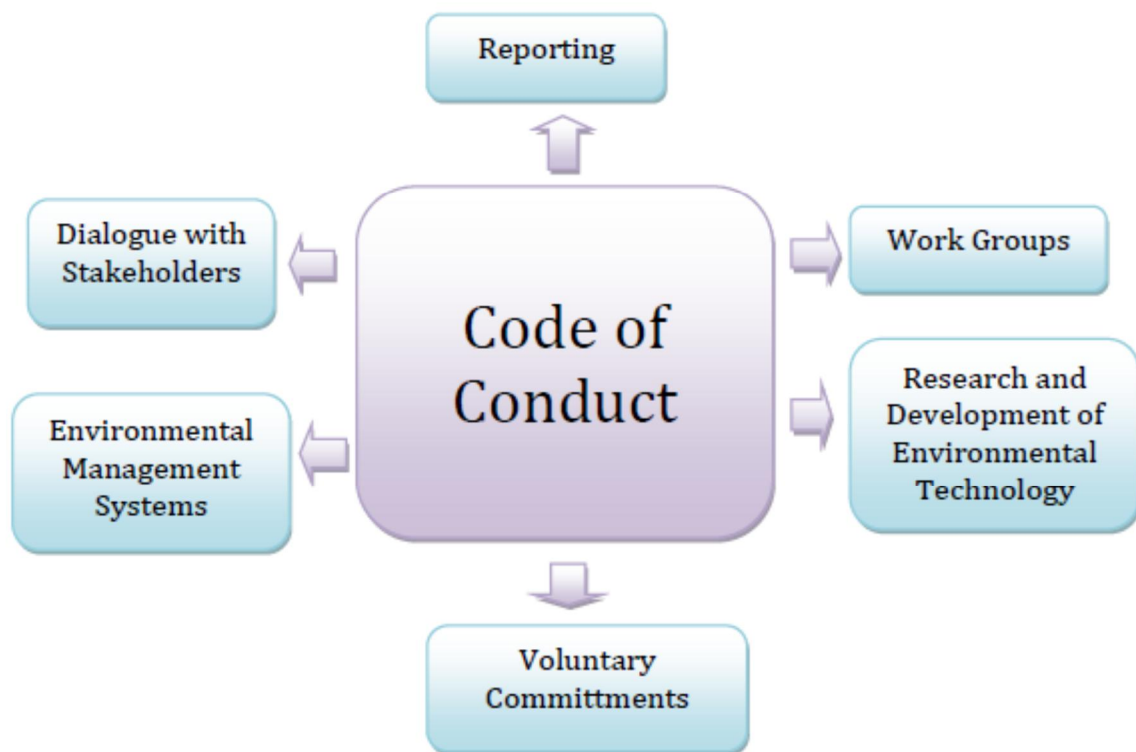


Figure 5: Code of Conduct

Source: Website of Wärtsilä: www.wartsila.com

The overall responsibility for sustainability performance at Wärtsilä lies with the Board of Management, which “defines sustainability targets and monitors performance against these set targets”. These are in accordance with the company’s *Code of Conduct*, which states that;

*Wärtsilä is committed to carrying out its business in a sustainable way. In order to promote the long-term interests of Wärtsilä and its stakeholders, the company strives to maintain the highest legal and ethical standards in all its business practices. Each employee is expected to act responsibly and with integrity and honesty, and to comply with this code and its underlying policies and instructions.*¹⁸⁹

Further, all Wärtsilä’s activities “shall be carried out strictly in compliance with applicable laws and under the requirements of good citizenship in each jurisdiction where such activities take place”, which includes environmental protection for example. This includes employees at the company as well. Further, the code includes openness, transparency and dialogue with the media, authorities, society, stakeholders, students etc. When it comes to the environment, the code states that the target of Wärtsilä is “develop and produce for its customers environmentally advanced solutions and services that fulfill essential requirements, such as

¹⁸⁹ Website of Wärtsilä: www.wartsila.com

low emissions and high efficiency. Still, some restrictions might be applied because of competitive considerations and stock exchange rules, i.e. what is called "business secrets".¹⁹⁰

At the same time, the code seems to emphasize the compliance of laws and requirements, rather than the corporate social responsibility itself. Still, the CEO of the company welcomes international legislation, similar to IMO laws and regulations, when it comes to the power plant industry.¹⁹¹ Also, there is no information about the code of conduct being subscribed by a global code developed by "global codes that have been developed by independent international bodies",¹⁹² as the UN Global Compact and OECD Guidelines for Multinational Enterprises, as suggested by Carroll.

5.1.2 Communication

At corporate level the company has decided to define owners, suppliers, employees, customers and the society as their most important stakeholders. This is done by developing products, services and activities based on stakeholder feedback. The channels in which the dialogues are taking place differ. For example, the company is in "regular contact with customers", and provides "lifecycle support for products",¹⁹³ have on going and open communication with its employees, have meetings with owners and investors, an active and open dialogue with suppliers, reports progress of sustainability to the society, are members and participate in organizations, cooperate with universities, and provides the media with annual reports and press releases. The communication is also assessed through measuring, indices, surveys and so on.¹⁹⁴

5.1.3 Voluntary Commitments

When it comes to the environment, the Code of Conduct states that "Wärtsilä's target is to develop and produce environmentally advanced solutions and services for its customers that fulfill all their vital requirements".¹⁹⁵ This is done by developing services and systems, i.e. products, with high efficiency and low emissions. Further, environmental management systems (EMS), as ISO 14001, are used to maintain and improve environmental performance.¹⁹⁶ Environmental management systems are effective strategies for companies to manage and structure their environmental corporate responsibilities and performance, where the basic principle is to always make improvements. It enables the company to communicate easily with interested parties, while signaling to the outside that the company is working; in a preventive manner, according to legislations, towards further improvements, and according to the company's own environmental goals and policies.¹⁹⁷

The ISO 14000 consists of tools to control indirect and direct environmental impacts, along with legislation and other means of control, which companies can use to assess their environmental performance. At the same time, ISO 14000 aims to create economic benefits, by increasing efficiency for example. When environmental performance is improved national environmental goals can be reached. Still, the ISO 14000 is a complement to the basic societal means of control, and a voluntary ambition for contributing to decreasing environmental impacts and supporting a sustainable development. Further, ISO 14000 is divided into eight

¹⁹⁰ Ibid.

¹⁹¹ Engineer 2, 2011

¹⁹² Carroll, A.B. 1979, p. 500

¹⁹³ Website of Wärtsilä: www.wartsila.com

¹⁹⁴ Ibid.

¹⁹⁵ SIS, 2006, p.26

¹⁹⁶ Wärtsilä Annual Report 2009, 2010, p.94

¹⁹⁷ Ibid.

connected, systems, where environmental management system, the ISO 14001, is one system. The requirements for ISO 14001 include; making an environmental policy ñmandated by the top managementò,¹⁹⁸ planning the work, implementing, checking and correcting errors and reviewing the progress, which should be done by the management. The ISO 14000-series also include;

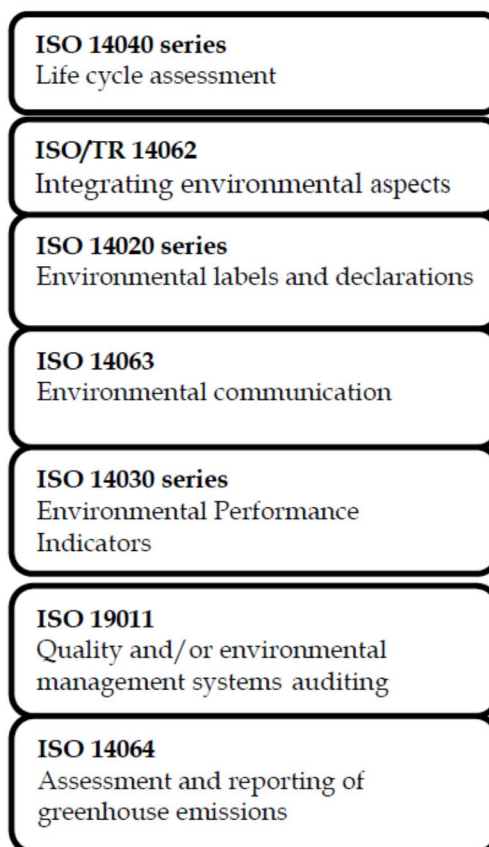


Figure 6: ISO14001 series
Based on figure in SIS handbook, 2006, p.9.

Sustainability reports state that the responsibility for following the guidelines of ISO14001 is distributed in the company on all levels. The effectiveness of this system, as well as the achievement of environmental targets, is then monitored by the Board of Management. Wärtsilä was first certified by ISO 14001 in 2002. Figure 7 shows the percentage of Wärtsilä units that were ISO 14001 certified from 2002 and onward.

