Is there a need for Environmental Product Declarations

Alfa Laval's communication of environmental information to their customers

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Master Thesis 2010
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Abstracts

As an international actor it is preferable to make an effort to understand how your performance affects the long-term sustainability, both in local and global terms. Sustainability includes subjects such as integration between economical, social and environmental spheres. It can be achieved by reorganizing living conditions, reappraising economic sectors and work practices, develop technologies in a sustainable perspective and adjust individual lifestyles.

Sustainabe Devlopment -
"Meet the needs of the present without compromising the ability of future generations to meet their own needs."

- United Nations General Assembly (1987): Report of the World Commission on Environment and Development: Our Common Future.

During this thesis the reader will get the relevant background information, to understand the theoretical part of Environmental Product Declarations (EPDs) and how different companies work with its application in real life. But also if any of Alfa Laval's customer show best practice in this area and in which sectors Alfa Laval may start up their work of producing EPDs.

The aim with this thesis is to investigate if there is a market need for EPDs among Alfa Laval's customers and what benefits that may come from such environmental information, for both the customers and Alfa Laval perspective. The study investigate both external and internal driving forces, barriers, pros and cons, best practice and different actors connected to Alfa Laval.

Thesis methodology is based on literature review about EPDs; and its tools, methodology and Alfa Laval's database; personal observations from the authors, adaptive learning method and systems thinking method.

In the empirical part called "Analysis" will the eight sub objectives be discussed. The analysis and proposal for the future will be based on the interview, our personal observation, and literature review.

Finally; the conclusion which is followed by a summary of the findings from our research project and critical discussion. This part provides learned lessons and recommendations for Alfa Laval: First of all an EPD is not the right communication tool for Alfa Laval, and therefore they should not create one. Secondly we recommend Alfa Laval to develop the internal communication and knowledge before finding the right target customer and tool.

Acknowledgements

This project has been our final thesis in our Master program in Industrial Management and Engineering at Lund's Institute of Technology, consisting of 30 credits.

We want to make a special thanks to;
our supervisor at Alfa Laval David Ford,
our supervisor from our university Robert Bjärnemo,
Co-workers at Alfa Laval, and all of you that have participated to this thesis with your knowledge and time.

But last but not least we want to thank each other!!

Contents

1. Introduction

Environmental issues are complicated and there are many ways on how to obtain and find more efficient solutions for different environmental problems. Much focus has been put on the climate change and the green house gases for the past decade. Recently more focus is directed to understand the environmental impact both from private homes to big, global, companies. Many driving forces have originated from the Kyoto Protocol - a protocol where the members commit to reduce their green house gases.[1] The climate change conference held in 2009 in Copenhagen[2] have been another driving force but also all the national and international regulations and standards that have been created and put into practice for the past years. Such regulations make a big difference in why more companies find it to crucial to work with environmental issues in their company.

Many global companies have created different solutions on how to become more environmental friendly and how to be more transparent and communicative for the all interest parties. One tool for communicating a products' environmental impact is the so called: Environmental Product Declaration (EPD). This type of document was produced for the very first time in 1999[3] - since than many different companies have produced these types of declarations. But do they really create an added value for the customer; is there a market need for this kind of document?

A growing number, such as customers, are requesting information about the environmental performance of products and services. The information in EPDs includes environmental details along the life cycle of the product, which involves every part from the production point until the point when the product has served its purpose. To meet this demand of information, standards and labeling have been created.

During the last years there has been much attention directing towards giving value and its provision to customers. But very few companies have the capability to actually assess that kind of value in real practice and deliver that value to the customer. [4] Those companies that have created EPDs for this purpose have also noticed a competitive market advantage, to be one of the first in their area of competence.

This thesis will investigate if there is a market need for EPDs, what the benefits are from creating one, how different companies have worked with it in the past and what the prediction for environmental documents and information will be in the future – what demand will the customer have on the information that is to be supplied to them in purchasing process. Our investigation, during the writing process of the thesis, have been done by analyzing the multinational company Alfa Laval; how it is dealing with environmental issues and problems

[1] Was initiated in Kyoto, Japan in 1997 and in November 2009 had 187 member countries signed the protocol to commit to decrease the green houses gases.
[2] In 2012 the Kyoto Protocol to prevent climate changes and global warming runs out. To keep the process on the line there is an urgent need for a new climate protocol. At the conference in Copenhagen 2009 the parties of the UNFCCC meet for the last time on government level before the climate agreement need to be renewed.
[3] *Eva Vitell, Environmental manager at Vattenfall, 2010-03-12*
[4] **Anderso**, J. and Narus, J. (2009), *Business Market Management – Understanding, Creating, and delivering value*. Third Edition. Pearson Education.

and what strategy they can use to add value for their customers from an environmental aspect. This study will investigate if there is an existing or future need for EPDs, and what benefits there are to be gained by producing one.

By identifying blind spots (areas where a competitor do not see the significant events, such as strategic move) can provide insight into what actions that will be necessary. By benchmarking the company can find out how other companies do something better and then imitate it and improve their techniques. This evaluation will be carried out through our thesis, by investigating already existing EPDs and those companies behind them.

The development of EPDs is money consuming and for those companies that provides them to their customers is it important to see beyond the cost itself to the value that can be gained from it. It is a hard and a demanding task to assessing value in monetary terms and therefore, there are few companies that actually try to do it, but those that do have found that it becomes easier assessing form every value assessment one does. This sort of thinking also provides these companies with a superior knowledge about the market.[5] This thesis will also take in account, whether or not one can put a price tag on EPDs.

1.1 Alfa Laval

Mission:
"To optimize the performance of our customers' processes. Time and time again."

Alfa Laval focus on three key technologies; heat exchangers, separators and fluid handling. The company has about 12 000 employees, 27 manufacturing units and about 70 service centers over the world. Their products are sold in approximately 100 different countries.

The forerunner of Alfa Laval, AB Separator was established in 1883 by Gustaf de Laval and Oscar Lamm Jr. During his lifetime Gustaf de Laval registered 92 patents and started 37 companies, among all he invented the centrifugal separator. In 1963 the company changed their name to Alfa Laval.

The products are used in various kinds of industries as solutions within cooling, heating, separating and transporting fluids. Alfa Laval's customers differ a lot from each other in what field of area they are active in. It is everything from foods and beverages to oil, pharmaceuticals, bio-fuel and waste water treatment.

[5] **Anderso**, J. and Narus, J. (2009), *Business Market Management – Understanding, Creating, and delivering value.* Third Edition. Pearson Education

The order intake of 2009 was 21,539 million Swedish kronor, whereas 45 percent of the sales are made in Europe, 31% in Asia, 22% in North and South America and the 2% in other regions. With a great focus on R&D the company produce about 30-40 new products each year.

1.1.1 Organization

Alfa Laval has a customer-oriented organization. The basic three divisions are:
- Operations Division; produces and supplies the products
- Equipment Division; focus on marketing and sales
- Process Technology Division; focus on marketing and sales

Equipment- and Process Technology divisions are divided into 9 different market segments.

Figure 1: Alfa Laval's organization scheme[6]

During this project we will focus on three of the sites of Alfa Laval;
1. Lund – the head office. The company has; production, development and sales in Lund, with 1037 employees.
2. Tumba – where we will have our office and some insight from the Marine industry with 455 employees.
3. Kolding – do a fieldtrip to the site to get a greater knowledge of Alfa Laval.

All of the three sites mentioned above will we visit during our project. In the following text have we described in a brief way how they operate in Kolding. The reason why we choose to describe this site in Kolding more closely is mainly due to the fact that we are only going to be

[6] www.alfalaval.com

there for two days during our whole project and thereby felt the need to describe the site and that we wanted to go there since they have a biopharmaceutical focus.

Alfa Laval in Kolding has about 500 employees and a yearly turnover of around 1 billion. The site is divided into four different parts:

1. Manufacturing Center (MC) - The production center where Alfa Laval's pumps and valves are manufactured. The transverse departments connected to the production are for example: Purchasing, Reparation and maintenance, Product support and Human Resource.

2. Production Center and Fluid Handling – The product center is responsible for the overall Fluid Handling products at Alfa Laval. They have the responsibility for the product during its life cycle and have to make sure the products are profitable for Alfa Laval.

   The product center is divided into two departments; R&D and Product Management. The R&D department is divided into the product development department (they are optimizing the existing products and developing new products) and the technology department (which is developing new technologies).

3. Equipment Division Sanitary Equipment (ESE) - ESE is a part of the equipment division. They are responsible for the sales and marketing for heat exchangers, pumps, valves, installation materials, tank equipment and separators to dairies, breweries and the food, cosmetics and pharmaceutical industry. Like all other segments in the equipment division ESE sell the products to distributors that finally sell to the end customer. The biggest customer for ESE is Tetra Pak.

4. DC – The distribution center in Kolding is the third distribution center within Alfa Laval in Europe. They distribute products and spare parts. DC is divided into Warehouse, Materials Management, and Order-handling/Shipping.[7]

1.2 Problem Definition

Business market management is about gaining a reasonable return on value delivered and of increasing a supplier's present and future profit. It is a way of thinking on how and what the industry can provide and accomplish in them. Those firms that are market driven can be recognized by their ability to sense events and trends in their markets ahead of their competitors. They know how to provide the right information and in that way attract customers, improve their internal and external relations and grow stronger comparing to their competitors. They have information that gives them superiority in each step of the process, from planning to

[7] http://local.alfalaval.com/da-dk/about-us/alfa-laval-i-danmark/alfa-laval-kolding/Pages/default.aspx

customer contact. This is done by having an open-mind when doing inquiry and synergistic information distribution; it is about having a strategy.[8]

Strategy – Definitions:
An elaborate and systematic plan of action. [9]
A plan or method employed to in order to achieve a goal or objective. [10]
The general plan or direction selected to accomplish incident objectives. [11]

A lot of the companies worldwide have environmental issues integrated in their strategies. Based on what benefits the strategies will gain, they can be divided into five different target groups:
- Research and development
- Marketing
- Supply Chain
- Production
- Environmental Support [12]

One way of adding extra value can be done by producing a document containing environmental information such as EPDs. Offering it to customers could add the extra value that is necessary to gain competitor advantage and attract customers.

"Everything is worth what its purchaser will pay for it" – Publilius Syrus, first century, B.C

At Alfa Laval the decision making concerning environmental issues is done by the Environmental Council at Alfa Laval, which was founded in 2006. The council has a decided scope and a strategy for the so called "Green Operations", which cover all of their environmental processes. The council consists of 7 senior managers with different responsibilities including two from the Group Management Team. The Environment Council include the most senior line managers of the organizations that have most environmental impact these include: Head of Manufacturing, Logistics and Purchasing, Head of Research and Development, Head of Human Resources, Deputy Head of Manufacturing, Head of CSR and Head of After Sales Service.

Amongst many questions they deal with on how to precede their environmental work in terms on adding value for their customers, whereas EPD could be one of the solutions to this problem. Alfa Laval created their first EPD in 2001, but not much has happened since then. It is costly to create a third part certified EPD. If Alfa Laval would create this document for the customers, will they use it for more than just to fill out a box in a "checklist"?

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[8] **Anderso**, J. and Narus, J. (2009), *Business Market Management – Understanding, Creating, and delivering value*. Third Edition. Pearson Education
[9] wordnetweb.princeton.edu/perl/webwn
[10] www.scoea.bc.ca/glossary2001.htm
[11] www.usda.gov/wps/portal/!ut/p/_s.7_0_A/7_0_1OB
[12] http://www.dantes.info/Strategies/strategies_info.html

1.3 Scope and structure of the paper

The main objective of the thesis is to investigate if there is a market need for EPDs for Alfa Laval's customer. Interviews with Alfa Laval's employees will take place, to get all information available upon the subject and their opinion on the subject. External interviews will be held with different companies that have been first in the field of competence to create an EPD. The goal with these interviews is to get knowledge about the reasons and values in creating EPDs and their personal prediction for these kinds of documents in the future. Environmental consults, organizations and governmental related operators will be interviewed to broad the overall picture on how familiar EPDs are to them seen from a Scandinavian perspective, and also interviews with best practice companies within Sweden. The investigation will result in a decision making; to concentrate this thesis on one or two different types of industries. Whereas a dividend of Alfa Laval's customers will be necessary; one industry that represent the more "clean" one and one to represent the so called "dirty" industry. The two industries will be compared to each other and put under the lop to see whether or not these industries will gain an added value of EPDs – and thereby if Alfa Laval will gain anything from creating one for them?

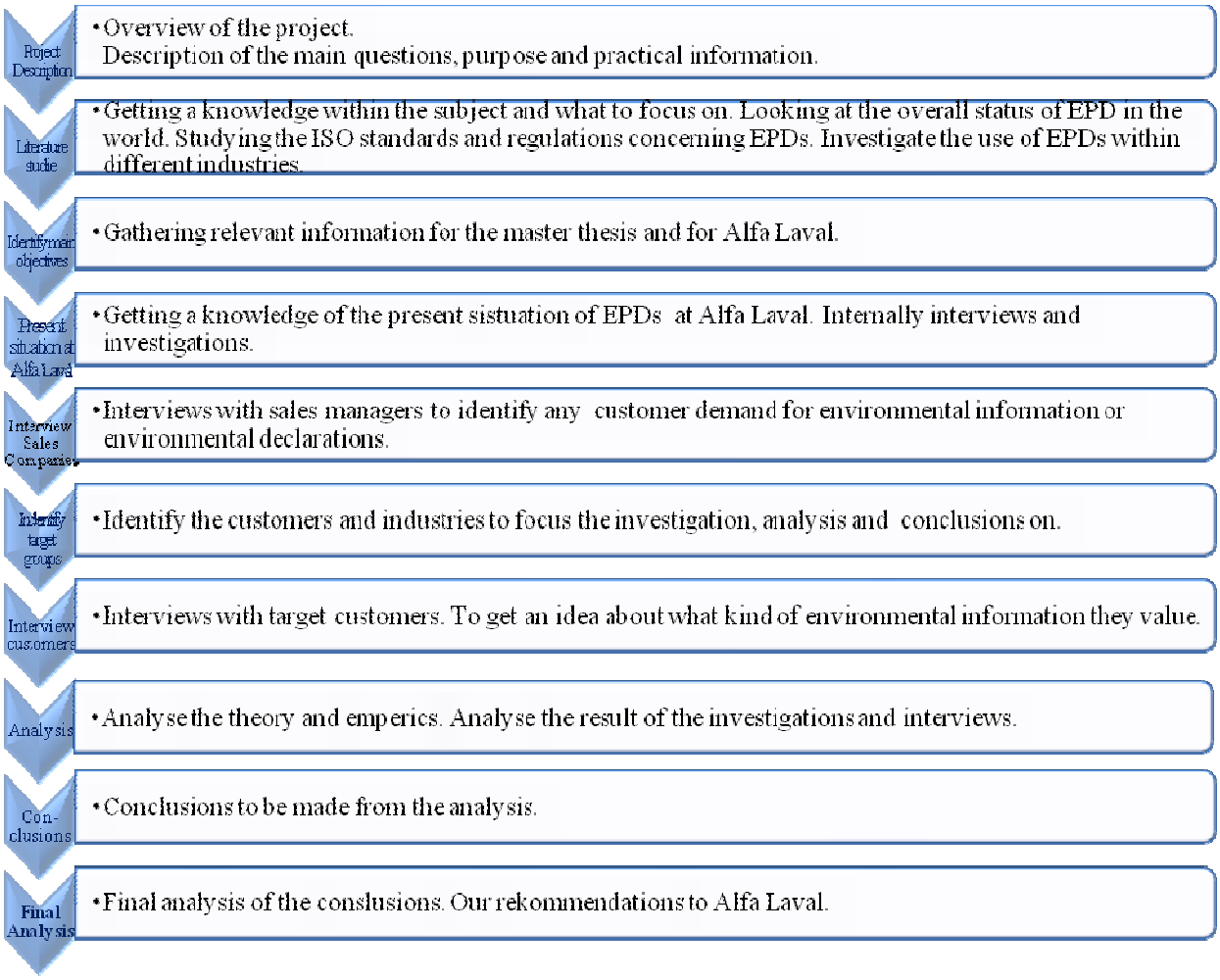

Figure 2: An overview of the structure of the project

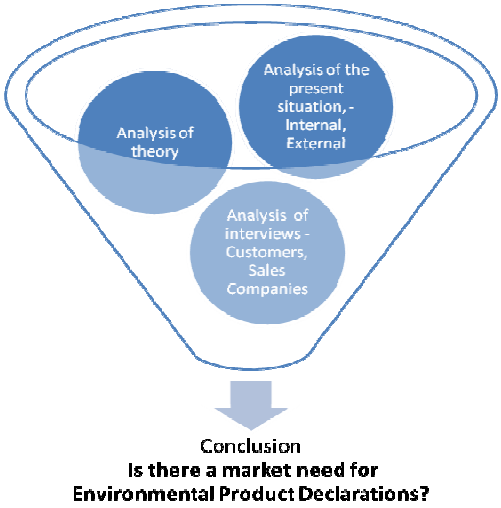

Figure 3: In broad outlines: The three big information sources for the project that will lead to the conclusion

The thesis is written to let the reader understand the theoretical concept of EPDs. This master thesis is planned to be a project thesis for implementation at Alfa Laval.

Our work will be the document that will be the ground for decision making, that is; whether or not Alfa Laval will precede the work with developing EPDs or put it to a final end. The Heads of both Marketing divisions will be the ones to read it and later make recommendations to the Group Management.

1.4 Research Questions and Objectives

The main question: Is there a need for Environmental Product Declarations?
Eight sub research objectives have been set:

1. *To investigate the use of EPDs in Swedish/Danish Industry including: In which industries they are evident; why they are produced; structure of their content; customer/consumer benefits.*
   This will be done by interviewing employees at Alfa Laval's sites in Tumba, Lund and Kolding, to get their point of view and suggestion on how to proceed with the project.

2. *To examine if competitors to Alfa Laval publish EPDs.*
   This is done by study competitors' homepage, finding what information they supply for interested parties and by both a written and verbal conversation, done by e-mailing and phone calls.

3. *Identify any appropriate benchmark EPDs used by other companies (in Alfa Laval's industry or outside).*
   By studying different companies homepage that use EPDs and find good example for those that have succeeded with their goals on implementing EPDs within their companies.

4. *Identify the customer perceptions and requirements for EPDs.*
   Doing a face-to-face interview with the to customer groups that have been selected to get their opinion about EPDs.

5. *Identify if there is a current demand for EPD (or similar) from customers in other segments.*
   This is to be done by survey of some sales companies.

6. *Identify potential regulatory requirements for EPDs within Sweden/EU.*
   Study literature and making phone calls and interviewing organizations dealing with regulations and standards.

7. *Produce recommendations on whether Alfa Laval will gain any benefits from producing EPDs for its newly developed products. Consideration should be given to customer values now and in the future; Investor/shareholder values; Regulatory requirements now and in the future; Brand perception and other CSR considerations.*
   The conclusions and recommendations for creating or not creating EPDs at Alfa Laval will be presented.

8. *If there is merit in producing EPDs; to propose a structure and sample content for an EPD that could be used by Alfa Laval that suits the two products/areas studied. The proposal should consider the resources needed to produce the EPD and how to minimise the cost.*

1.5 Limitations and Assumptions

The scope of the thesis is limited to the case study of one company. The empirical studies in this thesis are limited to the fact that it is hard to find environmental information from other companies, since environmental information most of times is not communicated externally, especially not in "dirtier" industries or by Alfa Laval's competitors. Another limitation is during the interviews, since different persons answer in different ways and the time they put on answering the questions differ, this is especially on the interviews made by email, for example the questionnaire for the sales managers at Alfa Laval.

This thesis will lay the ground on how Alfa Laval will precede with EPDs, it they going to develop them even further or try to find some other way to communicate and add value for their customers. The conclusions of this thesis are applicable to Alfa Laval only.

1.6 Methodology

The thesis is defined as an intrinsic case study, which is a study to be made in order to better understand the situation at Alfa Laval. The case study is an object that we study mainly due to our interest in questions related to sustainability but also thanks to the opportunity that was provided by Alfa Laval. The main reason for us selecting the case study approach is that we can be a part of Alfa Laval's organization and in that way be able to make the study from within the company. This is important since the empirical data is both collected from interviews and observation at the company and in that way a better understanding for the situation Alfa Laval is facing.

For us to answer the main research question and the eight sub objectives, we collect information mainly from two sources:

1. Literature survey about theory and practice of environmental product declarations. This consists mainly of literature and Internet sites on the subject of management-, assessment- and communication tools, regulations and information about those companies we have been in contact with.

2. Social research method – interviewing. By interviewing different people one can collect a wide range of opinions, experience and suggestions. We contacted Alfa Laval's employees, their competitors, customers and best practice companies in other segments. We have also been in contact with; environmental funds, environmental organizations and environment consultant. We mainly use a semi-structured interview method.[13] That is, we usually specify the questions before the interview but in some cases other questions appear and we will in those cases fill out the lack of information with additional questions. The interviews are all related to the environment and environmental declarations.

   Information will also be collected by e-mailing and phone calls.

1.7 Hypotheses

EPDs should be developed at Alfa Laval in order to add value for their customers by supplying them with environmental information and aspects for the product to be purchased.

In the empirical part called "Analysis" will the eight sub objectives be discussed. The analysis and proposal for the future will be based on the interview, our personal observation, and literature review.

We will analyze the whole picture of Alfa Laval by identifying the external customers that may or may not be interested in further environmental information from Alfa Laval. We will analyze the actors connected to EPDs, potential barriers and problems connected to implementation of EPDs, this will be done in order to propose a correct future development plan to integrate or not integrate EPDs at Alfa Laval.

[13] **May**, T. (1997), *Social Research: Issues, Methods and Processes*, Open University Press, Buckingham, Philadelphia.

2. Background

2.1 Environmental Awareness

Questions concerning sustainability and the environment have become one of the main topics that are disused in the media today – more and more information both point at and prove that the global environmental situation is not as well today as it was 100 years ago. Some of the main factors are; emissions, the green house gases (GHG) and the overall pollution that our world is exposed to.

Since it is a hot-topic is it important for all global actors, both in the industry and in the private sector, to reflect upon their environmental impact, on what they can do to decrease their environmental impact, both in small and big scale. This past decade has shown a great will of changing the world towards the better, improving the environmental processes and becoming better on working together, by crossing borders and national organizations and governmental regulations. Since the Kyoto protocol was formed in 1997, 187 countries have joined and signed the protocol to prevent climate change and global warming. In 2012 the Kyoto Protocol will run out and there is an urgent need for a new climate protocol. This was something that was discussed during the latest United Nations Framework Convention on Climate Change (UNFCCC) conference in Copenhagen in November 2009. This again shows that much has happened the past years, that there is awareness among industrialized countries, something that have not been there in the same extent before.

The big companies, working on an international market is more often put under the spot light to see how they meet the demands of environmental policies and regulations. Not only do the government and organization demand environmental policies within the company but a growing number of customers and consumers put a higher demand on companies. The customer wants to be able to make decision based on whether or not they agree with the company´s environmental profile and policy – they have become a new driving force why companies have to work towards transparency and mediate their environmental information. Customers demand, in a much greater context than before, information about the environmental performance of products and services.

2.2 Terminology

Sustainability tools are used when implementing sustainability strategies in companies.[14] The tools will help the company to find the relevant information and methods to be able to make environmental related decisions and to reach the overall environmental goals within the company.

[14] http://www.dantes.info/Strategies/strategies_info.html

There are three different kinds of sustainability tools to be used:

1. **Management tools**; such as EMS, ISO 14000 and EMAS
2. **Assessment tools**; such as PCR and LCA.
3. **Communication tools**; such as Carbon Footprints and EPD[15]

The **Environmental Product Declaration** (EPD) strategy describes how to use an EPD in the market communication; in more details that means how to communicate relevant environmental information about a product to the right target groups. Such target groups can be the environmental support at the company or the marketing department. The environmental support as a target group needs the EPD information to make strategic decisions to be able to reach environmental goals. The marketing department, on its' part, need the EPD to know how they can communicate the right environmental information to the company's customers.

2.3 Model of Thesis Problem

There is an obvious advantage to be able to work from within Alfa Laval, to get the right information flow and the right sense how the information goes from one part of the company to another. In this project for Alfa Laval will we focus on:
- External and Voluntary Environmental Information about Alfa Laval's Products.
- The customer as an external interest party.

The model in figure 4 shows where we are to focus our project from the environmental aspect, and as seen in the figure our focus lays on the external information flow concerning Alfa Laval's products, in terms of information that are voluntary to produce for external use.

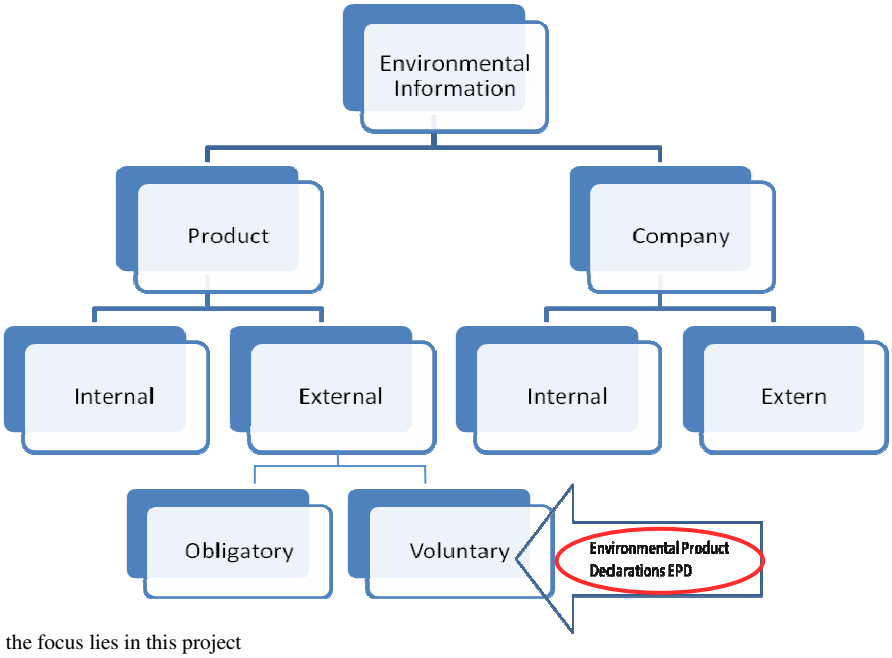

Figure 4: Where the focus lies in this project

[15] http://www.dantes.info/Tools&Methods/Tools_Methods.html

The model in figure 5 shows what kind of different interest parties there are for Alfa Laval, and as figure 4 showed will we direct the focus to the external information flow, whereas we will mainly focus externally on the customers.

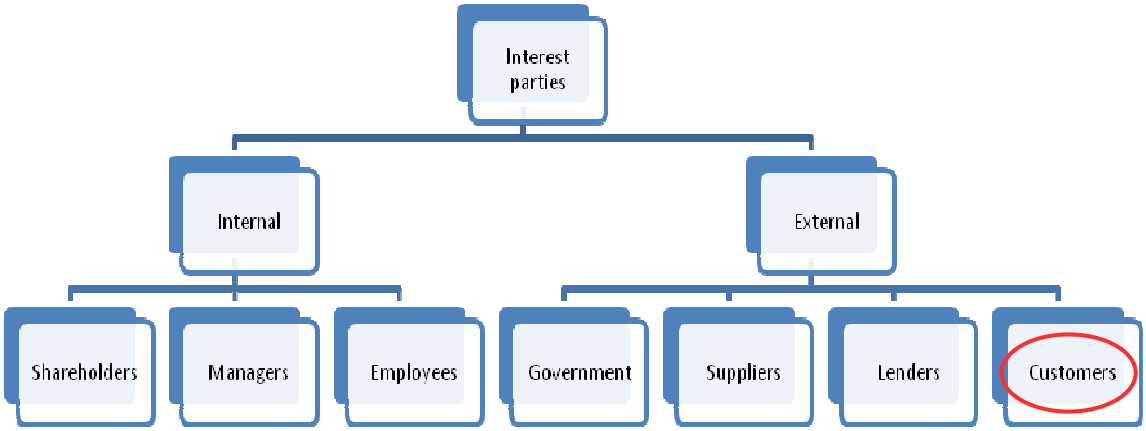

Figure 5: The interest parties of Environmental Information

3. Literature Review

This chapter provides a theoretical framework for the empirical part of the thesis and the literature review is divided into four different sections. The first three are described in figure 6, - the sustainability tools, and the last section for this chapter is called “Control Organization”.