¹⁹⁸ Ibid, 2006. p.7

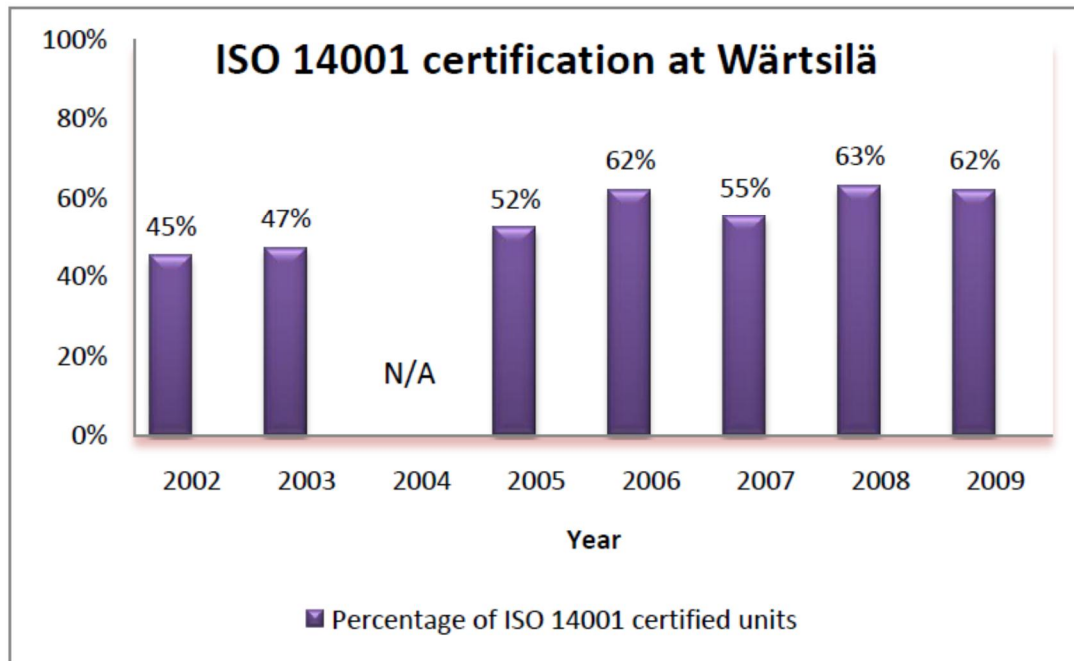


Figure 7: ISO 14001 certification at Wärtsilä

Source: Website of Wärtsilä: www.wartsila.com

The development of the product and operational issues, and the EMS's, is coordinated by Work Groups, which are appointed by the management. Work groups handling environmental performance issues include; *Wärtsilä EHS Management Team* and especially *Wärtsilä Environmental Forum*. The EHS Management Team develops the EMS, sets targets, monitors legislation development and are responsible for corporate level measuring. The Environmental Forum also monitors the development of environmental legislation, as well as creates and updates environmental strategies, coordinate the development of environmental technology and monitor environmental statements.¹⁹⁹ Further, Wärtsilä funds the development of environmentally friendly technology through the new department of EcoTech and Environmental Services, as well as through the research and development unit, R&D. As an example, expenditure for R&D has increased from about 80 million euro in 2006 to 140 million euro in 2010.²⁰⁰

Other voluntary commitments include, joining the Global Compact Initiative in 2009, developed by the United Nations. This means that the company agrees to following three environmental principles included in the initiative, which are based on the Rio Declaration of Environment and Development. These principles states that the company;²⁰¹

- Should support a precautionary approach to environmental challenges;
- Undertake initiatives to promote greater environmental responsibility; and
- Encourage the development and diffusion of environmentally friendly technologies.

¹⁹⁹ Wärtsilä Annual Report 2009, 2010, p.60

²⁰⁰ Ibid. p.94

²⁰¹ United Nations. *Global Compact – The ten principles*. 2011.

5.1.4 Target setting and reporting

The environmental targets set in 2005 of Wärtsilä include;

R&D
• The full release of 710 ppm NOx engine concepts for power plant engines and, in the case of marine engines, compliance with upcoming US and EU regulations. • Reducing the fuel consumption of diesel and gas engines, reducing fuel consumption and emission levels in 2-stroke engines, and reducing emission levels in common-rail engines.
Ship Power
• Broadening of the gas concept, increasing sales of environmental seals, and improving the propulsive performance of seagoing vessels.
Services
• Increase in diesel-to-gas engine conversions, sales of exhaust gas scrubbers, and an increase in the number of engines covered by CBM and O&M agreements.
Power Plants
• Introduction of a combined effluent treatment unit for treating various plant effluents, the market launch of wet techniques for optimised NOx reduction and fuel economy, and the active sales and marketing of power plant

Figure 8: Wärtsilä environmental targets 2005

Source: Wärtsilä Annual Report 2009, 2010, p. 83

Another step to taking responsibility for environmental sustainability and adapting to new policies and legislation is the making of the *Sustainability Reports*, which started in the year 2000 and in 2010 was prepared according to the GRI (Global Reporting Initiative) sustainability Reporting Guidelines (G3),²⁰² according to the company's website. Still, the idea of environmental consciousness has been present within the company since the late 1980s, when the emissions of NO_x started to be measured.²⁰³ The Sustainability Reports have grown in scope over the years, and are today a vital and large part of Wärtsilä's Annual Reports. These reports include information regarding its operations, stakeholders and products.²⁰⁴ One critique of the Sustainability Reports and environmental performance publications is that there are no indicators for product environmental performance, and no clear data of the improvement of the same. This is strange, since the annual report of 2002

²⁰² Engineer 8, 2001

²⁰³ Ibid.

²⁰⁴ Website of Wärtsilä: www.wartsila.com

states that the largest environmental impact is at the stage of the product lifecycle where the engines are used. This could, though, be explained by the secrecy of Wärtsilä's technology. Further, the company keeps society and the media updated through press releases, which are published in Finnish, Swedish and English and are available on their website.²⁰⁵

5.1.5 Internal Barriers

According to the interview material, the cost/benefit ratio²⁰⁶ does pose as an obstacle for the environmental CSR work, since the company must make profit and new environmental technology can be expensive to develop and install, while customers at the same time may be doubtful about new technology. Further, customers require products that are financially sensible, and may also prefer to use bad fuels, because it is cheaper. Also, fulfilling all requirements proves to be expensive, since it requires more complex technology, automation, filters and so on.²⁰⁷

5.2 Influences and Regulations i External Drivers and Barriers

Companies are obligated to follow national and international legislation concerning the environment, according to SIS. Further, they have to comply with demands from local authorities, as well as directions and agreements made between the company and authorities. This responsibility can then be increased by adopting environmental goals and policies for the company, where international guidelines, voluntary principles, and agreements with other organizations can be incorporated.²⁰⁸ In this chapter the drivers for environmental CSR and sustainable development are presented. The external drivers, according to Wärtsilä's Sustainability Report, are summarized in figure 9. According to this figure, the main drivers for sustainability at the company are; legislation, availability of natural resources, such as oil and natural gas, climate change, pollution, such as emissions of GHG, and changes in lifestyle. What the company means by "changes in lifestyle" is not explained further. The enable this drivers to result in further sustainable development, technological development and the ability and willingness to apply this new technology is needed.²⁰⁹

²⁰⁵ Webiste of Wärtsilä: www.wartsila.com

²⁰⁶ Laudal, T. 2011, pp 234-256.

²⁰⁷ All interviews, 2011

²⁰⁸ SIS, 2005, p. 26

²⁰⁹ Wärtsilä Annual Report 2008, 2009, p.68

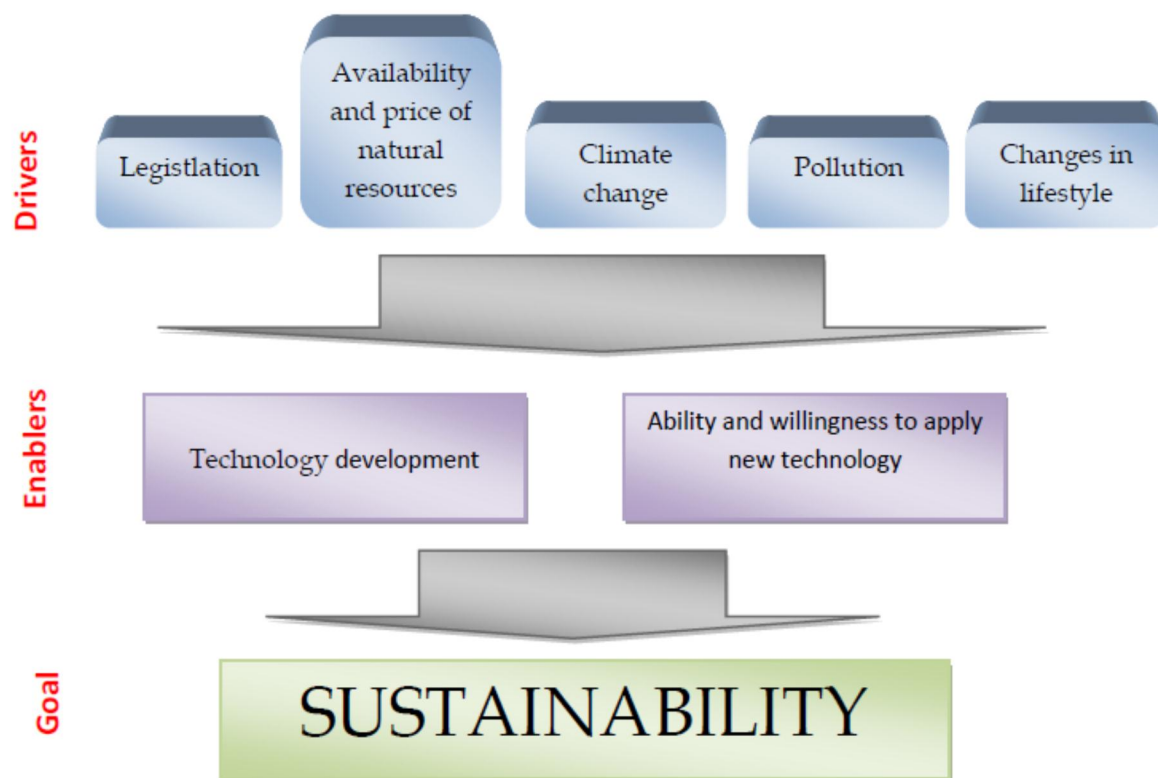


Figure 9: Drivers for Sustainability at Wärtsilä
Source: Wärtsilä Annual Report 2009, 2010, p.68