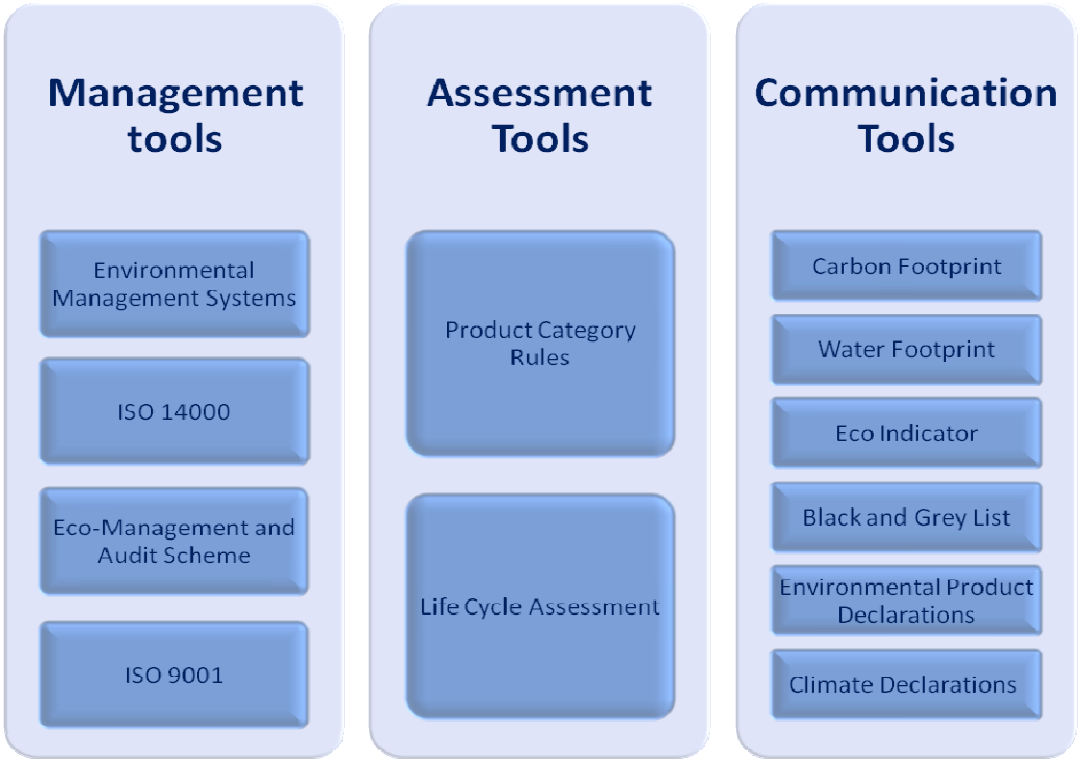

Figure 6: Three sustainability tools available for companies and organizations

3.1 Management Tools

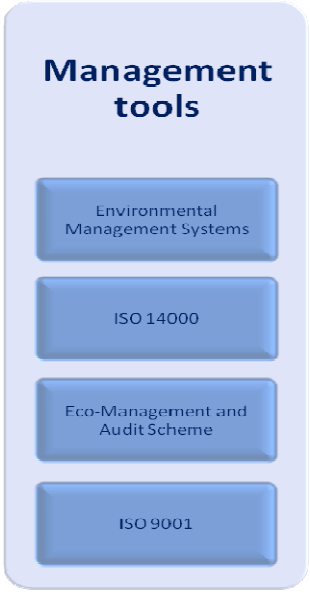

Figure 7: Sustainability tools – Management tool

3.1.1 Environmental Management System

Environmental Management System (EMS) is a practical tool on how to approach the environmental aspects of an organization. It emerged in the early 1990 and has since then developed to become a very useful tool. The most common EMS systems that are in use are; ISO 14001 and Eco-Management and Audit Scheme (EMAS), these standards are complementary and well established and helps to increase the benefits of using EMS.[16] These two can be seen as tools that specify the structure of an EMS and they provide a company or organization a tool on how to manage and improve environmental performance.[17] Most times, EMS can improve the cost efficiency within the company and in that way generate some financial savings, and improve the reputation of a company.[18]

"The Part of the overall management system that includes organizational structures, planning activities, responsibilities, practices, procedures and resources for developing, implementing achieving, reweaving and maintaining the environmental policy"
[European Committee for Standardization, 1996-08-21. Section 3.5]

Since EMS is meant to be applicable for all over the world, it is quite simple and general.

3.1.2 ISO 14000

ISO 14000 is a set of standards that help organizations and companies to build and operate a structural and systematic environmental work for their EMS. The set of standards are divided in organizational orientated- and product oriented.

Organization orientated standards:

- Environmental management systems
- Environmental audits
- Environmental performance
- Environmental communication
- Green house gases

Product orientated standards:

- Environmental labels and environmental declarations
- Life cycle analysis
- Environmental product development

[16] www.iema.net/ems/emas
[17] **Weiss**, P. and Bentalge, J. (2006), *Environmental Managment Systems and Certifications*. Uppsala.
[18] www.iema.net/ems/emas

The standards in ISO 14000-set are developed to work both on their own and together with other sets of standards. There are three standards that can be used for an independent third-part certification:

- Environmental management standard – ISO 14001
- Type III) Environmental Product declaration – ISO 14025
- Green house gases – ISO 14064

The rest of the standards are so called "guiders standards".[19]

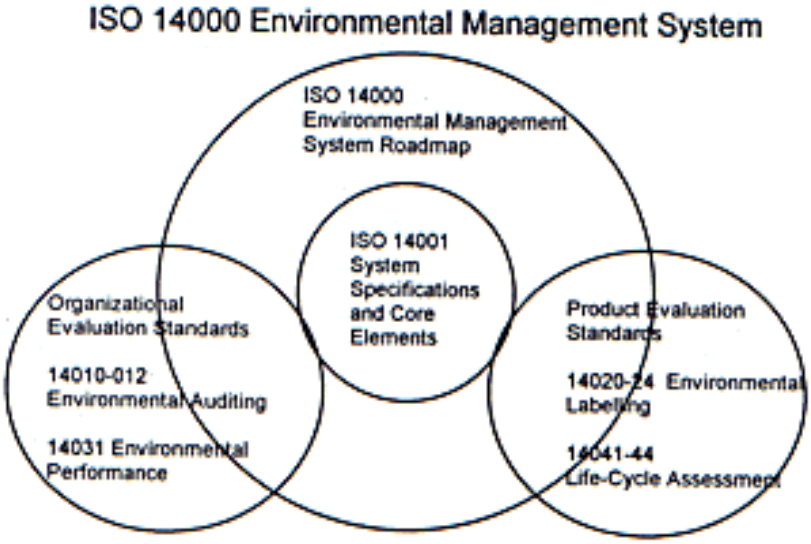

Figure 8: The ISO 14000 Environmental Management System[20]

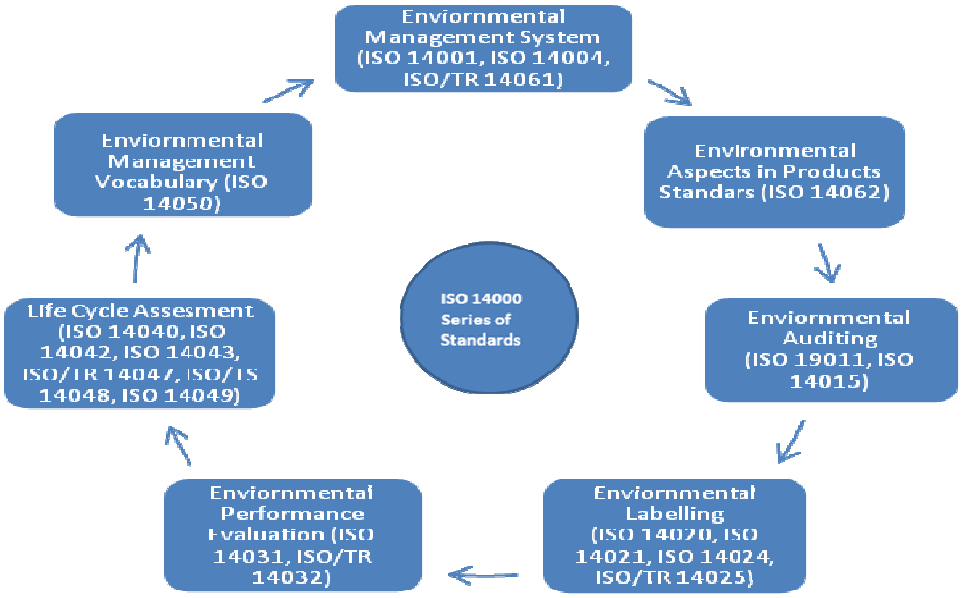

Figure 9: The ISO 14000 Series of Standards[21]

[19] http://www.sis.se/PDF/om_iso14000-serien.pdf
[20] http://www.esemag.com/0596/iso14000.gif
[21] **Weiss**, P. and Bentalge, J. (2006), *Environmental Managment Systems and Certifications*. Uppsala.

ISO 14001

ISO 14001 was published in 1996; it is a document with specification and guidance that is one of the cornerstones within ISO 14000.[22] An organization that have used an environmental management system according to ISO 14001 can choose to let an independent third party verify that the organization fulfill all the demands in the standard. This independent third party is called the certification authority, when the certification authority approves an environmental audit, will it result in a specific ISO 14001.[23]

ISO 14020 Principles

ISO 14020 series describes how to use and establish the ISO standards concerning environmental labels and declarations. The overall goal is to provide the market with verified, correct and non-misleading information about the environmental performance of products and services. To stimulate the demand of environmental friendly products and services and by that stimulate a continuously market driven environmental improvement.

Key Elements of an ISO 14001

- *Environmental policy*: the requirements to pursue the policy via objectives, targets and environmental programs.
- *Planning*: the analysis of the environmental aspects.
- *Implementation and operation*: to control and improve operational activities.
- *Checking and corrective action*: such as monitoring, measurement and recording of activities that have an impact on the environment.
- *Management Review*: to ensure its continuing improving and being effective.
- *Continual improvement*: a key component that completes the process plan, implements, check and review to continually improve.[24]

Figure 10: Different labels for ISO 14000 certificates

3.1.3 Eco-Management and Audit Scheme

Eco-Management and Audit Scheme (EMAS) was launched in 1995 by European Union and was in the beginning restricted to companies in the industrial sectors, but since 2001 has it been open to all economical sectors including the public and private ones.[25]

[22] http://www.dantes.info/Tools&Methods/Managementtools/Management_systems.html
[23] http://www.sis.se/DesktopDefault.aspx?tabname=@iso14000&menuItemID=8865
[24] http://www.dantes.info/Tools&Methods/Managementtools/Management_systems.html

EMAS is a voluntary scheme that works to enhance and increase the efficiency of the environmental work that is done by companies or organizations. It can be used as a management tool for organizations that wishes to evaluate and make improvements about their work connected to environmental performance.[26] A qualified third party checks the system and its statement to see if the requirements of EMAS are met.[27] Those using this EMAS tool do not need to make all the changes in the company at the same time; it is enough if they have a plan on how to proceed to later become more sustainable, to meet the requirements to get verification of an EMAS.[28]

Key Elements of an EMAS

1. Develop an environmental policy.
2. Make an initial environmental review.
3. Develop an environmental program.
4. Establish an EMS.
5. Carry out an internal environmental audit.
6. Review once more.
7. Develop an environmental statement.
8. Get validation and register.[29]

3.1.4 ISO 9001

ISO 9000 is a group name for the type of certification formalizing that a business process are being practical - it represent an international consensus on good quality management and practices, with standards and guidelines to these issues.[30] But it does not guarantee any quality of end products and services.[31] The ISO 9001 provides a set of standardized requirements for a quality management system – regardless of what the user organization does, in other words; it is designed and intended to apply to virtually any products or service, made by any process in the world. [32]

Figure 11: Different labels for ISO 9001 certificates

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[25] http://www.dantes.info/Tools&Methods/Managementtools/Management_systems_EMAS.html
[26] http://www.dantes.info/Tools&Methods/Managementtools/Management_systems.html
[27] **Weiss**, P. and Bentalge, J. (2006), *Environmental Managment Systems and Certifications*. Uppsala.
[28] http://www.iema.net/ems/emas/
[29] **Weiss**, P. and Bentalge, J. (2006), *Environmental Managment Systems and Certifications*. Uppsala.
[30] http://www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000/iso_9000_essentials.htm
[31] http://en.wikipedia.org/wiki/ISO_9000
[32] http://www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000/iso_9000_essentials.htm

3.2 Assessment Tools

Figure 12: Sustainability tools –Assessment tools

3.2.1 The Product Category Rules

The Product Category Rules (PCR) defines the environmental parameters to be included in an EPD. PCR can be formed by the organization undertaking to prepare EPD for similar products (that is; the manufacturer can define PCRs) but it is much more useful if common PCRs can be agreed for a whole industrial sector which enables EPD from different manufactures to be comparable, can be seen as a complementary to the general requirements of EPD programs. ISO 14025 states that those that are interested in developing an EPD can use an already existing PCR as a starting point for their own development of their PCR. So when creating an EPD one can consider available PCRs, and thanks to the global concept there has become an increased interest and effort to work together and collaborate to prepare a common PCR document for different product types.[33]

Since PCRs are developed continuously, a big archive on www.environdec.com already exists with the existing product groups, which makes it easier for companies to develop a PCR of their own. But the goal in the future is to have a set of more general pre-approved PCR-documents available for all kinds of companies and products. This is something that the international EPD system; Environdec, is working to develop to an even better system than the one before. The goal is to produce a complete database where one can search for available PCR document, PCR document that are under preparation and those that are subjected for review.[34]

[33] www.environdec.com

[34] **Erlandsson**, M. and Lindfors L.G. (2005) *Product Category Rules (PCR) for building product on an international market – A PCR based on LCA methodology in comploance with ISO 1402.* IVL, Stockholm.

A new PCR document can be constructed either by:

- Companies and organizations in co-operation with other parties
- A close cooperation between Life Cycle Assessment (LCA) experts and companies
- Single companies or organizations

Later the PCR needs to be approved upon which is mostly done by an open consultation and participation with different companies and organizations, which gives a wide range of product specific knowledge and expertise in the area.

The development of the PCR document includes these phases:

- *Initiation* – Such as appoint a PCR moderator, consider available PCRs and seek cooperation with other parties.
- *Preparation* – Includes definition of product category and criteria to use in the LCA study.
- *Consulting* – PCR documents must be subject to an open consultation before it can be officially approved.
- *Approving* – For example; finalizing the PCR proposal and setting validity of the document.
- *Publication* – Publication of the PCR document
- *Updating* – Since it has a pre-determined period of time, there can be a need for the document to be revisited in the case for an update.

The international EPD system allows for pre-certification of products and services during the time the company/organization is preparing for the "real" PCR.[35]

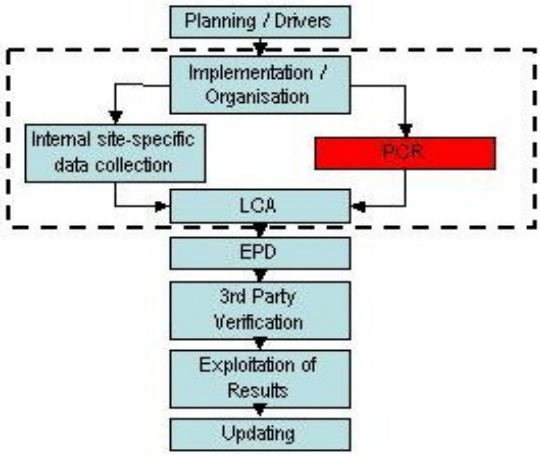

Figure 13: The Assessment Tools - how they are connected to each[36]

[35] www.environdec.com

3.2.2 Life Cycle Assessment

The initiator and creator of Life Cycle assessment (LCA) method is the Society of Environmental Toxicology and Chemistry (SETAC). LCA is a technique that is used and associated with environmental aspects for a products life cycle. It can be used for following purpose:

- Analyzing the overall environmental load done by the product.
- Comparison between products for internal or external communication

LCA became a very popular tool during the nineties due to the fact that many thought it would be a useful tool to support environmental claims done by the company and in that way could it be used in the company's market strategy. But through the years it has shown to be a wrong assumption, even though it is still important to communicate LCA results in a well-balanced way, the focus of LCA is more within the environmental policy making. There it really serves a purpose, mainly because more and more companies put a greater effort to enhance their sustainability aspects connected to their company or organization.

The most common reason for LCA is for internal purpose, such as; product improvement, support strategic choice or benchmarking, and even though LCA is used for external communication the main use is internal. It is important to properly define the purpose and the application of the LCA before starting the investigation and how to communicate it; both internally and externally, and have a well defined budget for it.[37]

An LCA study consists of four steps:

1. Define the goal and scope of the study
2. Make a model of the product life cycles inflows and outflows – the data collection is known as the Life Cycle Inventory (LCI) stage.
3. Understand the relevance of the inflows and outflows – is known as the Life Cycle Impact Assessment (LCIA) phase.
4. The interpretation of the study.[38]

The main technique to create an LCA is by a model. The model is produced during the inventory phase and consists of an analysis that gives information on how to produce, use transportation and dispose a product. The analysis leads to a flow sheet or process tree with all the relevant processes.

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[36] http://www.ecosmes.net/cm/navContents?l=EN&navID=envProductProcedure&subNavID=2&pagID=4&flag=1

[37] http://www.pre.nl/download/manuals/SimaPro7IntroductionToLCA.pdf

[38] **ISO 14040** (1997), *Environmental management – Life Cycle Assessment – Principles and Framework.* ISO 14040:1997(E) Geneva.

Since LCA are very multidisciplinary it has some complexity connected to it, much due to its ***three spheres***, that differs allot form one another, which are required in an LCA:

- *Techno sphere*: Technique systems, such as; production processes and transport processes.
- *Ecosphere*: Environmental mechanisms which are hard to verify and be exact about.
- *Value sphere*: Are the subjective choices, they are dealing with weighting the impact of categories or just allocate procedure or time horizon.

One of the more demanding and time consuming part of creating LCA is the data collection, which is divided into two parts:

1. *Foreground data* – specific data to model the system. It describes a particular product system.
2. *Background data* – data for generic material, energy, transport and waste management systems. Usually easy find in databases or in literature.

There is really not a sharp line between these two steps of data collection and the differentiation between them is mainly done upon the product that is evaluated for the LCA. . The collection of the data in a LCA can be tricky to collect, especially since it is most of times a need to find information from external sources.

- Ones willingness to supply data to other parties is important to keep a good relation
- Confidentiality can really be an issue, so it can be a good thing to take in an independent third party that averages the data from different suppliers.
- The terminology used in different industries can easy become a barrier in which the questions does not make sense/understandable for a person outside the company.[39]

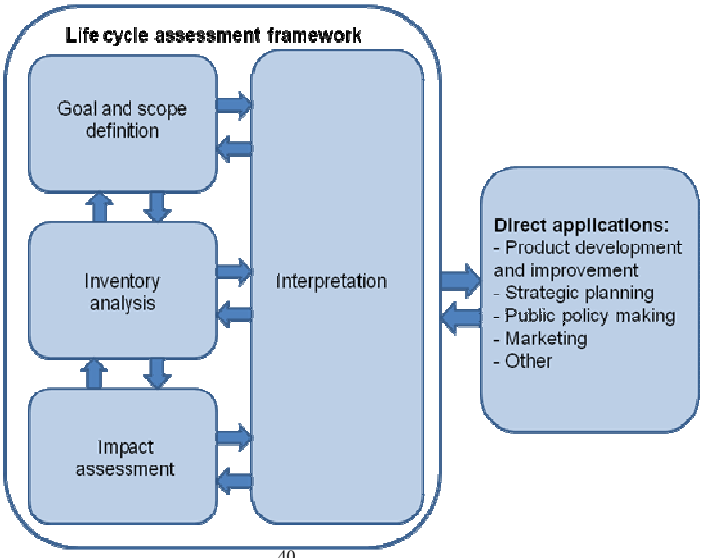

Figure 14: The Phases of a LCA[40]

[39] http://www.pre.nl/download/manuals/SimaPro7IntroductionToLCA.pdf

There are some *limitations* of using a LCA*:* The results of LCA studies are often hard to interpret because LCA results contain a number of different environmental flows. The implementation of a LCA study takes too much time to be useful for designers. Additionally, LCA study does not often include involvement of different stakeholders groups that can provide good information sources.[41] LCA is also an expensive technique. Many variables of LCA or their values are not known or uncertain in the early phase of LCA study.[42] However, with development of software and database it is possible to manage quicker and cheaper LCA studies.

3.3 Communication Tools

Figure 15: Sustainability tools – Communication tools

3.3.1 Carbon Footprint

Carbon footprints are used to measure the environmental impacts, especially the green house gases (GHG), off different activities. The unit for carbon footprint is tons or kilos of *carbon dioxide equivalent* (CO_2e). CO_2e is the amount of a GHG equivalent to the amount of carbon dioxide with the same environmental impact. For example one kg of methane is equal to 21 kilos of carbon dioxide.

[40] **Luttropp**,C. (1998) *Life Cycle design 98,* Department of machine Design/Engineering Design at the Royal Institute of Technology – KTH, Stockholm
[41] **Luttropp**, C. (1998) *Life Cycle design 98,* Department of machine Design/Engineering Design at the Royal Institute of Technology – KTH, Stockholm
[42] **GodKoop**, M. and Spriensma, R. (2000), *The Eco Indicator 99: A damage oriented method for Life Cycle Impact Assessment,* Methodology teprt, 2nd edition, Pre Consultants B.V., Amersfoort.

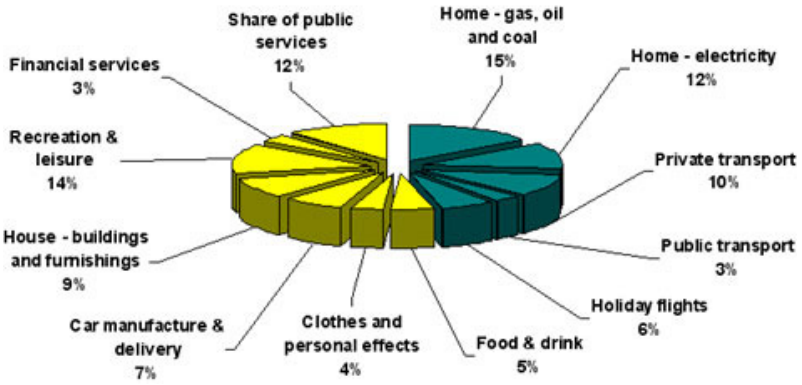

Figure 16: The main elements in carbon footprints for a person in the developed world[43]

The green part represents the ***primary footprint***, which are the activities that we have direct control of, such as the direct emissions of CO_2 from burning of fossil fuels, for example transportation and energy consumption.

The yellow part represents the ***secondary footprint***, which are the indirect carbon emission from the life cycle of all products. This is including all the activities from manufacturing to the break down.[44]

3.3.2 Carbon Calculator

GHG Protocol is considered to be the most widely used international accounting tool for government and business leaders to understand and quantify GHG emissions. GHG Protocol is a partnership between World Resources Institute and the Worlds Business Council for Sustainable Development and is working together with example government and environmental groups all around the worlds. It provides the framework for accounting for almost every GHG standard and program in the world, such as; ISO and the Climate Registry.

Calculating emissions is a multi-step process. To make it accurate and a useful tool it needs to be developed under much consideration to different aspects and many quality controls and active data is required. GHG Protocol offers a Corporate Standard which is a guide on the entire inventory development process. They have 26 different types of tools, which all of them reflect best practice methods on a step-by-step basis.[45]

3.3.3 Water Footprint

"*The water footprint of a business is equal to the sum of the water footprints of the business output products.*"

The water footprint is an indicator of water use. It takes in account both the direct users and the indirect ones. The footprint is defined as the total volume of freshwater that is used to produce

[43] http://www.carbonfootprint.com/carbonfootprint.html
[44] http://www.carbonfootprint.com/carbonfootprint.html and http://www.naturvardsverket.se/sv/Nedre-meny/Fragor-och-svar/Klimat/Vad-ar-koldioxidekvivalenter/
[45] http://www.ghgprotocol.org/

the goods and services that is consumed by an individual, company or the community as a whole. It shows the volume of the water use and pollution, its locations and timing. This gives a much deeper level for analysis, especially since the ecological and social impact of water use not only depend on the volume, but where and when it is used.

It is known that there is a connection between water depletion and pollution and economy. Many countries have a considerably big water footprint, much due to importing water-intensive goods from other regions, and in that way putting pressure on the where resources in the exporting regions.

The water footprint of a business is the total volume of fresh water that is used directly and indirectly to run and support the business. It consists of two components:

1. *Operational water footprint* - the direct water use by a company
2. *Supply-chain water footprint* - the water use in the company's supply chain.

It is quite common for companies to have a supply-chain water footprint that is much larger than the operational water footprint. The main reason for this the agricultural activity itself but partly based on the intake of agricultural products such as; meat, milk, cotton and so on. [46]

The water footprint consists of three components;

1. *Blue water footprint* – the volume of freshwater that evaporated from surface water and ground water, to produce the goods and services consumed by the individual or community.

2. *Green water footprint* - the volume of water evaporated from rainwater stored in the soil as soil moisture.

3. *Grey water footprint* - the volume of polluted water that associates with the production of all goods and services for the individual or community. [47]

3.3.4 Eco Indicator

In 1993, the Netherlands started a project called the ***"Eco Indicator"***. The project was divided into two parts; normalization and evaluation, with the main purpose with to develop an *environmental indexing*.[48] An Eco Indicator is mainly used as an indicator for toxic emissions, an indicator that some companies actually use it in marketing strategy.[49]

[46] http://www.waterfootprint.org/?page=files/home
[47] http://en.wikipedia.org/wiki/Water_footprint
[48] Environmental indexing is a final and aggregated assessment of the environmental impact based on the classification procedure".
[49] **Bakker**, C. (1995), *Environmental Information for Industrial Designers,*Technische Universiteait Delf

3.3.5 Black and Grey List

Alfa Laval has created a "Black and Grey" list of hazardous substances. The substances are banned or restricted within Alfa Laval's processes and products. The list is based on global agreements and EU directives and legislation.[50]

3.3.6 Environmental Product Declarations

As a result of the globalization and the strategic value of environmental issues the demand for Environmental Product Declarations (EPD) is increasing. A growing number, example customers, are requesting information about the environmental performance of products and services. The information is including environmental details along the life cycle of the product.[51] That involves every part from the production point until the point when the product has served its purpose. To meet this demand of information, standards and labeling have been created.[52]

EPDs are used by companies to provide parties, mainly for their customers, with quantified and verified information about the environmental performance of the company's products or services. They are made to be used by a wide range of stakeholders and can be used both external, for customers, and internal, for strategically and environmental management.

The external users can be divided into *direct* or *indirect* users:

- *Direct users* – In business to business (B2B) relations and Business to Consumer (B2C) relations. The direct users are the *manufacturers* (consumers, distributors and retailers).
- *Indirect users* - the political institutes, environmental organizations and other parties that are part of creating public opinions.[53]

The potential values in an EPD are:

- *Communication tool* – to communicate environmental information to interest parties. An EPD is a way to communicate the relevant information from the LCA, to the customers.

- *Management tool* - in different levels of the company, both within the product development as well as in marketing and other strategic operations. Decisions made by the company's purchase and procurement sections can be made by evaluating the value of the EPD of the product. EPDs make it possible to identify environmental characteristic and apply them in the process of improvement.
  An economical reason behind EPDs is that it can lead to a possible improvement of the environmental performance which can lead to cost savings.

[50] http://www.alfalaval.com/about-us/for-suppliers/black-and-grey-list/Pages/Black-and-Grey-list.aspx
[51] www.gednet.org/?page_id=13 and http://www.businesslink.gov.uk/bdotg/action/layer?topicId=1079438684&lang=_w
[52] http://www.dantes.info/Tools&Methods/Environmentalinformation/enviro_info_epd.html
[53] www.gednet.org/?page_id=13

- *Product development* - EPDs make it easier to design products and improve existing products to accommodate them for a better environment. [54]

- *Political and legally*- to create a broader environmental consciousness. Environmental regulations and laws can force the company to provide the market with different kind of environmental reports such as EPDs.

- *Action* - The consumers can question the environmental information and ask for disclosure of their concerns.

- *Marketing* - Since there is an increasing demand for more and better information concerning the environment, EPDs make it possible to convince different interest parties about the company's control and improvement of environmental aspects.

- *Relations* - Improving relations with customers, stakeholders, investors and the general public. Consumers have greater believe in companies that care and take action for a better environment.

- *Recruitment and job applications* – EPDs and other environmental commitment can be a way o attract key competences and to retain employees within the company. The coworkers will feel proud of being a part of the organization.

The *external* use of EPDs is to be a basis for comparison between products within the same business. In that way the costumer can make sure they choose a product that goes along with their environmental strategies. *Internally* the EPD can be used as a tool for both management and communication. It can be used as a proof of the environmental improvement over time.

EPDs encourage the demand and supply of products that cause less stress for the environment and create a market driven environmental improvement.[55]

3.3.6.1 The Information Provided in an EPD

The information is based on factual, comprehensive and scientifically valid data from the Life Cycle of the product. Some of the characteristics of EPDs are; objective, neutral, credible and comparable. An EPD is based on scientifically accepted and valid methods.

The absences of valuations make it possible for the interest parties to evaluate the EPD according to their interest. EPDs are comparable since the information is collected and calculated according to common synchronized calculation rules. There are some requirements for inspections and reviews, which makes it a credible document.[56]

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[54] www.gednet.org/?page_id=13 and http://www.businesslink.gov.uk/bdotg/action/layer?topicId=1079438684&lang=_w

[55] www.gednet.org/?page_id=13 and http://www.businesslink.gov.uk/bdotg/action/layer?topicId=1079438684&lang=_w

[56] www.gednet.org/?page_id=13 & http://www.msr.se/sv/epd/

3.3.6.2 The Need for LCA in EPDs

One of the main things to do when creating an EPD is to develop an LCA, because when creating an EPD the environmental performances have to be described from a life cycle perspective, which is done by following prerequisites:

- Make sure that the LCA meets the requirements of ISO 14040 and ISO 14044
- Make sure it follows the main purpose of an EPD, the way one collect the date and the methods that are connected to the ISO 14025.
- Look over the PCR rules to make sure everything follows smoothly.[57]

It is difficult to see if an LCA has been made according to a specific standard due to the fact that ISO standards are defined in a quite vague terms. To define if the LCA meets the requirements of an ISO-standard is important since a LCA based on ISO standards are more reliable then if not, for both the internal and external use of it. [58]

Sometimes there is no data on any existing LCA in a company, which can lead to some difficulties for the company when it comes to look in to specific data when to cover the entire life cycle of the product. But these problems are mostly usual in the supply chain "from cradle-to-gate", which is the most commonly basis for creating EPDs. And for that reason are companies and organization allowed to use a defined amount of generic data, but it is important that the environmental impact associated to generic date do not exceed 10 percent of the overall environmental impact from the product system.