Wärtsilä cannot be seen as a so called "cause company", since the company is not based on an idea of environmental sustainability, i.e. the production of engines run by fossil fuels which result in the emission of GHGs.²¹⁰ One can also conclude that the "founding purpose and time" has not influenced the development of corporate citizenship in a positive manner. What is obvious, though, is that the pulling external pressures as NGOs and other stakeholders, customers and legislation have had a large influence on the company's development of environmental performance. These external factors have functioned partly as an obstacle for the development of corporate citizenship, since it has required the company to become more environmentally conscious and develop products, which are mostly more expensive, to comply with new laws and regulations, while at the same time pushing the company to improve its environmental performance. This also includes the drivers that Wärtsilä's Sustainability Report points out; climate change, pollution and changes in lifestyle, since these are the reasons behind the pressures from stakeholders and environmental laws and regulations.²¹¹

There is a consensus among the employees interviewed that legislation is the main driver of environmental sustainability in the company. The CEO adds that the international marine emission legislation of IMO (described further in 6.2.1) is an advantage since it covers most parts of the world, and that it is unfortunate that international legislation does not exist on the

²¹⁰ Hellén, G., 2010.

²¹¹ All interviews, 2011

power plant side. On the other hand, Engineer 6 says that he believes national legislation to be stronger than international legislation, since they are more specific and more strongly anchored. No international legislation is still developed when it comes to emissions from power plants, but it is likely that such standards, similar to the IMO standards, will be developed in the near future. This is welcomed by the company, according to the CEO, since it makes it easier to develop engines when set international regulations and laws are in place.

According to the respondents, availability and price of natural resources is an important driver also, as well as an important company strategy, since customers wish to use as profitable fuel as possible. Further, several engineers argue that use of natural gas as engine fuel is going to increase the coming years. This is, according to them, since natural gas is a relatively environmentally friendly fuel, but also because the availability of natural gas compared with oil. According to an outside source, natural gas will last for about 50 years, oil for about 35 years and coal for about 150 years, if they are consumed at the same rate as in 2009. At the same time, world energy consumption is expected to have risen about 80% until 2100.²¹² This means that the availability of fuel can be questioned in a long term perspective, since the scientific material states that natural gas will be available for about fifty years, if consumption stays on the same level as today, which it is expected not to.²¹³

When asked about climate change and pollution, most respondents agree that these drivers do not directly affect the business environmental work. On the other hand, these drivers affect indirectly, since they are the drivers for legislation that the company is obligated to follow. Changes in lifestyle, was on the other hand not considered a driver for environmental sustainability within the company, according to the employees. Furthermore, legal and customer requirements affect the environmental management, which in turn affects the environmental product and operational performance. This is summarized in the figure 10.

²¹² Climate and fuel – Fossil fuel and fuel reserves in the world. *Summary of world fuel reserves and annual consumption*.

²¹³ Ibid.

Environmental Management of Wärtsilä

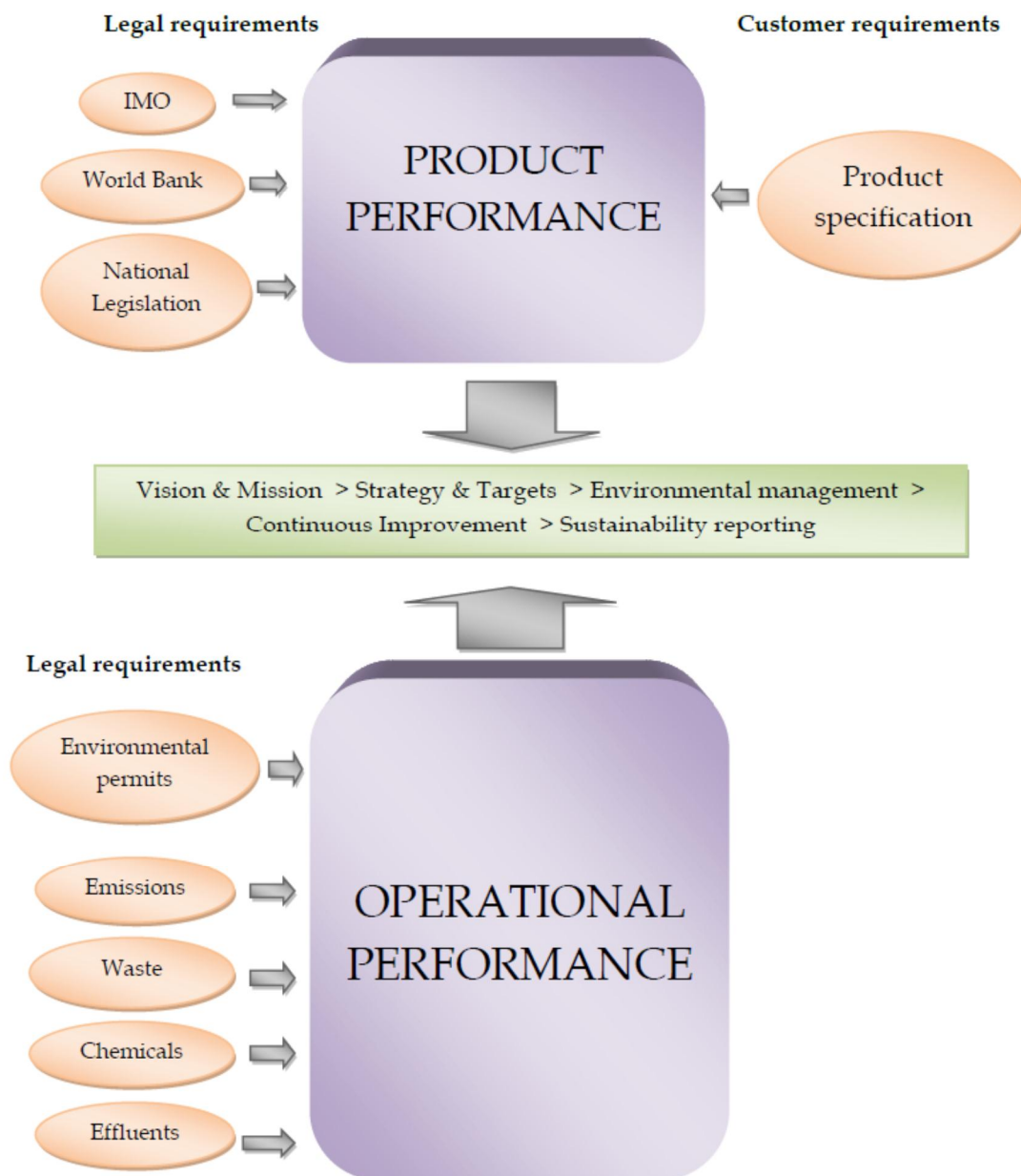


Figure 10: Environmental Management at Wärtsilä
Source: Wärtsilä Annual Report 2009, 2010, p.92

5.2.1 Legislation and regulations

An important driver for the company's environmental and sustainability work, is the international regulations and standards developed by the International Maritime Organization, according to the Sustainability Reports and the interviews with the employees.²¹⁴²¹⁵

According to the IMO's website the organization is a "specialized United Nation agency", which is responsible for "the safety and security of shipping and the prevention of marine

²¹⁴ Wärtsilä Annual Report 2010, 2011.

²¹⁵ All interviews, 2011

pollution by ships.²¹⁶ The agency was established in 1948 under the name of Inter-Governmental Maritime Consultative Organization (IMCO), which changed into the International Maritime Organization in 1982. A need for international laws and regulations at sea has always been recognized, since shipping is a huge industry and is usually not confined within national or regional borders.²¹⁷

In 1973 *The International Convention for the Prevention of Pollution from Ships* (MARPOL) was adopted at IMO, which covers pollution from oil, sewage and garbage, chemicals other harmful substances. The convention consists of six Annexes, Annex I to VI. Annex VI regulates air pollution from ships, which include NO_x, SO_x, and ozone depleting substances.²¹⁸ SOX ECA, or SECA, is explained further in 5.1.1.

In 2008 the IMO made amendments to Annex VI, concerning NO_x emissions, which will be introduced in two Tiers, Tier 2 and Tier 3. Compared with the original levels in Tier 1, which came in effect in 2005, the Tier 2 requires global NO_x emission from ships to decrease with 20 percent. Tier 2 will come into force this year. Tier 3, which comes into force in 2016, requires an 80 % decrease of NO_x emissions.²¹⁹

The World Bank is made up of two institutions for development; the International Bank of Reconstruction and Development (IBRD) and the International Development Association (IDA), and which is owned by 187 member countries, and is also an important external driver for the company's environmental work. The purpose of the WB is to provide assistance, both technical and financial, to developing countries, by providing loans, credit and grants for investments in health and environmental management, for example. The goals are to eliminate poverty and to support sustainable development. For example, WB financially supports projects for energy, like power plant building.²²⁰

At the same time, these loans are controlled by the guidelines, the EHS guidelines, which mean that projects which are financed through WB loans etc. have to be in line with the WB goals of fighting poverty and promoting sustainable development.²²¹ These guidelines include environmental, occupational health and safety, community health and safety, and construction and decommissioning.²²² This means that Wärtsilä is responsible of following the WB guidelines, if the installation of a power plant is financed by the WB, according to the Sustainability Reports.²²³ In figure 11, a graph shows an example of WB and IMO NO_x emission legislation, from 1988 to 2016, for a medium speed diesel engine at Wärtsilä. This graph shows that there were no restrictions on NO_x emissions up till 1995, when the WB restricted the emissions to 1100 pm. IMO restrictions did not come into force until 2000, but are getting stricter for every tier.

²¹⁶ IMO. *Brief History of IMO*. 2011.

²¹⁷ Ibid.

²¹⁸ IMO. *International Convention for the Prevention of Pollution from Ships (MARPOL)*. 2011.

²¹⁹ *Wärtsilä Annual Report 2008*. 2009, p. 20

²²⁰ The World Bank, 2011.

²²¹ The World Bank, 2011.

²²² International Finance Corporation, 2011.

²²³ Website of Wärtsilä: www.wartsila.com

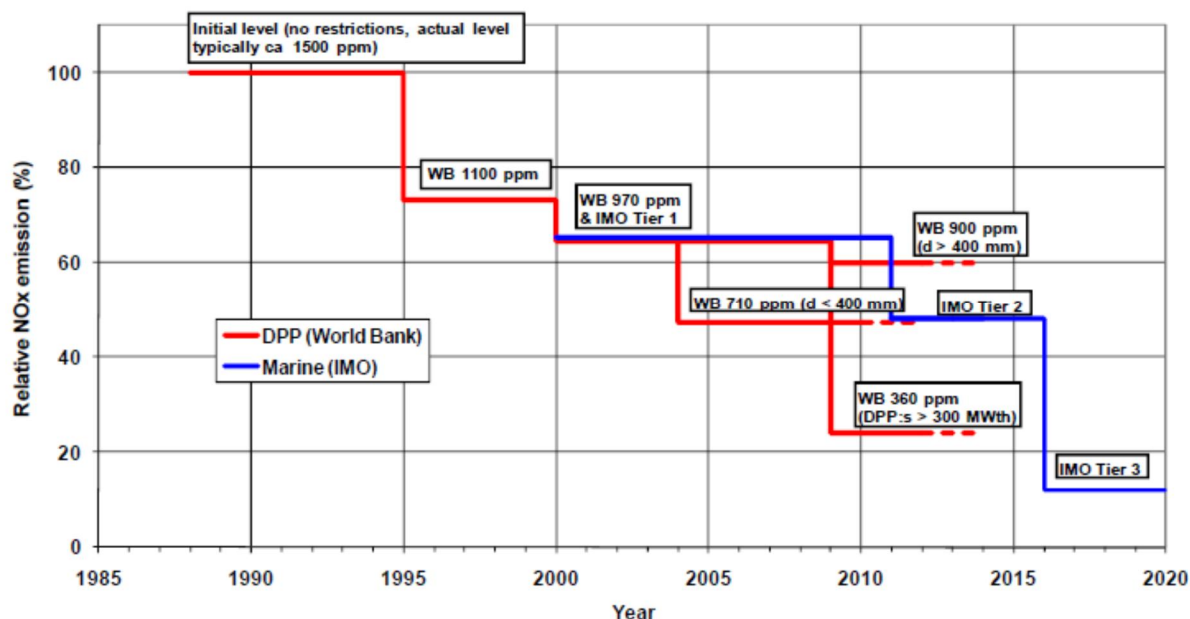


Figure 11: Example; NO_x emission legislation for Medium Speed Diesel Engines, 1988-2016
Source: Various internal material, Wärtsilä, 2011

In July 2010 the European Parliament approved a new directive, the *Industrial Emissions Directive*, to strengthen the legislation concerning emissions of industrial installations, which also regulates Wärtsilä's operations. These emissions include; SO_x, NO_x and dust. The directive came into effect in 2011, but industries will have until the year of 2016 to comply with the new legislation.²²⁴

The development and use of Wärtsilä's product are also controlled by national and regional legislation, which may vary spatially, according to the Sustainability Reports.²²⁵ One example which is presented on IMO's website is the MARPOL Annex VI, which contains provisions allowing for special SO_x Emission Control Areas (SECAs) to be established with more stringent controls on sulphur emissions,²²⁶ which includes the Baltic and the North Sea,²²⁷ as well as the Californian Coast.²²⁸ In the SECA areas, ships are not allowed to use fuels with a sulphur content of higher than 1.5 m/m. As an alternative, exhaust gas cleaning systems must be installed, or by using other technological means, to limit the emissions of SO_x.²²⁹

National legislation, on the other hand, is regulations that exist within a country or state. For example, the United States has its own laws concerning the emissions of marine, and especially coastal, areas, as well as on land.²³⁰ For example, the Environmental Protection Agency (EPA) has in 2006 formed national norms for emissions from gas and diesel engines. These norms came into effect in 2007.²³¹

²²⁴ Euractiv. *Parliament approves emissions directive*. Date of access: August 22, 2011.

²²⁵ Website of Wärtsilä: www.wartsila.com

²²⁶ IMO. *The protocol of 1997 (MARPOL Annex VI)*. Date of access: August 22, 2011.

²²⁷ Ibid.

²²⁸ California Environmental Agency. *Emission control area*. Date of access: August 22, 2011.

²²⁹ IMO. *The protocol of 1997*.

²³⁰ Environmental Protection Agency. *Ocean vessels and large ships*. Date of access: August 22, 2011.

²³¹ Wärtsilä Annual Report 2006, 2007, p.111

5.2.2 Customer Requirements

In the interviews with Wärtsilä's employees most agree that customer requirements are one of the most important external drivers, since the company aims for profit and therefore needs to be competitive on the global market. Further, the consensus is that customers invest in emission reducing equipment if they are obliged to do so, or if they can reduce the costs of operation.²³² According to Engineer 8, there are only a few customers who invest in emissions reducing technology, which is not required by law, for gaining a green image.²³³ And according to Engineer 1 most of these customers are in Northern Europe. Further, Engineer 1 says that many customers use their green image for marketing and/or in their sustainability reports. Often there is a will to improve the trends of sustainability from year to year. Another reason is the reduced harbor fees, when reducing emissions from ship engines in harbor areas. This is the case in some Norwegian harbors, for example.²³⁴

5.2.3 External Barriers

When asked about the external barriers, or obstacles, for environmental CSR work at Wärtsilä, the answers vary widely between the respondents. Engineer 8 at Environmental Services says that the "installations of new products means that the customers have to do large capital investments", and therefore the technology has to be worth it. Since new installations for emission reduction are expensive and the competition on the market is tough, customers and companies usually reduce emissions just below what is required, according to Engineer 1. Engineer 4 agrees and says that "clients of different levels quite seldom are ready to act as true consistent drivers to pick-up something that is more than required". Further, environmental technology can have practical obstacles. For example, installing scrubbers demands a lot of space and usually there is no unoccupied space on a ship, according to Engineer 8.

Engineer 1, on the other hand, points out that the fuel used in the business is "not the best" of fuels, as crude oil for example. In the car industry cleaner fuels are used, with low sulphur content, but within the ship and plant power industry, all fuels are allowed. But he points out that new requirements for fuels used in ships are coming in 2015, which will have some effect in emissions. According to Engineer 5, the refineries are starting to use different processes, by using crude oil more for asphalt, and not burning residual fuels and using cleaner fuels. This means lower sulphur levels in fuels, and lower PM emissions.

Relying on filters only for emissions reduction is not an option, since there is a competition situation on the market when it comes to the basic engine, and using filters and scrubbers is expensive for customers, according to Engineer 5. Therefore the goal is to develop engines with low emissions, without additional installments of scrubbers etc. Engineer 2 also agrees that technical obstacles exist, and solutions to these are sometimes hard to find. And even if they are found, they might be too expensive. At the same time, he points out that the possibilities, and supplies of resources, for the development of innovations at the company are good.

²³² All interviews, 2011

²³³ Engineer 8, 2011

²³⁴ Engineer 1, 2011

For the R&D engineers (engineers 5, 6 and 7) the main obstacle for environmental performance and sustainability lies in fulfilling all requirements. These requirements include; environmental regulations, reliability and cost-effectiveness of the company's products. According to Engineer 5 "it is very seldom to get everything", so trade-offs and compromises have to be done. "One cannot compromise emissions, since it's law, and then you have to compromise fuel consumption. Reliability can also not be compromised, and higher cost has to be accepted. We try to weigh this up by using more automation and more efficiency in the production to save on costs."²³⁵ For example, there is a conflict between NO_x emissions and fuel consumption, since reducing NO_x emissions means that fuel consumption increases. This also means that it is difficult to decrease CO₂ emissions, when at the same time reducing NO_x emissions.²³⁶ Still, Wärtsilä has a positive trend when it comes to reducing NO_x emissions and increasing fuel efficiency, according to the sustainability reports.²³⁷ Further, there is a need for "deeper approach on combining customer wishes, innovations and supportive actions from external stakeholders to support the use of products and solutions with an improved environmental performance", according to Engineer 4.