The EPD system allows for a group of products, that have similar usage, to be in the same declaration, but the specific data of the product is not allowed to differ with more or less than 5 percent. For those companies and organizations that have sets of similar products with only small modification from one another can in this way create EPDs in a more cost efficient way.[59]

3.3.6.3 Producing an EPD

Producing an EPD is a voluntary choice made by the company. When making this choice there are a lot of factors to consider and questions to be asked, for example [60]:

- Are we able to make this kind of declarations?
- On what level can we make them?
- Is there a need for EPDs internal or external?
- Is there a need for EPD's among our customers and within our market segment?
- What are the costs of making EPD's?
- What are the benefits of making EPD's?
- Costs compared to benefits, what is the total value?
- Does this decision go along with our environmental strategies?
- Required input data?

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[57] www.environdec.com
[58] http://www.pre.nl/download/manuals/SimaPro7IntroductionToLCA.pdf
[59] www.environdec.com
[60] www.gednet.org/?page_id=13 & http://www.dantes.info/Tools&Methods/Environmentalinformation/enviro_info_epd.html

There are four steps when creating an EPD:

1. Gathering the information relevant for the topics in the EPD, this is made out of the LCA.
2. To calculate the environmental effects during the life cycle of the product
3. If necessary; let a third part review and accept the declaration.
4. Registration and publication of the EPD.[61]

Figure 17: The four steps of creating an EPD

EPD as a Living Document

When there are relevant changes in the LCA of the product the EPD has to be updated. An update can be relevant if materials or components have changed, which affects the environmental performance of the product.

Since the contents of an EPD, can be changed (for example if the processes are changing over time), the company can add and change information when it is required and necessary. This creates an opportunity for the company to communicate and add up relevant information along the value chain. EPD's are a living document and have to be updated.

Other factors that change can be the product design or the type of materials because of changes in the supply of material; these are factors that can change the product's effect on the environment. The declarations have to adjust according to the modifications.

3.3.6.4 Different Levels of EPDs

To meet the demand for environmental declarations within different types of business and for different products, there are three ISO standards, within the ISO 14020 series, that can be used for creating different types of EPDs. These three different types of ISO standards are supposed to be a complement rather than compete with each other. In ISO 14020 there are also some descriptions about the generally principles behind the environmental labeling and declarations.[62]

When a company has decided to create EPDs for their products or services they have to choose between the three different types of EPDs. What type a company chooses depends on the type of business and product/service that is to be evaluated, but also on to the ambition level of the company.

[61] www.msr.se/sv/epd

[62] www.force.dk/sv/Menu/Consultancy+and+Development/Environment/080114_miljoevarudeklarationer.htm

1. **Type I**, ***Environmental Labeling*** - the most basic one. It is a certificate labeling of the product, for example; the flower made as an environmental label within the European Union. Type I declaration is made according to the ISO-standard **ISO14024**.

2. **Type II**, ***Self-declared EPD's*** - do not require any third part certification, they can be made by the company itself. Type II declaration is made according to the ISO-standard **ISO14021**.

3. **Type III**, ***Environmental Product Declarations*** - are made according to standardized labeling schemes that are administrated by public or private sectors. This is the most complicated certification, it does not only require PCR but also a LCA and the certification must be verified by a third part. Type III declaration is made according to the ISO-standard **ISO14025**.[63]

3.3.6.4.1 Type I Declarations - Environmental Labeling

To get a Type I label the product have to fulfill the rules and regulations made by the organizations providing the label. Type I Labels are developed for specific product categories or products.[64]

The eco-label, with its EU flower, is the official Type I Environmental Label used within Europe. The European Commission is the organization behind the label. The decision of the label and regulation was made in 1992 and the goal was to provide the European market with a voluntary environmental labeling to encourage and promote environmental friendly products. The label encourages companies to reduce the environmental effects of their product during its life cycle. The label is also meant to guide consumers to choose environmental friendly products and provide them with the right environmental information.

To receive a Type I Environmental Label the product has to fulfill the regulations according to the EU commission. The product is valuated in a life cycle perspective; from the production point until waste. It has to fulfill high demands within environment, health, function and quality. The third part regulation is made by a national organization, in Sweden it is made by an organization called "Miljömärkning Sverige AB", on behalf of the Swedish government and parliament. There are seven different product areas and 28 product categories, that only concern consumer goods, for example; domestic appliance, cleaning products, textiles, paper products and lubricants.[65]

[63] www.iei.liu.se/envtech/forskning/forskningsprojekt/mvdtransport?I=sv

[64] http://www.dantes.info/Tools&Methods/Environmentalinformation/othertools_label_type1.html & http://ec.europa.eu/environment/etap/policy/pdfs/roadmaps/sweden_sv.pdf

[65] http://www.svanen.nu/SISMABDocs/EU_ecolabel_webb_sv.pdf

Type I environmental labeling in Sweden

For products within Sweden there are five main environmental Type I labeling are; the Nordic Swan, "Bra Miljöval", KRAV, TCO and the European flower.[66]

The Nordic swan is a voluntary and neutral certification program for Type I environmental labeling. It is the official Type I Labeling in the Nordic countries. In Sweden the certification is made by Miljömärkning Sverige AB. As well as the European flower the Swan is based on an environmental evaluation from the life cycle of the product. The demands and regulations for the Swan label are made higher for every year, in that way there is a constant environmental development. The vision of the Swan is to create a sustainable society and consumption. Today there are 65 different product groups market with the Swan. In Sweden the both the EU flower and the Nordic Swan is administrated by SIS environmental labeling.[67]

- Bra Miljöval "Bra Miljöval" is made by the Swedish Society for the Conservation of the Nature. By choosing products with this label the consumers can support an environmental friendly product.[68]

- KRAV represent ecological products. KRAV is a Swedish organization with 27 member organizations within Sweden. The label is only used for products that can fulfill the demands for being ecological. The label is mainly used for consumer-products such as provisions.[69]

- The TCO label is an international label for IT products made by the Swedish Confederation of Professional Employees (Tjänstemännens Centralorganisation TCO). The name of the company providing TCO labels is TCO Development, which is owned by TCO. TCO Development is part of the global network GEN (Global Eco-labeling network). [70]

Eco Mark (Japan) Blue Angel (Germany) Environmental Choice Program (Canada)

The Thai Green Label scheme (Thailand) Environmental Friendly Label (Hungary)

Environmental Choice (New Zeeland) [71]

Figure 18: International environmental labels

[66] http://swedbank-nyhetsbrev.allready.net/ftg/2008/06/inte_helt_latt_att_marka_ratt.csp

[67] http://www.dantes.info/Tools&Methods/Environmentalinformation/othertools_label_type1.html & http://www.svanen.nu/Default.aspx?tabName=Om%20oss&menuItemID=6996

[68] http://www.naturskyddsforeningen.se/gron-guide/bra-miljoval/

[69] http://www.krav.se/

[70] http://www.tcodevelopment.com/pls/nvp/Document.Show?CID=4146&MID=572

[71] http://www.ricoh.com/environment/label/type1/index.html

3.3.6.4.2 Type II declarations; Self-Declared EPDs

Type II is a self-declared declaration based on environmental statements made by a company. It can be made within different kind of companies; manufacturers, importers, distributors and retailers. The company makes environmental statements based on reliable and relevant information from the products life cycle. The data and information in the declaration is chosen by the company according to the ISO 14021 standard. The information underlying the statements has to be clear, documented, straightforward and factual. When producing Type II declarations there are less regulations and limits compared to Type III. The documentation can be design by the company itself or made out of any existing industry-specific template. A third part certification is not required but the information has to be controllable. The information in the Type II EPD has to be accurate, truthful and able to be substantiated. Type II declarations have to follow the rules and requirements in ISO 14021.

How to Produce a Type II Declaration

When producing the Type II EPD the company will look into the environmental impact of the product during its lifecycle. That includes all the parts from the manufacturing, distribution usage and waste of the product.
The information in a Type II declaration shall include:
- *Raw materials*
- *Resources* and *energy* used during the production and usage of the product.
- *Emissions* generated through the manufacturing process and usage.
- *Amount of energy* and *resources* used during the distribution from manufacturing to the market.
- If there are any possibilities to *reuse, recover* or *recycle* the product.
- The *environmental impact* if the product goes to landfill.

The main advantage with Type II compared to the other two types, is that it is more flexible. The company can, within the ISO 14021, decide what kind of information to add in the Type II. There is no need for a third party, which not only makes it easier to produce them but also more cost efficient. It is only published when the company wants it to become an official document. A disadvantage with Type II declarations is its credibility, since there is no third part certification or evaluation.

3.3.6.4.3 Type III Declarations - Environmental Product Declarations

Type III is the most advanced type of EPDs. Type III requires a LCA and a third part certification. The certification is standardized according to ISO 14025. EPDs are used to provide interest parties with qualified, neutral and comparable environmental information.[72]

There are three main parts in an EPD of Type III. All together include details about the company and product/service; from the production point until the waste.

[72] **ISO** (2000), *ISO/TR 14025 – Miljömärkning och miljödeklarationer.* ISO, Geneva.

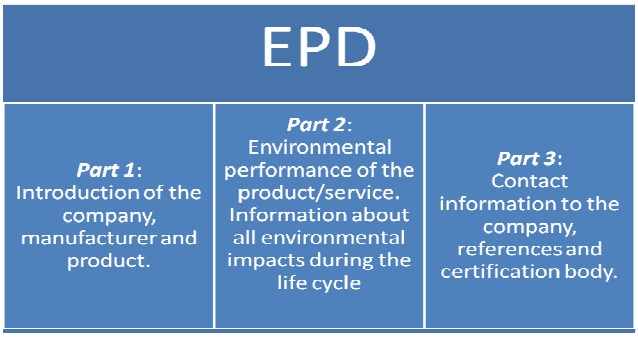

Figure 19: The three parts of a Type III EPD

Part 1: An introduction of the company, manufacturer and product.
Part 2: The core of the EPD, describes the environmental performance of the product or service. The information is concerning all environmental impacts during the life cycle such as raw material, transportations, efficiency and energy use, emissions to air, soil and water. There are also a description of the content of the materials and the chemical substances. Resources are divided into renewable and non renewable. Emissions are described both in inventory data and as influences of different environmental impact categories, for example global warming. Finally there is a description of the waste and the recycle of the product.
Part 3: Contains contact information to the company that is providing the EPD, references and certification body. The validity of a third part certificated EPD is three years, but if there are process changes during this time the EPD has to be updated.

The EPD framework made by the Swedish Environmental Management Council (SEMCO) is the most internationally recognized. It describes how to develop and create EPDs. How data and calculations behind an EPD are made and what kind of information an EPD shall contain is verified in two documents:

1. Municipal Sewage Regulation (MSR) – containing the general requirements for all EPDs.

2. Product Category Rules (PCR) – containing detailed requirements for each product group. [73]

3.3.7 Climate Declarations

Climate declarations, where introduced in 2007 by the Swedish Environmental Research Institute (IVL) and the environmental council.[74] The declarations make it possible for a company to provide their customers with information about how their products or services affect the climate. In that way the customer can evaluate the climate in the purchasing process.

Climate declarations are a further development of EPDs. The climate declaration gives information about the products' or services' environmental performance during the life cycle, with focus on the climate impact. The Climate Declaration is an extract of all the climate

[73] http://www.dantes.info/Tools&Methods/Environmentalinformation/enviro_info_epd.html
[74] http://www.klimatdeklaration.se/om/Bakgrund/

related information in the EPD and gives information about the emissions during the life cycle of the product. The climate impact is expressed in CO_2e.

The declaration is made according to international ISO standards for LCA (ISO 14040, ISO 14044) and EPD (ISO 14025). The climate declaration is evaluated and approved by an independent verifier. The main reason behind the development of the climate declaration was the increased pressure on companies and organizations; they needed to be able to prove how they could reduce their contribution of the greenhouse effect. The climate declaration is a standardized way for companies to meet this demand.

Since the climate declaration is a standardized document it is comparable to products within the same category but from different companies. The standard climate declaration was developed to be a tool for climate related issues and as a basis to environmental labeling. The declaration shall be credible and comparable. The first company to make a climate declaration was the paper industry Cascades Djupafors, [75]2007. [76]Cascades Climate declaration can be found on Environdecs website.[77]

Climate declarations are used in several fields:
- Purchasing; products and services can be evaluated due to their influence on the climate.
- Reports; to pubic authorities and to the publicity.
- Internal environmental commitment; by giving a good overview of the environmental performance related to the company's products.
- Marketing; in a way to promote products and services as environmental friendly.[78]

Climate declarations are a central point in the development of a carbon footprint tool kit, made by the Swedish Environmental Management Council (SEMCO) and the Italian company Life Cycle Engineering. The tool kit is a system for climate calculations which was initiated by the EU-regulation in 2007. ISO standardizations for climate labeling and climate calculations are also established in the EPD ® system.

When making a climate declaration the company has to look into the LCA data and investigate the emissions made by the product during its life cycle.

An Climate declaration is including information about:
- The product
- The company
- The climate declaration (the main part)
- Other information
- Contact details
- Formalities

[75] http://www.klimatdeklaration.se/om/Bakgrund/
[76] http://www.environdec.com/reg/epde31e.pdf
[77] http://www.environdec.com/reg/epde31e.pdf
[78] http://www.klimatdeklaration.se/om/Anvandningsomraden-/

3.4 Control Organizations

3.4.1 Standards

A standard is a technical document that is used as a rule, guideline or definition. The purpose with a standard is to bring different interest parties together, such as consumers, suppliers, regulators of products, material and so on. In Europe there is a "European Standard" (EN) that is the national standard with its 31 member countries. There are a lot of different benefits one an gain on taking help from standards; such as: create a competitive advantage, develop and maintain best practice and attract and assure customers.[79]

3.4.2 International Organization for Standardization

International Organization for Standardization (ISO) is based in Geneva, Switzerland. It is the largest organization that develops standards in the world and works together with other standardizations organizations from 156 countries.[80]

3.4.3 European Committee for Standardization

European Committee for Standardization (CEN) is a non-profitable organization operating under the Belgian law. With its 31 member countries it is possible to develop publications in a broad area of subjects to help build up the European internal market in goods and services.[81] There are three European Standardization Organizations (ESOs), where as CEN represent the European Committee of Standardization of which the main fields of activity are for example; Chemistry, Consumer Products, Energy, Food and Mechanical Engineering. While the other two; CENELEC and ETSI represent Electro technical domains and Telecommunication fields.[82]

3.4.4 Swedish Standard Institute

Swedish Standard Institute (SIS) is the national organization for standardization in Sweden. It is responsible for development, revenues and sales of ISOs standards. It is a part of a network that prepares European standards and global standards. SIS have just as ISOs representative interpretation responsibilities when comes to interpret the text about different standards, that is if something is to be questioned or just some un-clarity about the interpretation.[83]

3.4.5 REACH

In 2007, the EU implemented REACH, a new set of legal requirements for chemical risk assessment and control of chemical product procurement and use. It deals with the **R**egistration, **E**valuation, **A**uthorization and **R**estriction of **C**hemical substances. The goal of REACH is to protect both human health and the environment by better identify intrinsic

[79] http://www.cen.eu/CEN/Pages/default.aspx
[80] www.sis.se
[81] **SIS** (2010), *Utveckla standarder – kort om hur det går till*. SIS, Stockholm and **SIS** (2010), *Luft, Vatten, Mark, Energi,Produkt. Standarder och miljö – visst hör det ihop?* SIS, Stockholm.
[82] http://www.cen.eu/CEN/Pages/default.aspx
[83] **SIS** (2010), *Utveckla standarder – kort om hur det går till*. SIS, Stockholm

properties and chemical substances. REACH gives greater responsibility to industries to manage the risk from chemicals and also provide safety information about the substances. Both manufactures and importers are required to collect the information and register it on a central database run by European Chemical Agency (ECHA).[84]

One of the main reasons for developing REACH was due to the large amount of substances that had been manufactured and placed on the European market without really knowing the impact of the substances on human health and environment, and there was a need for filling these information gaps.

To be able to implement these regulations for offshore companies a workgroup was established to identify the gaps between REACH and the Northeast Atlantic OSPAR Convention.[85] Together they develop a new set of goals that are to be reached by the end of 2020, which are:

- Oily substance must be reduced to a non-harmful level.
- Synthetic hazardous substances must be brought to a near-zero level.

Discharges must not affect the background level of naturally occurring substances.

[84] http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm

[85] The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic. Work under the Convention is managed by the OSPAR Commission, made up of representatives of the Governments of 15 Contracting Parties and the European Commission, representing the European Community.

4. Empirical Part

This chapter contains interviews with people from different kinds of industries, such as:

- Environmental consults
- Fund managers
- Environmental research organizations
- Swedish companies using EPDs
- Alfa Laval's customers in Biopharmaceutical and in Marine & Diesel
- Alfa Laval's sales companies

In this chapter we have also investigated:

- How Alfa Laval's competitors are working with environmental issues
- The sustainable development within Alfa Laval

4.1 Environmental Consults

Many companies are using environmental consults to get the help they need to improve their work within environmental issues and sustainable strategy for their company. By interviewing some consults from different firms will it hopefully give a more united picture of what kind of environmental needs and issues that is out there right now.

4.1.1 Ecowise Consulting

Ecowise Consulting in Sweden works with different companies to develop their environmental work and sustainability. They have broad range of different clients; companies that works with mechanical construction, home electricians, furniture industry and banks.[86]

Finn Stillerud, an Ecowise Consulting, says that they only do a handful of LCA or EPD reports for their customers, and mainly for those that have come a long way in their work with sustainability. Most of their customers (90-95%) only ask for ISO-certificates. They do not believe there will be an increased demand for EPDs – probably will more ask for specific information from the LCA itself than a whole EDP document.[87]

[86] http://www.ecowise.se/foretaget.htm
[87] *Finn Stillerud, Ecowise Consulting, 2010-02-23*

4.1.2 Ragn-Sells Environment Consult

Ragn-Sells Environment consulting AB provides knowledge and competence within environment and energy technique, in both small and big projects. They have been active since 1986 and are one of Scandinavia's biggest recycling centrals with over 2500 employees. In Sweden they have approximately 40 consults that help companies with everything from energy technique to environment project.[88]

Mission:
"Provide knowledge and competence within environment, and energy techniques – in both small and big projects"

Anna Swartling that works at Ragn-Sells as an Environmental consult says that they do not work very much with environmental declarations. But they do get in contact with customers (SVK, ABB and Siemens) that have developed an environmental product declaration for their own products. Anna believes that EPDs is less a less "hot" subject today, than it was only a few years ago.[89]

4.1.3 Miljögiraff

Miljögiraff are focusing on sustainable development and work to ensure holistic and creative solutions for their clients. They work with both small and big projects, but they try to avoid being a commercial force for those companies that only work with sustainability for marketing reasons. Therefore they give 10 percent of their time in non-profit projects. Their clients are active in a broad field of industries, from everything from mechanical- to biological industries.[90]

"Miljögiraff represent the LCA-software SimaPro® in Sweden. It is one of the markets leading software's for an effective and long-term LCA-work"

Marcus Wedin, a consult at Miljögiraff says that their customers (mainly in the industrial sector) contact them since they are considered to be very good at what they do and ask them to develop ISO-standards for the companies. Miljögiraff usually recommend their customer to develop an EPD, to become more credible as a serious actor that works with sustainability and environmental issues. They believe that EPDs are good for marketing reasons since EPDs are consider being more rigid than PCR and LCA. It is also usually cheaper to develop an EPD then to produce and meet all the requirements to get an Environmental label such as "Svanen märket" for a product. They believe that developing EPDs can be one of the first steps to become a more "green" company.[91]

[88] http://www.ragnsells.se/Startsida_RagnsellsMiljokonsult/Om-foretaget/
[89] *Anna Swartling, Ragn-Sells Miljökonsult, 2010-02-23*
[90] http://www.miljogiraff.se/om/?lang=en
[91] *Marcus Wendin, Miljögiraff, 2010-02-22*

4.1.4 Good Point

Good Point is a Swedish environmental consultant company with 25 consults that work with questions related to everything from sustainability to CSR. They help both companies and public authorities looking for innovative solutions that unite economics with core values. They provide a holistic perspective to sustainable growth.

Good Point use tools that contribute to healthier people, environment and organizations. They are working with:
- *Strategic analysis and planning*
- *Environment and health risk assessments and evaluations*
- *Management systems for environment, quality and work environment*
- *Training in, and communication of environment, health and social responsibility*[92]

Siw Bengtsson, working at Good Point, specializes in toxicological assessments, with focus on products and the link between health and environment. Siw has 15 years of experience within environmental standards in procurement. Siws' opinions on the subject EPD; 10-15 years ago the work within EPDs started, Good Point made a few declarations for different companies, most within the building trade. Siw think that the most important information can be found in the "Safety Data Sheet", there is no bigger need for EPDs. Certificated EPDs is an old concept, about 5 years. Siw has not seen any advantage or profit in it, but she believes that EPDs can be a way to communicate environmental performance.

4.1.5 Raul Carlson

Raul Carlson has a master degree in Engineering Physics in the subject of environmental information.

Raul claims that *"environmental facts are complicated to understand because they are presented in a complicated way"*. He believes that the complexity of environmental information has to be reduced.

He summarizes his research work in his PhD dissertation by providing four key principles to consider when structuring environmental information:

- *"Economics*: Environmental requirements is not a passing trend but is here to stay, therefore environmental information shall be structured considering its future users and applications.
- *Cognition*: Environmental information is not intended for environmental experts, but shall be presented so that people outside of the environmental expertise can understand and act according the information.
- *Physical reality*: To facilitate decisions about reality, environmental information shall be transparently based on real facts.
- *Quality management*: Most environmental consequences are long-term or far away, which gives that feedback might not be given to correct any wrong data. Therefore all environmental information needs to be quality managed in a systematic way. "

[92] http://www.goodpoint.se/english/index.html

During purchasing decisions media have a great part in influencing the consumers. If media brings up an environmental issue, people will respond with an increased demand of information concerning that issue.

EPD and Carbon footprints etcetera is a way to provide customers with information during the consumption process. However, EPDs are not used for consumers; it is used in the business to business area. During purchasing the company has certain guidelines and standards to follow. Some of these guidelines can include EPDs, especially as a part of the documentation process. But most often it is hard to understand LCA based information. Professional purchasers of today feel a pressure to ask for environmental information in the purchasing process.

Companies are even more expected to take some care of the environment and to care about a sustainable development today than before.

Since EPD is an already made concept which makes it easier for companies to adapt and have as a part in their decision processes. However, just because companies are switching EPD documents it does not mean that the documents are becoming any basis of decisions. A lot of companies only use the EPD as a point in a checklist; the actual information is seldom used for making decisions. It is rather the fact that the supplier can provide the information, not the information itself, that is used during decision making. The information does not have a greater value for the person asking for it; the purchaser, since the purchaser cannot interpret the information. Often it is just the fact that he/she got it that matters. However EPDs create an information flow and an increased environmental awareness.

Raul says that we are in the beginning of a process. People have just started to be aware of environmental facts, but they do not really see the created value. The market has to change. “Paper money was also hard to except in the beginning, no one could see the value in the little piece of paper. It was hard to spread the concept.” It is the same with environmental information.

A human being has to be able to take in the information to be able to see the value connected to it. It is always easier to focus on particular questions one at a time, not all at the same time. An EPD is a strong and excellent document but it is too complex to understand. The buyer has to understand the information. It is better to focus on one environmental issue, than all of them. The environmental documents that are focusing on only one issue, for example Carbon Footprint, are much easier to understand.

Rauls opinion about different documents for communication of environmental information:

- Carbon Footprint, Water Footprints and Climate Declarations: Easy to understand and adapt. People can easily understand the documents and use the information.

- Eco-Indicator: The word “eco” is very hard to interpret. It is a generic term and the meaning is very abstract. To be able to interpret the word you have to know exactly what “eco” means, otherwise it is too complex to base a decision on it.

Eco-indicator can successfully be used within a company but only if it is integrated in the company's policy, but not on the open market.

- Black and Grey list, or even better Black and White list. Very good, without them we would be lost! The purchasers have to get the list and understand it.

- Concerning EPDs and third part certification; such certification is important for the reliability of the document, especially since the documents are complex. However, Raul believes that the third part certification of today is not enough, it has to be developed. Even if customers most often trust big, well-known companies, this is not enough. As soon as the EPD expert feels that people trust his work, he will stop making the same effort.

Type II declarations is a good way for companies to provide interest parties with information about the environmental performance of a product, but if the declaration shall be comparable to declarations from other companies it is necessary with a third part certification. Type II declarations keep the companies alert and up to date.

The process from a small group of conscious people to a trend and a mainstream behavior

Today the general consumer is not interested in environmental friendly products, but there is a small group of people that always have the environment in mind during consumption. This group only buys environmental friendly products, do not buy red meat, drives an environmental friendly car etcetera. They do not influence the bigger group of people around them. However they can influence the other group if anything special happens; that makes the other group look up to them. The other group will follow their examples and thereby experience a higher status. This process with interacting between different groups takes a longer time and is made step by step, in waves. More and more groups get committed in the new way of thinking. Raul believes that this process in environmental information and a more environmental friendly consumer has started already today and that within 1-10 years there will be more and more influenced groups. Somewhere between 1-5 years from today (2010) there will be a whole new group of people with a greater commitment in environmental issues. One day this behavior will be the only accepted behavior. More and more groups will be involved, mainly because if they do not, they will not get a job, friends or be accepted. Responsibility by then is a mainstream concept. For this process to be successful it has to start in one of the upper medium classes in USA, Europe, Japan, India or China. It will not have the same power if it starts in Sweden.

This process will end in a wide consciousness among the groups; the future customers will take for granted that the products they buy do not cause any damage to other people or the environment. People using a product will be ashamed if they use products that cause any damage. People will not accept it, just like a lot of people do not accept fur coats today. The word "quality" will expand towards; responsibility and solicitude.

The process of getting consciousness among customers is a simplification process. In the beginning the consumer want to know what is interesting him/her and make sure the interest is fulfilled. During time more people will have the same interest and evaluations. The process is about spreading an interest and make it easy to fulfill this interest. For example: the interest for

sustainability thinking is spread among groups, but it has to be simple to live in a sustainable way.

The driving forces behind the process is:
- For companies (producers): Money
- For private persons (consumers): Healthiness

First when interest parties such as employees, customers and lenders find an interest in taking their responsibility, then the companies have to adjust and care more about environmental issues.

4.2 Funds in Sweden

To get a wider picture of how investors think about questions concerning the environment and how investors actually get the knowledge needed before investing in so called “Environmental Funds”. All of the text in the box below is taken both from the companies’ homepages and from interviews with fund managers.

Company	Turnover in million kronor in 2008	Quantity of direct related environmental funds	Information about environmental fund and example on those
SEB	11 944	1	Their environmental funds are connected to GPM (they deliver a total end-to-end solution to multi-national companies aiming to expand their global footprint in the Asian market). Example:"Östersjöfond/WWF"
Swedbank	10 887	8	Swedbank Robur has managed environment fund for 30 years and are consider being of the pioneers in responsible investment. It is one of the few Nordic fond commissions that handle their own ethical- and environmental analysis, where four analytics is working full time with responsible investment.
Skandia Banken	12 471	3	They have three funds connected to the envrionment; "Banco ideella Miljö", "Banco Svensk Miljö" and "Klimatfonder". (Klimatfonder is Nordeas fund that Skandia Banken also sells to their customers).
Nordea	1261	3	They have three funds connected to the environment; "Banco ideella Miljö", "Banco Svensk Miljö" and "Klimatfonder". (Whereas the first two ones are owned by Skandia Banken, but which Nordea also sells to their customers).
SPP	919	1	SPP has a fund, "Aktieindexfond Global Sustainability" which is a index fund that tries to copy investment placement strategy after "Dow Jones Sustainability Group Index" (excluding Tobacco, Alcohol, Gambling, Armament and Firearms (DJSGI)). The purpose overtime is to become very close to having the same income from capital as the DJSGI index has. DJSGI is a global stock that contains 250-300 of the best companies that fill the requirements for corporate sustainability.

Figure 20: An overview of the banks

4.2.1 Interview with the Fund Directors

We contacted four of Sweden's banks (SEB, Swedbank, Skandia Banken and Nordea) and one life insurance company (SPP) that are dealing with environmental funds and got in touch with the person handling the fund directly. The interviews with the five fund directors are summarized as following:

All five fund directors had noticed an increased interest in "Environmental funds", both from private- and public sectors. Those investing in "Environmental Funds" are next to always satisfied with the information regarding the type of fund that they can read about on the banks homepages. Very few customers ask more specific questions; such as: who decide if a company has become more environmental friendly? What is the definition or demands for a company to be a part of an "Environmental fund"?

Three of the fund directors told us that most investors, private or company related, do not really care for the specific details concerning the environmental funds. Therefore there are no incitements concerning specific information, such as LCA, EPD and so on from their investors. The main reason for this, they believe, is that the investors trust, the banks/fund director, that they do the right choice in picking trustworthy funds for them. The other two fund directors did not have any to say upon this subject, that they did not know why their customers do not ask more specific questions about the funds.[93]

See Appendix A: Interview Question for Fund Managers

4.3 Environmental Research Organization

There are many laws and regulation one need to take under consideration before one act, for that reason there is a need to investigate what the different organizations do and their opinions on environmental issues, what they value and also their prediction about the future. Since USA is a global actor it is interesting to look further into their regulations, to broaden our perspective.

4.3.1 The Swedish Environmental Management Council

Ever since the EPD system was launched in 1998 more and more countries have found a genuine interest of it - whereas it slowly has developed to an international system that fits many different markets and products.

The Swedish Environmental Management Council (SEMCO) is a corporation that was established in 1995 and its own by both state and industry through the "Ministry of environment", the "Confederation of Swedish enterprise" and the "Swedish association of local authorities and regions".