The R&D engineers also state that the shifting focus on targets also is an external obstacle, like focus of reducing NO_x or CO₂ emissions for example. Figure 13 shows the changing focus of emission reduction over time, according to the company. This figure shows that NO_x, SO_x and PM emissions are very much in focus today, while CH₄ and CO₂ emissions are expected to be in focus in the future. The focus on CO emissions, on the other hand, has decreased. The lines represent which emissions are relevant for which type of engine.

This shift of focus can be seen as an external barrier for environmental CSR, where the company is unable to foresee the changes of focus. This means that it is difficult to find the right path for development of engines and technology, which manages to follow all laws and regulations, and which might also be expensive for the company and its customers. Also, mechanical restrictions of an engine and other components can be an obstacle, which becomes expensive for the customers. For example, high component temperature in the combustion chamber and high cylinder pressure, result in mechanical wearing and become expensive for the customers since it results in reduce products life.

²³⁵ Ibid.

²³⁶ Ibid.

²³⁷ Wärtsilä Annual Report 2010, 2011, P.104

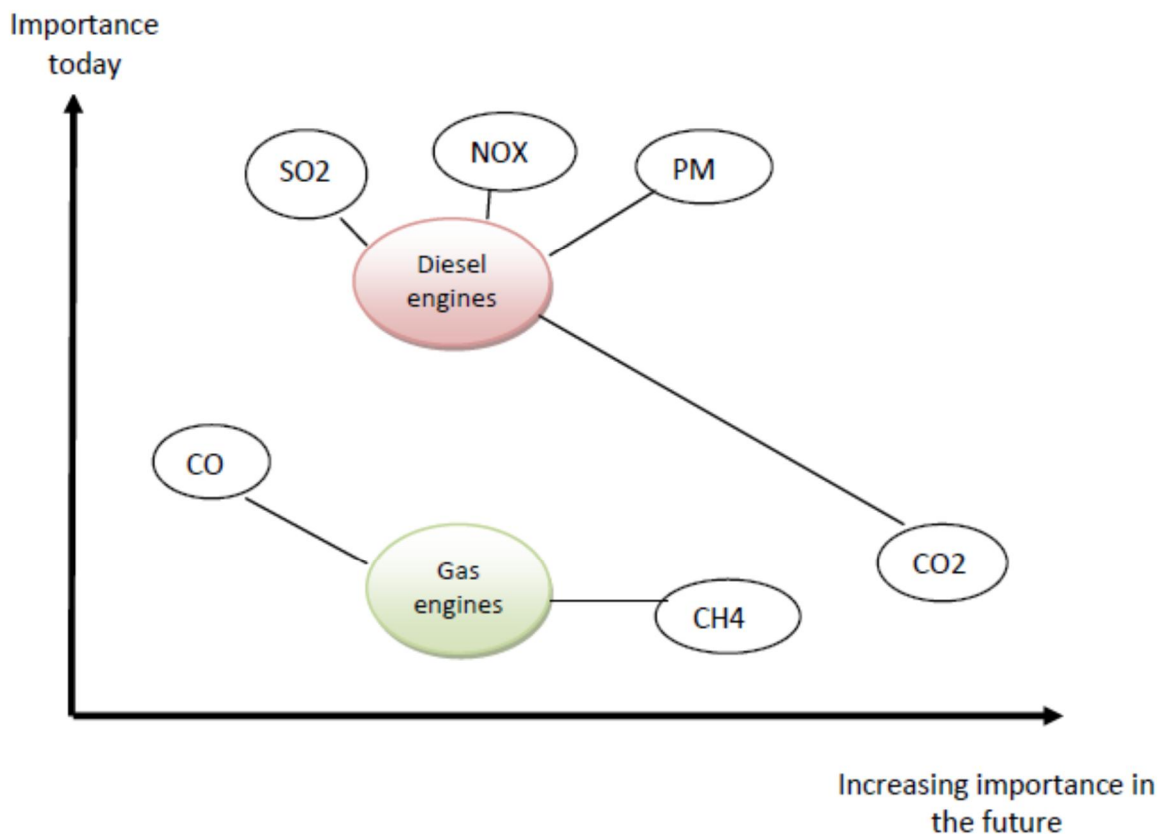


Figure 13: Changing focus of air emissions
Based on figure in Wärtsilä Annual Report 2006, 2005, p.35

The acceptance of new technology on the market is also an obstacle, which demands good communication and cooperation between the technology development departments and the sales units. According to Kyölä, it is hard work to convince customer to buy new technology, and according to Engineer 4 none can even state the industries quite conservative, which will even make it difficult to deviate from the prevailing practices and bringing novel solutions with improved environmental performance to the market. Here, support from the sales units is important, according to the R&D engineers, to find ways to get the new technology out on the market. Products also need to be tested on in the field, which means that they need to be out on the market as soon as possible, according to Engineer 3.

6. Discussion and Conclusions

In this chapter the result of the study are discussed, and conclusions drawn, in accordance with the theoretical framework chosen, i.e. the theory of Corporate Citizenship by Mirvis and Googins.

6.1 Drivers and Barriers

According to Fleming, many companies report on sustainable development without subsequent actions to manage risks and create values.²³⁸ This is true when it comes to the environmental performance of the Wärtsilä's products, which are not evaluated through an environmental indicator system as the operational performance is. According to Fleming, it is important that there are meaningful indicators in place to measure performance. On the other hand, Wärtsilä has identified the material risks of their business, through reporting on the environmental impacts of their business, and integrated sustainability reporting into the management of the company, as suggested by Fleming.

The company also seems to have many checks and balances in place, as the code of conduct, and have integrated ethical principles into strategies and the decision-making of the company, as suggested by Carroll.²³⁹ Still, when it comes to the ISO 14001, it only concerns operational performance and is therefore not product specific.²⁴⁰ It must therefore be pointed out that although Wärtsilä operate with EMS, these rules do not directly apply to the product environmental performance. The effect might be indirect though, but this is unclear when analyzing the empirical material. Further, Wärtsilä was certified by ISO 14001 rather late, not before 2002,²⁴¹ and most environmental and sustainability work started at the company in the beginning of 2000s, which might indicate an earlier reluctance towards integrating environmental sustainability in the business. For example, the Sustainability Reports were first produced,²⁴² fuel cell development and engine conversions started in 2000.²⁴³

What is obvious from analyzing the empirical material is that the pulling external pressures as NGOs and other stakeholders, customers and legislation have had a large influence on the company's development of environmental performance. These external factors has required the company to become more environmentally conscious and develop products to comply with new laws and regulations, which are mostly more expensive and more technically complex. This also includes the drivers that Wärtsilä's Sustainability Report points out; climate change, pollution and changes in lifestyle, since these are the reasons behind the pressures from stakeholders and environmental laws and regulations.

Still, after reviewing the interview material, it becomes clear that all drivers are not of equal importance. This is of course a problem, since the reporting does not fully reflect the reality, according to the interview material. Some drivers are even considered insignificant by some of the interviewees. In fact, the interview material in general states that legislation is the main driver for CSR and sustainable development of the company, which contradicts the theory of

²³⁸ Fleming, N., 2011, p.32

²³⁹ Wärtsilä Annual Report 2008, 2009, p.71

²⁴⁰ SIS. 2005, p.7

²⁴¹ Wärtsilä website: www.wartsila.com

²⁴² Environmental Report 2000, 2001.

²⁴³ Wärtsilä Annual Report 2009. 2010, p. 107

Mirvis and Googins.²⁴⁴ Some interviewees even said that without legislation and regulations, there would be no concern for sustainability and the environment within the business. Therefore, the information and figure of drivers for sustainable development made by the company is slightly misleading. Figure 14 is a modified figure of the drivers mention in the report, and their influence according to the interview material. Climate change is considered a direct driver for legislation, but an indirect driver for the environmental performance and sustainable development in the company. Legislation then has a direct effect on environmental and sustainable development of the company. "Changes in life style" is not considered a driver at all, but another effect of climate change and new legislation. Further, the interview material suggests that one of the main drivers for environmental sustainability and responsibility within the company is in fact the profitability of the engines and other products, for the company as well as for the customers, while environmental performance is not mentioned as an internal driver. In this way, profitability, or the cost/benefit ratio, also becomes an obstacle, or an external control, for the development of environmental CSR, as suggested in 5.1.5.