[93] Summarization from speaking with fund managers from SEB, Swedbank, Skandia Banken, Nordea and SPP held in March 2010.

The owners have given the assignment to administrate three voluntary systems; EMAS, EPD and "The Swedish environmental management councils Procurement criteria".

SEMCO is one of the main actors in this area and works mainly with issues that involve the information flow but also educate organizations that are interested to become more environmental aware. They work together in collaboration with many national and international projects. The main objective for SEMCO is to provide an open and neutral platform for any organizations, in either public or private sector, that whishes to build up or just strengthen their work connected to sustainability. They encourage a sustainable development by supporting initiative taken by the private or public sector. This is done by strategic or cost-effective procedures. SEMCO has chosen to use and apply a well-established and accepted process used on International Standard Organization (ISO) for developing global standards.[94]

Joakim Thorneus works as a project leader with EPDs at SEMCO. He says it is mainly the provision industry that asks for EPDs and approximately do SEMCO get a few questions per day from interested companies (in all sectors) that want to know more about EPDs but also concrete questions about developing an EPD for them. SEMCO believes that the main reason behind the increased interest in EPDs is mainly thanks to the climate change and issues related to that. But also a genuine interest from their clients that wants to know more about the subject and what they, as a company, can do to improve themselves in this area.
Since SEMCO only develop third party certificated EPDs it was hard for them to tell if there is any interest in EPDs without such certification, based on the requirements from ISO 14021.

SEMCO is a firm believer in carbon footprint; they also managed how France has already put a law into action that regulates the provision industry to provide their customers with EPDs. They believe that Carbon Footprints and Water Footprint is going to be a bigger in 5-10 years, since it is fairly simple to develop and uncomplicated for customer to relate to. And their main objectives are that it will not be a question for asking for "footprints", every product will have one connected to it.[95]

4.3.2 Swedish Environmental Research Institute

Swedish Environmental Research Institute (IVL) is Sweden's leading organization for applied environmental research. They were founded in 1966 by a mutual agreement between the government and the business community.

They have a broad competence and cover the whole environmental field. They work with both research and contract assignments, within six areas: *Climate and energy, Sustainability building, Air and transport, Sustainable production, resource efficient products and waste* and *Water*. They apply a holistic approach throughout all their work and can develop detailed

[94] http://www.msr.se
[95] *Joakim Thorneus, SEMCO – Project leader with EPDs, 2010-03-11*

solutions to specific problems. They also produce and arrange courses, conferences and seminars.[96]
Martin Erlandsson is working at the Swedish Environmental Research Institute (IVL). He is focusing on environmental friendly product design, environmental friendly buildings, Materials Assessments, system analysis such as LCA and EPD, LCA in business perspective and energy and resource efficiency.

According to Martin EPD and LCA was very popular in late 1990. It was a new way for the companies to communicate environmental information. Martin believes that the new way for companies to provide their customers with such information is Climate Declarations.

A climate declaration is focusing on one part of the EPD; the climate related information. Martin believes that such declaration will become more popular in the close future. There are both customers behind the demand but also laws and regulations, for example the Kyoto protocol.

Martin believes that the type of industry, if the industry is known as being environmental friendly or not, does not effect on their need for EPDs. He believes that within the pharmaceutical industry there are not enough demands for EPDs, the end customer do not value environmental information in the purchasing process of drugs. The main objective behind an increased demand of environmental information is the consumers.

The reason for making an EPD is only a market argument; is there a profit of making it. There has to be an increased value connected to the declaration, for example increasing demand and profit for the customers.

4.3.3 Environmental Report

Claes Sjöberg is responsible for the Environmental Report (Miljörapporten). The environmental report is a paper that is investigating the present situation in environmental related issues. They have a daily report with the latest news and updates in the concerning environment and sustainable development; it is called “Environmental Report Direct” (Miljörapporten Direkt).

Environmental Report’s conclusion about environmental declarations, especially climate declarations and climate labeling, is that the techniques of how to produce them, the calculations methods and the way to show the result is not yet enough developed. Environmental Report recommends companies to wait with the marketing of their environmental communication tools such as carbon footprint and climate declarations. Such documents are not enough developed to be a valuable but mostly a comparable environmental document. Of course the company shall give environmental data to the customers that are asking for such documents, but the demand is rather small today and mostly business to business. To be able to calculate the total environmental effect of the company they have to get

[96] **IVL Swedish Environmental Research Institute** (2009), *Fact Sheet*. IVL, Vårgårda.

the right and the relevant data from their suppliers. But such data has to be comparable between the suppliers; otherwise the value of the EPD will be rather low. Environmental Report encourages companies to engage in the development of different standards. The fastest way forward is to help SIS, SEMCO and other parties within the development of the techniques and models.

According to Environmental Report the environmental focus has to reach outside the Swedish boundaries, the companies have to focus more on their suppliers abroad. The globalization is concerning almost all industries and businesses today. It does not make sense if the Swedish CSR- and environmental managers have control of the production in Sweden, most of the environmental effects are made in the line of suppliers, which often is located abroad and especially in countries where there are insufficiencies in the public authorities, laws and regulations. [97]

According to Claes Sjöberg EPDs are not very strong documents. A lot of companies have to make them, just to make sure that they will not be dropped in different processes. Claes believes that the EU water directive with the goal to have a good water status in 2015, will be the main reason for the water issue to be the next focus area. He points out that Carbon footprint are quite hard to use since it is difficult to know how far back in the supplier chain to look. Concerning environmental information within the purchasing process it is important that the information is standardized and comparable. [98]

4.3.4 EPA

Environment Protection Agency (EPA) have been active since 1970 and works to protect human health and a cleaner, healthier environment in USA. They ensure for example:

- National efforts to reduce the environmental risk
- Natural resources, human health, economic growth, energy, transportation and so on, when they establish environmental policies.
- That state, government and communities have access to correct information concerning human health and environmental risks.
- Environmental protection which is done by contributing to a diverse ecosystem and sustainability.
- That USA act as a leader in working with other nations to protect the global environment.

Their main work is connected to the laws written by the congress. As soon as the congress has written an environmental law, they implement it by writing regulations. Commonly they set the national standards, which the states implement through their own regulations. That is, if a state fails to meet the national standards, EPA helps them and other companies to understand the requirements.

[97] http://www.miljorapporten.se/281.html
[98] *Interview with Claes Sjöberg, Miljörapporten 2010-03-18*

The laws written by the congress usually do not have enough details to be put into practice right away. EPA is called a regulatory agency because the congress has authorized them to write regulations that explain all details necessary to implement the environmental law. They have for example helped the congress with regulations connected to following laws:

- Atomic Energy (AEA)
- Chemical Safety Information, Site Security and fuels Regulatory Relief Act
- Clean Air Act (CAA)
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, or Superfund)
- Marine Protection, Research, and Sanctuaries Act (MPRSA, also known as the Ocean Dumping Act)
- National Environmental Policy Act (NEPA)
- Pollution Prevention Act (PPA)
- Toxic Substances Control Act (TSCA)[99]

4.3.5 Green Seal

Green Seal is an non-profit organization working with manufactures, industry sectors, purchasing groups and governments at many different levels to "go green" in the production or purchasing chain. Their goal is to identify sustainability leadership performance levels and practices. Their process is based on ISO standards for environmental labeling programs, such as ISO 14020 and ISO 14024, and they are reviewed by third parties and found to meet with these ISO standards.

Green Seal manage different task and missions with a life cycle approach, which in their case means that they evaluate a product or service from the very beginning until the recycling and disposal part of the product. They only certified products with their "Green Seal" after a rigorous testing and evaluation, including on-site plant visits. Which make them a fair, unbiased and credible organization.[100]

4.4 Swedish Companies using EPD's

Since there are companies on the Swedish market using EPDs it is crucial to find out for what reason they are using it, what benefits they have gained from it and their prediction for the future need for EPDs and so on.

[99] http://www.epa.gov/lawsregs/
[100] http://www.greenseal.org/certification/environmental.cfm

4.4.1 ABB

In 1992 ABB signed the International Chamber of Commerce Business Charter for Sustainable Development, which became the starting point for their work connected to sustainability. Two years later, in 1994, they published their first environmental report. Between the years of 1995–1998 they developed their ISO 14001 and EMAS, which were published in 23 languages. Since the end of the 1990's have ABB's work around sustainability increased and they have been a part of improving ISO 14001 standards in more sites, adopted human right criteria and so on.

As a further step in the sustainability work, ABB decided to include their products in the ISO environmental standards by implementing EPDs. The decision was made as a result of an increasing environmental awareness and an increasing number of customers questioning about the environmental performance of the products. The customers wanted to be able to compare different products environmental performance. ABB also saw a use in EPDs as a sales argument and within marketing. The EPDs are made for the core products, both services and hardware.

ABB decided to base their pilot project on a particularly series since the product of this series had an environmental friendly design. The first LCA for the series was created in 1999. The framework for an EPD is specified by the PCR. There is one PCR made for every type of product. The document is to be used as a guideline for all manufacturers of the same type of product, when they create EPDs. In this way the environmental information for the same type of products, with different manufacturers, can be compared. In ABB's case there were no existing PCR, so they had to create it them self. The first draft was published in January 2000 and after discussions with other companies within the same business, the PCR was finally approved in April the same year. [101] ABB had a marketing value from being the first company on the market to develop an EPD.[102]

To cover the whole product series the first LCA at ABB was made for the biggest and the smallest machine in the series. The EPD was based on the LCA. The final EPD was approved, by SEMCO in Mars 2000. The EPD was the first EPD, worldwide, for a rotating electrical machine. Advantages experiences by ABB during the EPD process were:
- A greater interest for environmental issues related to ABB's products
- An increased awareness of the environmental factors in the designing process as well as in the manufacturing, and how to make the environmental effects during the life cycle smaller.
- How to work in line with a sustainable development. [103]

Today ABB develop both LCA and EPDs as a part of their product processes. ABB have an environmental goal to develop EPDs for all the main products in the company. The EPDs are of type III, which means that they are developed according to the international ISO 14025 standards. ABB's EPDs are based on LCA. In each life cycle there are environmental aspects;

[101] http://www.abb.com/cawp/abbzh258/3d76091aeb235c70c12569ee002b47f4.aspx
[102] **Allander**, Anders. (2001), *Corporate Environmental Strategy, Vol 8, No 2*. Elsevier Science Inc.
[103] http://www.abb.com/cawp/abbzh258/3d76091aeb235c70c12569ee002b47f4.aspx

power losses and production of waste.[104] The existing, around 50, EPDs for ABBs products can be found at their international homepage.[105]

4.4.1.1 Interview with Environmental Manager at ABB

The person in charge of their environmental work stop working for ABB at the 1st of April 2010, therefore we did not manage to get a hold of any one that could answer our questions about why they started doing EPDs, their reason to have it third part certified and how their competitors are working with EPDs today and so on.

4.4.2 Volvo

A car can never be described as "environmental friendly", but it can be described in terms on how one car differ from another car with its environmental effect, such as fuel consumption. Volvos EPD is supposed to provide a holistic view of the environmental impact of the Volvo cars, through its life cycle. The data and information that Volvo used for their EPDs has been verified by Lloyd's Register Quality Assurance Limited (LRQA)[106].

Volvo provides information on how much energy that is used to manufacture their cars; they illustrate the emission levels generated by their cars when they are driven and how much fuel they use. This makes it possible to compare different cars, for example how much CO_2 that is emitted.

Volvo uses a tool to evaluate the life-cycle environmental impact of its product, and was the very first automaker to do this. They use the tool Environmental Priority Strategies (EPS) in product design. EPS makes it possible to evaluate the impact of their product and processes on natural resources, ecosystem and human health.

In 1998 Volvo was the first automaker to provide the customer that bought a Volvo S80 a verified EPD. Since then they have published EPDs for several other models.

Their EPD is divided into 4 different environmental areas;

- *Management* - how improvements are made continuously
- *Production* - life cycle perspective
- *Useful Life* - life cycle perspective
- *Recycling* - life cycle perspective

Their system is based on ISO 14001 standards and EMAS regulation. Volvos LCA is based on the requirements in the ISO 14040 standards and their EPD is based on the requirements from ISO 14021 standard. [107]

[104] http://www.abb.com/cawp/abbzh258/3d76091aeb235c70c12569ee002b47f4.aspx
[105] http://www.abb.com/cawp/abbzh258/3D76091AEB235C70C12569EE002B47F4.aspx
[106] An organization that provides for example; certificates and validation for ISO-standards, EMAS and so on.
[107] http://www.ecodesignguide.dk/html_pages/pdf_files/volvo_s60_epd.pdf

Volvo has created an "EPD-calculator" (based on their EPDs) to provide their customers and other interested parties with information about the environmental impact during its life cycle. The EPD-calculator is a web-application and contains information such as; materials, energy consumption, emissions and so on. The calculator is mainly used as a complementary tool to help customer to present their environmental dedication for their customer or assigner, whereas Volvo is the first automaker to present this sort of environmental tool to their customers. The calculator can show the environmental impact from a single transportation emission or for the trucks entire life cycle. They material information that they use to create their calculator upon are based on the truck model Volvo FH or Volvo FM.[108]

Environmental Priority Strategies (EPS) in product design is computer program that is used in LCA. It is a Swedish validation method that was initiated by Volvo but developed and produced by the Swedish Environmental Research Institute (IVL). EPS describes the environmental effect on for example the biological multitude, biological reproduction -ability, natural resources and human health. The final validation is done upon the actual will to pay in terms of preserve these biological objects and a key figure from Environmental Load Unit (ELU)[109] is used for comparison.

4.4.2.1 Interview with Environmental Manager at Volvo

The EPDs pilot project started at the same time as EPD was launched international as a useful tool in 1998. The pilot project was based on an EPS-system and the project itself was initiated by IVL that wished to do a study over Volvos LCA reports that could lead to an EPD. Back then was the main purpose only for internal use but in the beginning of 2000 some positive effects such as using it externally for marketing reasons was registered, and more focus was put on using it for their external parties.

An EPD that is comparable and multi dimensioned requires other companies in the same segment to be involved in producing EPDs. But none of Volvos competitors were interested in being a part of that sort of environmental work and there was a vague interest among Volvos customers so they did not feel the need to pressure their competitors to do an EPD. Instead Volvo produced an EPD that meet the requirements of ISO 14021 (Type II). Since then have more customers specifically asked for Volvos EPDs, but still today there are no customers that have requested or demanded that the EPD should be third party certified. The reason for this is believed to be that Volvos customers trust them and believe they leave credible and transparent information to their customer. So Volvo has no plans on changing the way they work/produce their EPDs, much due to the fact that third party certification is pricy.[110]

[108] http://www.volvo.com/trucks/sweden-market/sv-se/aboutus/Environment/Environmental_Product_Declaration/Introduction.htm
[109] Method for calculating environmental load
[110] *Inge Orkeby – Environmental Manager at Volvo. 10-03-08*

4.4.3 Tetra Pak

Tetra Pak´s activity affect the environment in many different ways and their environmental strategy is to become a leader when dealing with environmental issues. The packing industry has three main areas where more focus has to be put upon; recycling, usage of resources and climate affects. They have some environmental goals such as; decreasing their CO_2 emission with 10 percent, between the years of 2005 to 2010. Even though the global emission for packaging industry increased with 16.5 percent from 2005 to 2008, did Tetra Pak decrease their CO_2 emissions with 12 percent during the same time.