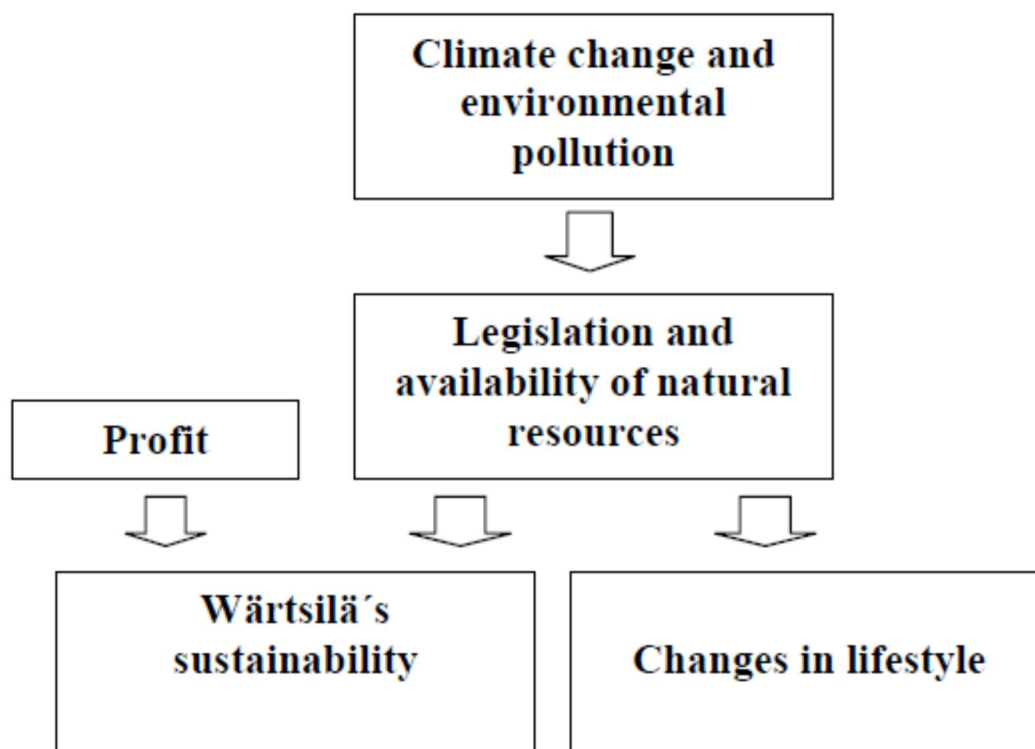


Figure 14: External drivers for environmental sustainability according to interview material

The question that remains is why there is such a difference between the importance of the different drivers when it comes to the two empirical sources. Values, which are important according to Fleming, have been created when it comes to the drivers of environmental responsibility and sustainable development in the reports, but this is not reflected in the interview material. One possible reason might be the absence of good guidelines for sustainability reporting, as suggested by Lozano and Huisingh²⁴⁵ and Zadek.²⁴⁶ Lozano and

²⁴⁴ Mirvis, P. & Googins, B., 2006, pp.122-123

²⁴⁵ Lozano, R. & Huisingh, 2009, pp.99-107

Huisingh state that the current guidelines, as the GRI Sustainability Guidelines and ISO 14001 series, are not sufficient for integrating CSR values into the business. Zadek sees a difference between company's intentions, which companies usually state in their reports, and actual behavior. In other words, companies tend to state a variety of intentions in their reports, to appear as a responsible actor towards society and their stakeholders, but not complying with them in reality. This could also be true in the case used in this study, even though intentions also are important "indications of change". In that case, the company needs to "do" and not "say" as suggested by Fleming.

To solve this problem, Zadek suggests that the leaders and management of a company needs to understand the meaning of sustainability, and integrating this into the whole business. Further, there needs to be a sustainability auditing system in place, which analyses the interactions between the organization, people and the environment. The reporting should also be quality assessed, while transparency and communication should be strived for when it comes to the work for CSR. The transparency and communication with stakeholders, as well as within the company departments, could also assist in breaking the barriers of customer reluctance towards new technology.

When it comes to the other external barriers mentioned, it is clear that these problems will subside as long as the legislation is as tolerant as it is at the moment. For example, there appears to be a need for stricter legislation on the fuel used in the business, as have been done within the car industry. At the same time, there also seems to be a need for legislation to be clearer on the focus of emission reduction, so the right technology can be developed to reduce significant GHG emissions. This way, the development of environmental technology could also become more profitable for the companies and its customers.

6.2 Stages of Corporate Citizenship

Social demands have forced businesses, as well as Wärtsilä, to develop stronger CSR to keep their creditability on the market, which has triggered companies to move from away from the elementary stage of corporate citizenship.²⁴⁶ As stated in the theoretical framework, Wärtsilä is, as many other companies, on different stages when it comes to corporate citizenship. When it comes to the *Citizen Concept*, Wärtsilä is somewhere between stage 3 and stage 4. This is since they, according to the Sustainability Report, have a good definition of the concept of corporate citizenship, which is intended to be integrated from the bottom to the top of the company, and are a forerunner in the industry when it comes environmental technology and innovation.

At the same time, the interview material indicates that there the integration of CSR is not as deep as suggested in the reporting, which put them on stage 3. Partly, development is slowed down because of strives for profit. This is not true, though, when it comes to the fuel cell development which does not bring any profit to the company at this point. Because of this it will also prove to be difficult for the company to move to stage 5 if, according to Mirvin and Googins, laws and regulations, or pressure from stakeholders, does not trigger this kind of commitment. Therefore, the *Structure* is on stage 3 or 4 also. To reach the next stage, the company needs to "create coherence" by making sure that the values of environmental CSR is integrated into every level of the company, according to Mirvin and Googins.

²⁴⁶ Zadek, S., 199, pp.21-31

²⁴⁷ Mirvis P. & Googins, B. 2006, p.119

On the point of *Strategic Intent* Wärtsilä would, according to the reports, be on stage 4 or stage 5, since their goal is to follow the legislation and future laws and regulations about the emissions to air, while also making use of the positive effects of integrating CSR into the business. But would this be the case without laws and regulations in place? The empirical suggest that it would not. Instead, the empirical material suggests that they do not do more than necessary, since the purpose of a company is to maximize profit, which puts the company on stage 2. According to the theory used, there is therefore a need for educating staff about environmental responsibility, creating programs, involving management and communicating with stakeholders, which does not seem to be lacking according to the interview material. Instead, a deeper commitment seems to be needed to advance in stages.

When it comes to *Leadership*, Wärtsilä seems to be on stage 5, as visionaries and ahead of the pack through offering the power plant and ship industry the best environmental technology available on the market, according to the sustainability reports. An example of that is again the fuel cell technology development, but also the dual-fuel engine developed by the company. The interview material also shows there is no lack of strong leadership and management at Wärtsilä²⁴⁸, that the management has much knowledge and awareness of their responsibility and what needs to be done, while also having good faith in the innovations of the company. Also, engineer 2 is involved in both the management of the company as a whole, as well as managing the department of EcoTech. This is significant since it connects the two bodies of management together, so that environmental sustainability can be integrated into the governing bodies of the company.

On the *Issues Management*, Wärtsilä has a good responsiveness to new policies and legislation, and also is proactive in the sense that they develop technology for future needs and requirements. For example, they develop engines that will manage to pass the IMO laws and regulations coming into force in 2016. Further, they follow up on their environmental performance and sustainability, even though it is lacking environmental indicators for product performance. They also try to incorporate sustainability into their connection and communications with all stakeholders, including their customers. This would put them on stage 4 of the Corporate Citizenship scale. Still, it must be pointed out that the company is proactive, but not when it comes to environmental concern directly. The proactive approach is to satisfy the need of the customers, which are controlled by laws and regulations, but which indirectly means proactive when it comes to following environmental laws and regulations. This would put the company on stage 3. Here, also, there seems to be a need for deeper commitment, according to the theoretical framework.

When it comes to *Stakeholder Relationships* Wärtsilä is, according to the reporting and information on the website, on stage 4. This is since the company has a relatively open dialogue with the media and the rest of the society. This is done through reporting, as the Sustainability Report for example, through press releases, and interviews with student etc. At the same time, some of the technology and information cannot be made public for competitive reasons, which prevents them from being on stage 5 in the development. The same is true when it comes to *Transparency*. In this case, it is also difficult to reach stage 5 since business secrets cannot be revealed, and the company therefore cannot make that commitment.²⁴⁹ On the basis of this analysis a profile of Wärtsilä's corporate citizenship can be drawn.

²⁴⁸ Engineer 2, 2011

²⁴⁹ Mirvis, P. & Googins, B. 2006, pp.107-123

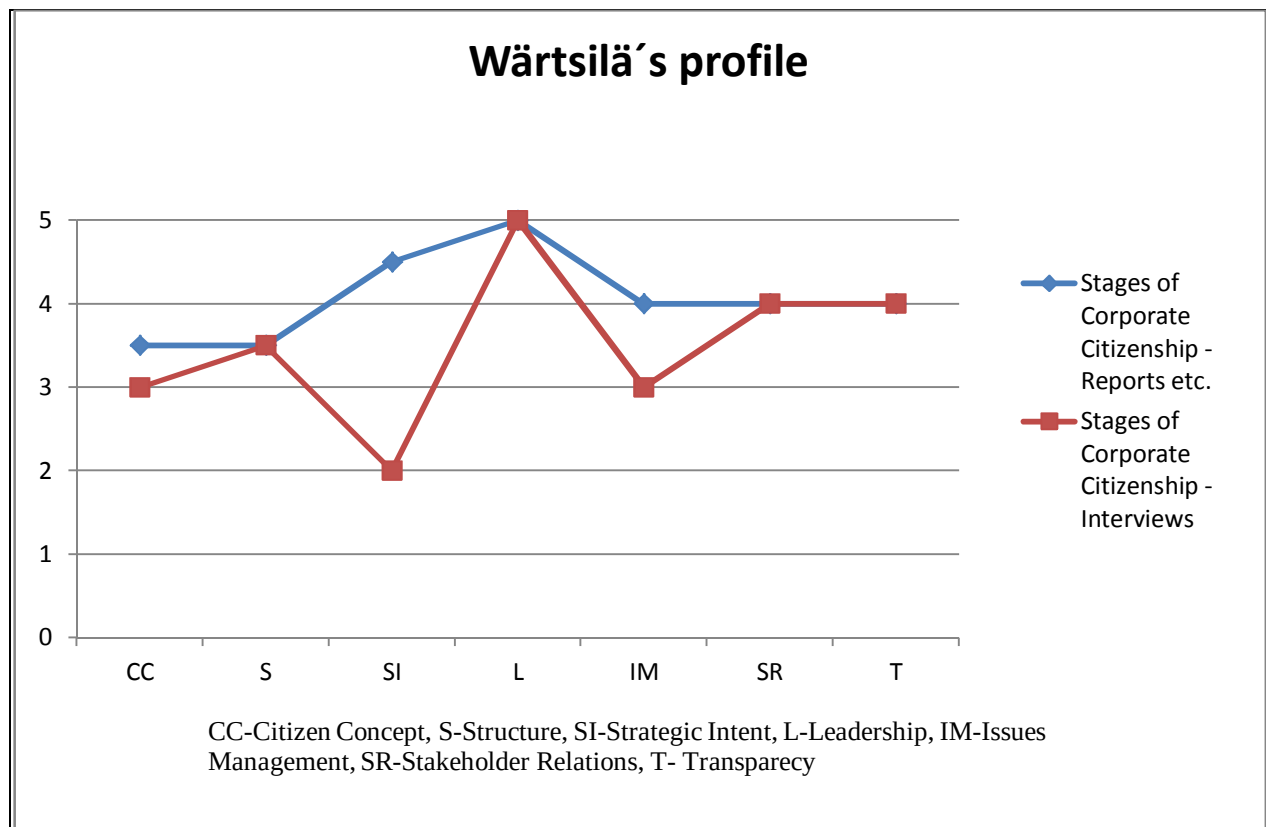


Figure 15: Stages of Corporate Citizenship according to Sustainable Development reports and other official material versus interview material

These profiles (figure 15 and 16) show that there is an inconsistency between the information presented in the sustainability reports, and other official material, and the views and opinions of the employees interviewed. This could again be explained by the difference in company's reporting and the actual actions carried through, as suggested by Zadek. There is therefore a need to further integrate the environmental sustainability goals into all departments and all levels of Wärtsilä. Also, the goals, and their integration, should be evaluated and assessed, while communication and transparency should be strived for when it comes to stakeholders, as well as within the company. One can therefore, according to the findings of this study, conclude that there is still room for improvement when it comes to environmental performance and sustainability at Wärtsilä, by integrating the goals even further in the structure of the company.

7. References

7.1 Scientific references

- Altman, W. 2007. *Working for the greater good?* Engineering Management. 17:6, pp. 12-15.
- Alvesson, M. & Sköldbberg, K. 1994. *Tolkning och reflektion. Vetenskapsfilosofi och kvalitativ metod*. Studenlitteratur, Lund.
- Berhout, T. 2005. *Corporate Gains*. Alternatives Journal. 31:1, pp. 15-18.
- Blowfield, M. & Murray, A. 2008. *Corporate Responsibility i A Critical Introduction*. Oxford University Press, New York.
- Carroll, A.B. 1979. *A Three-Dimensional Conceptual Model of Corporate Performance*. Academy of Management Review, 4:4, pp. 497-505.
- Carroll, A. 2004. *Managing ethically with global stakeholders: A present and future challenge*. Academy of Management Executive, 18:2.
- Carson, R. 1962. *Silent Spring*. Houghton Mifflin, United States.
- Clarkson, M.B.E. 1995. *A Stakeholder Framework for Analyzing and Evaluating Corporate Social Performance*. Academy of Management Review, 20:1, pp. 92-117.
- Doane, D. 2005. *The myth of CSR*. Stanford Social Innovation Review. Pp.22-29.
- Esaiasson, P., Gilljam, M., Oscarsson, H. & Wängnerud, L. 2007. *Metodpraktikan: Konsten att studera samhälle, individ och marknad*. Norstedts Juridik AB, Stockholm.
- Fleming, N. 2011. *Assured Sustainability Reporting i Navigating Obligations*. ECOS, Vol. 161, p.32,
- Forster, P. et al. 2007. *Changes in Atmospheric Constituents and in Radiative Forcing*. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Garriga, E. & Melé, D. 2004. *Corporate Social Responsibility Theories: Mapping the Territory*. Journal of Business Ethics, Vol.53, pp.51-71.
- Grafström, M., Göthberg, P. & Windell, K. 2008. *CSR: Företagsansvar i förändring*. Malmö: Liber AB.
- Herrmann, K. 2004. *Corporate Social Responsibility and Sustainable Development: The European Union Initiative as a Case study*. Indiana Journal of Global Legal Studies. 11:2, pp. 204-232.

- Holme, I.M. & Solvang, B.K. 1997. *Forskningsmetodik i Om kvalitativa och kvantitativa metoder*. Studentlitteratur, Lund.
- Jamali, D. 2008. *A Stakeholder Approach to Corporate Social Responsibility: A Fresh Perspective into Theory and Practice*. Journal of Business Ethics, Vol. 82, pp. 213-231.
- Laudal, T. 2011. *Drivers and barriers of CSR and the size and internationalization of firms*. Social Responsibility Journal, 7:2. Pp 234-256.
- Lee, T. 1999. *Using Qualitative Methods in Organizational Research*. Sage Publications, Thousand Oaks, CA, USA.
- Lozano, R. & Huisingh, D. 2011. *Inter-linking issues and dimensions in sustainability reporting*. Journal of Cleaner Production, Vol. 19, pp.99-107.
- Matten, D. et al. 2003. *Behind the Mask: Revealing the True Face of Corporate Citizenship*. Journal of Business Ethics, Vol. 45, pp.109-120
- Mirvis, P. & Googins, B. 2006. *Stages of Corporate Citizenship*. California Management Review, 48:2, pp. 103-126.
- Nagel, F. 2008. *Electricity from wood through the combination of gasification and solid oxide fuel cells* (Ph.D. Thesis). Swiss Federal Institute of Technology Zurich.
- Newell, P. 2005. *Citizenship, accountability and community: the limits of the CSR agenda*. International Affairs, 81:3, pp. 907-919.
- SIS. 2005. *CSR i Socialt ansvarstagande för företag - Handbok 40:2005, 1st Ed*. Stockholm: SIS.
- SIS. 2006. *ISO 14001 fyller 10 år*. Miljölednings lägesrapport, Vol.3.
- Sullivan, R. 2010. *An assessment of the climate change policies and performance of large European companies*. Climate Policy, Vol.10, pp.38-50.
- Trost, J. 2005. *Kvalitativa Intervjuer 3rd Ed*. Studentlitteratur, Lund.
- Vogel, D. 2006. *The Market of Value*. The Brookings Institution, Washington D.C.
- White, J., Wagner, W. & Beal, C.N. 1989. *Global climate change linkages: acid rain, air quality, and stratospheric ozone*. Elsevier Science Publishing Company Inc., New York. p. 106. Available at:
<http://books.google.com/books?id=gnaNHeU4rgQC&pg=PA106&hl=en#v=onepage&q&f=false>
- Zedak, S. 1999. *Stalking Sustainability*. GMI. Vol. 26, pp. 21-31.

Electronic sources

Atwater, G. & Riva, J. *Natural gas*. Encyclopædia Britannica, 2011. Date of access: March 15, 2011. <http://www.britannica.com/EBchecked/topic/406163/natural-gas>.

Bernes, C. *Förurning*. Nationalencyklopedin. Date of access: March 28, 2011. <http://www.ne.se/lang/förurning>

Bioenergiportalen. *El med gasmotor*. Date of access: August 22, 2011. <http://www.bioenergiportalen.se/?p=1803&m=1160>

Butler, T. & Likens, G. *Acid Rain*. Encyclopædia Britannica, 2011. Date of access: 24 Mar. 2011. <<http://www.britannica.com/EBchecked/topic/3761/acid-rain>>.

California Environmental Agency. *Emission control area*. Date of access: August 22, 2011. <http://www.arb.ca.gov/research/seca/seca.htm>

Clarson, M. *The Clarkson Principles - Value Based Management*. Date of access: August 22, 2011. http://www.valuebasedmanagement.net/methods_clarkson_principles.html

Climate and fuel i Fossil fuel and fuel reserves in the world. *Summary of world fuel reserves and annual consumption*. Date of access: August 22, 2011. <http://www.climateandfuel.com/pages/fuel.htm>.

Egneus, H. & Helmersson, D. *Biodiesel*. Nationalencyklopedin. Date of access: March 22, 2011. <http://www.ne.se/lang/biodiesel>.

Elvingson, P. *EMAS*. Nationalencyklopedin. Date of access: March 22, 2011. <http://www.ne.se/lang/emas>.

Encyclopædia Britannica. *Diesel Fuel*. Date of access: March 22, 2011. <<http://www.britannica.com/EBchecked/topic/162731/diesel-fuel>>.

Encyclopedia Britannica. *History*. Date of access: August 22, 2011. http://corporate.britannica.com/company_info.html.

Encyclopædia Britannica. *Sulphur Oxide*. Date of access: March 23, 2011. <<http://www.britannica.com/EBchecked/topic/572790/sulfur-oxide>>.

Encyclopædia Britannica. *Greenhouse gas*. Date of access: March 24, 2011. <<http://www.britannica.com/EBchecked/topic/683450/greenhouse-gas>>.

Euractiv. *Parliament approves emissions directive*. Date of access: August 22, 2011. <http://www.euractiv.com/en/climate-environment/parliament-approves-industrial-emissions-directive-news-496092>

European Environment Agency. *Environmental Indicators: Typology and overview*. Technical Report No. 25. Available at: <http://www.eea.europa.eu/publications/TEC25>

European Environment Agency. *Environmental Terminology and Discover Service*. Available at: http://glossary.eea.europa.eu/terminology/concept_html?term=dpsir

Gore, A. *Ascension Gateway i Climate Change Quotes*. Date of access: July 1, 2011.
<http://www.ascensiongateway.com/quotes/subject/climate-change/index.htm>.

Hardin, M & Kahn, R. *Aerosols and Climate Change*. NASA i Earth Observatory, 2010.
Available at: <http://earthobservatory.nasa.gov/Features/Aerosols/>.

IMO. *Brief History of IMO*. Date of access: August 22, 2011.
<http://www.imo.org/About/HistoryOfIMO/Pages/Default.aspx>.

IMO. *International Convention for the Prevention of Pollution from Ships (MARPOL)*. Date of access: August 22, 2011.
<http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-%28marpol%29.aspx>.

IMO. *The protocol of 1997 (MARPOL Annex VI)*. Date of access: August 22, 2011.
<http://www.imo.org/ourwork/environment/pollutionprevention/airpollution/pages/the-protocol-of-1997-%28marpol-annex-vi%29.aspx>

International Finance Corporation (IFC). *Environmental, health and safety guidelines*. Date of access: August 22, 2011. <http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines>

Jackson, S. *Climate change*. Encyclopædia Britannica, 2011. Date of access: March 24, 2011.
<http://www.britannica.com/EBchecked/topic/121632/climate-change>.

Lafayette Proctor II, C. *Internal-combustion engine*. Encyclopædia Britannica, 2011. Date of access: 15 Mar. 2011.
<http://www.britannica.com/EBchecked/topic/290504/internal-combustion-engine>.

Nationalencyklopedin. *Dieselolja*. Date of access: March 22, 2011. <http://www.ne.se/lang/dieselolja>.

Schumm, B. *Fuel Cell*. Encyclopædia Britannica, 2011. Date of Access: June 28, 2011.
<<http://www.britannica.com/EBchecked/topic/221374/fuel-cell>>.

The Engineering Toolbox. *Scrubber basics*. Date of access: August 22, 2011.
http://www.engineeringtoolbox.com/scrubbers-air-washers-d_139.html

SIS. *Miljöledningens Lägesrapport i Om ISO 14000-serien*. 2006:3. Available at:
http://www.sis.se/PDF/om_iso14000-serien.pdf.

The World Bank. Date of access: August 22, 2011. <http://web.worldbank.org>

Tud Management Service GmbH and Tud Sud Group. *ISO 14001:2004 i Summary of significant changes*. Available at: http://www.iqa.org.br/pdf/iso14001_new_revision.pdf.

UNEP. *Rio declaration*. Date of access: August 22, 2011.
<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163>

United Nations. *Global Compact i The ten principles*. Date of access: August 22, 2011. <http://www.unglobalcompact.org/AboutTheGC/TheTenPrinciples/index.html>

Website of Austrian Standards. *Corporate Social Responsibility*. Date of access: August 22, 2011. <https://www.astandis.at/shopV5/search/Details.action?dokkey=233333>

7.2 Empirical material

Written Sources

Annual Report 2004, Sustainability report. KPMG Wideri OY AB. Helsinki, 2005. Available at: <http://wartsila.com/en/media/materials>.

Environmental Report 2000. KPMG Wideri OY AB. Helsinki, 2001. Available at: <http://wartsila.com/en/media/materials>.

Energi nyheter. *Wärtsilä tar hem kontrakt i Brasilien*. Date of access: March 2011. Available at: <http://www.energinyheter.se/2010/10/w-rtsil-tar-hem-kontrakt-i-brasilien>.

Hellén, Göran. *Introduction to Performance - Exhaust Emissions*. Presentation on December 14, 2010.

Pakarinen, Risto. *Ecotech i Focusing on the Environment*. Twentyfour7, 3:9, pp.45-47.

Various internal material. Wärtsilä, 2011.

Wärtsilä Annual Report 2006. KPMG Wideri OY AB. Helsinki, 2007. Available at: <http://wartsila.com/en/media/materials>.

Wärtsilä Annual Report 2007. KPMG Wideri OY AB. Helsinki, 2008. Available at: <http://wartsila.com/en/media/materials>.

Wärtsilä Annual Report 2008. KPMG Wideri OY AB. Helsinki, 2009. Available at: <http://wartsila.com/en/media/materials>.

Wärtsilä Annual Report 2009. KPMG Wideri OY AB. Helsinki, 2010. Available at: <http://wartsila.com/en/media/materials>.

Wärtsilä Annual Report 2010. KPMG Wideri OY AB. Helsinki, 2011. Available at: <http://wartsila.com/en/media/materials>

Wärtsilä Sustainability Report 2002. KPMG Wideri OY AB. Helsinki, 2003. Available at: <http://wartsila.com/en/media/materials>.

Wärtsilä. *Power Plant Product Catalog 2011*. Available at: www.wartsila.com.

Electronical sources

Official website of Wärtsilä: www.wartsila.com.

Interviews

Product Center EcoTech (PCE)

- Engineer 1 - E-mail interview.
- Engineer 2 - April 13th 2011, 13.00.
- Engineer 3 - April 18th 2011
- Engineer 4 - April 12th 2011

Research & Development (R&D)

- Engineers 5, 6 & 7 - April 12th-18th 2011

Environmental Services

- Engineer 8 - April 14th 2011

Appendix 1 i Interview guide:

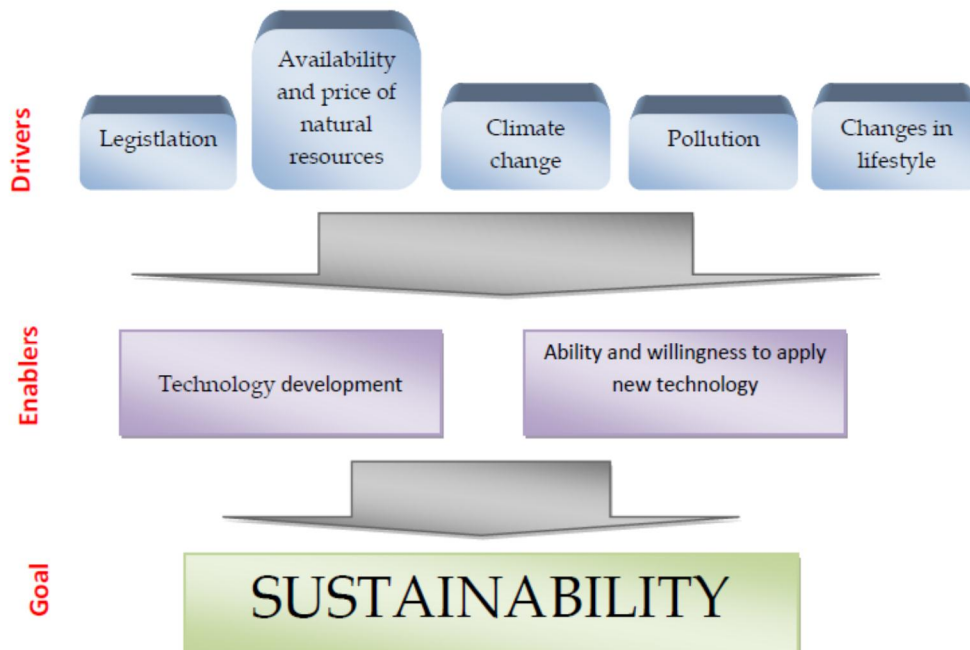
Interview guide

General Information

- Can I use a tape recorder?
- Name?
- Education?
- Position at Wärtsilä and responsibilities?

Environmental CSR

1. How would you, in your own words, describe Wärtsilä's product environmental performance?
2. What are the ambitions and goals for product environmental performance at **your department and position** in the company?
3. Which **external drivers** driver do you believe has been the most important, or prominent, when it comes to product environmental performance and environmental sustainability?



4. What have, in your point of view, been the driver(s) of product environmental performance **within the company**?
5. What have been the driver(s) of product environmental performance **within your department**?
6. Which **obstacles**, in your area of expertise, for product environmental performance do you think are the most difficult to overcome? And why?
7. What are your **thoughts and hopes** for the future, when it comes to product environmental performance in the company, and within your department?

Thank you for your time!