Tetra Pak uses Carbon Footprint on their consumer packaging mainly since their customers (primarily companies in the food industry) are asking for it. They are measuring their affect during the process of:

1. Transportation of raw material to different sites.
2. The transformation from raw material to package.

The carbon footprints are measured on a global scale thanks to the greenhouse gas protocol that World Business Council on Sustainable Development and World Resource Institute (WBCSD)[111] has developed. [112]

4.4.3.1 Interview with Central Environmental Group at Tetra Pak

Inger Hellborg works at the Central Environmental Group – project development at Tetra Pak. She says that they started to produce their LCA in the beginning of the 1990s with focus on their packing products. The main purpose was to communicate the results for internal use but this has changed a bit, and now they also use it for external purpose. For example; their customer in Germany demands a third party certified LCA on packaging products.

All of their LCAs that are used for external purpose are third party certified, and they have an LCA for most of their products, but a few products only have LCA for internal use and are therefore not third party certified.

Request concerning LCA have been going in waves. For the moment there is a big interest in them, mainly thanks to the climate congress and the debate that was held in the end of last year (2009). Usually their customers ask for the environmental profile; it is very rare that customers ask for something specific, such as LCAs or EPDs. And if they do ask for such things is mainly because they do not really know what information that they are looking for or need.

During the year of 2004-2005 they created their first two EPDs, which still are the only two existing. They are third part certified, to be credible and show transparency.

They are firm believers in carbon footprints and water footprints, but they emphasize the lack of information these gives. It only shows a small part of the whole picture. But still, they are

[111] WBCSD is a CEO-led, global association of some 200 companies dealing exclusively with business and sustainable development.
[112] http://www.tetrapak.com/se/miljo/pages/default.aspx

less comprehensive that LCAs or EPDs are and are in that way much easier to understand. They do not believe the demand for EPDs will increase, but something else, maybe a cluster of small EPDs, such as carbon footprints and water footprints. If a company should focus on something to do in their environmental area; this is what they should focus on. [113]

4.4.4 Vattenfall

Vattenfalls' goal in the Nordic area is to be climate neutral by the end of 2030, to meet this goal they are focusing on decreasing the CO_2 emissions and develop new and sustainable technologies, such as wave-power, but also resource effectively.

They have developed a calculator that calculate the environment impact that comes from the electricity that a customer buys from Vattenfall in Sweden. The system is based on data from the LCA reports. The result shows the amount of COx, NOx and SOx emissions.

Their LCA reports are created after the requirements of ISO 14040 and ISO 14044. They have different LCAs for different types of electricity production systems, which give a broader perspective than many of their competitors' offers to customers and other interested parties. The reason for creating LCA is not only for external use, but also for internal use. For example they use their LCA when they want real factual numbers on how they are improving in environmental terms and what areas to focus on. This could for example be; decreasing the usage of water, chemicals and electricity and how to avoid oil-spilling. They use it also for comparing different technical solution; where and how to place power lines.

Almost 100% of their electricity production in Sweden has a certified environmental declaration. Their EPDs meets the requirements of ISO 14025 standards. Their EPD contains information such as discharge, waste, recycling processes and the kilowatt of electricity that is produced. This makes it possible to compare Vattenfall´s products and environmental impact with other companies' environmental work.[114]

An interesting fact is that Vattenfall lets out almost twice as much CO_2 then entire Sweden does and over 70 percent of the company's investments goes to coal and nuclear power,[115] even though that Vattenfall claims to work to decrease their environmental impact. They are considered to be a master on portraying themselves as climate masters while lobbying to continue business as usual, using coal, nuclear power and pseudo-solutions (Agro-fuels and Carbon Capture Storage).[116] In 2009 they received the reward for "Green Washing"[117].

[113] *Inger Hellborg, Central Environmental Group – project development at Tetra Pak, 2010-03-15*
[114] http://www.vattenfall.se/www/vf_se/vf_se/518304omxva/523914miljx/index.jsp
[115] http://www.greenpeace.org/sweden/kampanjer/klimat/sveriges-storsta-klimatbov
[116] http://www.climategreenwash.org/vattenfall
[117] When a company claims to be more "environmental friendly" then they are in reality.

4.4.4.1 Interview with Environmental Manager at Vattenfall

Eva Vitell works as Environmental manager at Vattenfall, she says that during the same time that LCA became more frequently, in the mid 1990s, Vattenfall asked themselves what they could do upon the subject. The main reason that they started to look in to it was mainly thanks to their external contacts such as; media, universities, customers and so on.

Vattenfall collaborated with the company Sydkraft (today called e.on) whereas Vattenfall produced a rapport of method that Sydkraft used for their LCA work. When the two of them compared the data it showed that there were small technical differentiations on the result but overall it showed the same result. This study was completed in 1998.

When Vattenfall started working on their LCA there were no ISO 14040 or ISO 14025 standards to follow, only guidelines to former ones LCA from. But in the end of 1998 they produced their first PCR that met the requirements of ISO 14025 and in 1999 they became the first company in the world to produce an EPD that meet the requirements of ISO 14025 standard.

As a former governmental company, and having nuclear power as one of their main activities, they have always been questioned and for this reason do they use a third party certification to their EPDs. So they believe that to produce an EPD to be credible it demands a third party certification, so that no one can question their work method, credibility and their transparency.

They have noticed an increased interest/demand for both carbon footprint ad water footprint, and they believe these two will be more frequently asked for in the future and a matter of course for a company to provide to their customer.[118]

4.4.5 Atlas Copco

Atlas Copco, was founded in 1873 and is a world leading actor within the production of industrial productivity solutions. They are operating within three business areas: Compressors and Generators, Construction and Mining Equipment and, Industrial Tools and Assembly Systems. Headquarter is located in Stockholm, Sweden and they are selling products on more than 160 markets and have sales operations in 80 different countries. Their 83 production sites are located in 23 different countries; the main manufacturing is based in Belgium, Sweden, Germany, Italy, the United States, India and China. In the end of 2008 the Atlas Copco Group had 34 000 employees and a revenue of 7.7 billion EUR.

The sustainability focus at Atlas Copco:

"Atlas Copco has grouped its main sustainability activities in three dimensions:

- Community engagement (philanthropy) for example *Water for All*

[118] *Eva Vitell, Environmental manager at Vattenfall, 2010-03-12*

- Reengineer within 'the family' (internal processes), for example ISO 14001 in all production processes, supplier evaluations and HIV/Aids programs
- Reengineer the larger environment (Industry standards), for example launch of new innovative products that shape the regulations and push the industry to adapt to new standards e.g. compressors with variable speed drive."

4.4.5.1 Interview with Environmental Manager at Atlas Copco

Anna Brandhorst is responsible of environmental related issues at Atlas Copco. Her opinion about environmental declarations based on LCA is that most of the customers experience them being too hard to interpret and understand. The information is too advanced and hard to take in. Atlas Copco used to make Type III EPDs but they do not anymore, since the customers do not evaluate them. Often the purchaser does not have any knowledge within environmental related issues, and it can be hard for them to evaluate such information in the purchasing process.

LCA is useful during the product development to get a good fundamental knowledge about the products environmental performance. But such LCA information does not cover the need of the customers. They need more specific information concerning toxic materials and other judgments. Today there is no system that is covering all needs of environmental information by itself. The most important document, according to Anna, is the lists of hazardous materials.

To communicate environmental performance to their customers Atlas Copco is focusing on energy effectiveness. They measure the energy consumption of every new product and compare this value to the energy consumption of same product but the previous model. In this way they can show the customers that the products are getting better.

They do not ask for EPDs in their purchasing process ABB had a marketing value from being the first company on the market to develop an EPD.[119]

Anna does not believe in Carbon Footprint, since it is hard to measure and the value depends a lot on the fuel, the country it is used in etcetera.

4.6 Competitors to Alfa Laval

One interesting aspect to environmental work and EPDs when investigating an eventual need EPDs amongst Alfa Laval's customer is by looking into how Alfa Laval's competitors are working with environmental policy and transparency. By studying nine of Alfa Laval's competitors homepages it comes clear that they do not have much information about the environment available. Later we tried to fill out the gaps from the homepages by e-mailing to these nine companies, but only three of the competitors replied on the e-mail with some additional information on how they work with environmental issues. We made phone calls to the rest, but did not get hold of the outer most responsible for their environmental work or in the companies did not want to give away environmental information.

[119] **Allander**, Anders. (2001), *Corporate Environmental Strategy, Vol 8, No 2.* Elsevier Science Inc.

4.6.1 GEA Group

Produce: Plate heat exchangers, High-speed separators, Decanters and Sanitary fluid handling.
Certificates: They have **ISO 9001** certificate, but it do not say what year they received it.
Information: Headquarter is situated in Bochum, Germany and have more than 250 companies in 50 different countries. Their focus and knowledge lies within mechanical engineering, and they see them self's as the world leader in 90% of their different business areas. In 2008 did they have more than 20 000 employees and generated in sales 5 billion Euros.[120]

4.6.2 Pieralisi

Produce: High-speed separators and Decanters.
Certificates: They received **ISO 9001** certificate in 2006.
Information: A worldwide company that produces over 850 decanters to more than 23 000 customer worldwide. They have a yearly turnover of over 170 million Euros. Headquarter and production is located in Jesi, Italy. Their work is mainly in the production of mechanical extractors for separators (decanter centrifuges and separators).[121]

4.6.3 Guinard/Andritz

Produce: Decanters and Seperators.
Certificates: They received **ISO 9002** certificate in 1992.
Information: They are one of the global leaders in manufacturing decanters and separators. They have offices in France and in Austria and they have sold more than 10 000 centrifuges all over the world and had a turnover of over 366.6 million Euros from the year of 2008.[122]

4.6.4 Decanters Flottweg

Produce: Decanters.
Certificates: They have **ISO 9001** certificate, but it do not say what year they received it.
Information: They are one of the world's leading manufacturers of industrial centrifuges. The headquarter lies in Vilsbiburg, Germany and have an annual turnover of approximately 116 million Euros, and export more than 85%.[123]

4.6.5 SWEP

Produce: Plate heat exchangers.
Certificates: They received **ISO 14001** certificate the 15th of June 2009.
Information: Is growing fast and is becoming a strong competitor on the global market. They are represented in more than 50 countries and their production units in Sweden, Switzerland, USA, Malaysia, Slovakia and China which makes it possible to serve customers all over the world. Headquarter is situated in Landskrona, Sweden, and have approximately a yearly revenue on 4 million Swedish kronor.[124]

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[120] http://www.gea-phe.com/
[121] http://www.pieralisi.nl/
[122] http://www.andritz.com/sv/ANONID7D8E458C2A2E4D53/ep
[123] http://www.flottweg.de/global/home/index.html?parent=&subid
[124] http://www.swep.net/

4.6.6 HISAKI

Produce: Plate heat exchangers.
Certificates: They have **ISO 9001** certificate, but it do not say what year they received it.
Information: They have since 1953 sold many Plate Heat Exchangers in almost all industrial fields, much thanks to their compact design and high heat transfer efficiency.[125]

4.6.7 SPX/APV

Produce: Plate heat exchangers, Sanitary fluid handling.
Certificates: No information if they have any certificates.
Information: Headquarter in USA and their products are mainly in the engineering and automation area as solutions to food, beverage, pharmaceutical and healthcare industries. They have customers in over 40 different countries, all around the world.[126] Their revenue for 2009 was 46 million Euros.[127]

4.6.8 Mitsubishi Kakoki Kaisha

Produce: High-speed separators.
Certificates: They received **ISO 9001** certificate in 1998 and **ISO 14001** certificate in 2000.
Information: Company is located in Japan and is seen as an "all-round" engineering company that provides a wide range of chemical plants and machinery in example; gas, synthetic fibers and medicine. But their original field is chemical machinery, where they make separators, filters and mixers.[128] Their revenue in 2009 was 5.4 billion Euros.[129]

4.6.9 ITT Industries

Produce: Sanitary fluid handling.
Certificates: No information if they have any certificates.
Information: They are a considered to be a global leader in being a supplier of pumps and systems that control fluids, with headquarter in USA. They sell mainly to North America, with 43 % of their customers originates from here, but their products can be find all over the world. Their revenue from 2008 shows a profit of 3.8 billion dollars in the fluid technology and 7.9 in their other areas. [130]

4.7 Sustainable development at Alfa Laval

Alfa Laval started to work on their EMS in 2004. The process started with the ISO 14001 certification, with focus on four manufacturing sites. They are now using a system they are calling "The Alfa Laval EMS" to decrease their environmental effect. The system is based on ISO 14001 and has a score system where the production sites are evaluated after a 4 step scale;

[125] http://www.hisaka-asia.com/
[126] http://www.apv.com/
[127] http://www.marketwatch.com/story/spx-cuts-2009-earnings-view-after-profit-fall-2009-10-28
[128] http://www.kakoki.co.jp/english/
[129] http://wrightreports.ecnext.com/coms2/reportdesc_COMPANY_C39262210
[130] http://www.itt.com/

from getting no score at all, to getting either; bronze, silver or gold. The system is developed to be able to make improvements on both local terms but also so that the board of Alfa Laval can identify where the biggest environmental effect is, and in that way make the tight decision for change and improvements. [131]

Alfa Laval environmental work has an external focus, which means that more than 45 percent of the company's CO_2 emissions generated by transportations. They have also started doing LCAs with the main purpose to be able to identify the material in the production , that is; what comes in the factories and what is coming down – for this they are using a method called ECO-99[132]. [133]

In 2004 Folksam made a raking of different Swedish companies concerning climate index and their environmental work. Alfa Laval got bad criticism; -1 of 5 possible credits.

This was a starting point for a serious environmental work in the company. They had to get better! In 2006 Björn Wilhelmsson got a project from David Ford; "product and environment". The project involved four different departments in the company and resulted in new three new implementations;

- LCA
- Black and Grey List
- REACH

The first official sustainability report was made in 2007.

4.7.1 The environmental Council

In Tumba 2006, Alfa Laval got their very first ISO 14000 certificate, this was the starting point for a serious environmental work at Alfa Laval in Tumba. The same process happened simultaneously on many manufacturing sites, receiving ISO 14000 certificate. The reason for this turning point at Alfa Laval in Tumba was thanks to the driven force by a large customer in the Marine industry. This led to the foundation of the Environmental Council in 2006.

The Environmental council makes sure the company obtains sustainable development in all processes and operations through the whole organization, so called *Green Operations*. The environmental work at Alfa Laval is today focusing on these areas:

- Environmental Management Systems; Focus on the ISO 14001 standards.
- Reduce of CO2 emission; for example different type of transportation. Alfa Laval has a goal of a 15 percent reduction of CO2 from 2006 to 2011.
- Life Cycle Assessment; Implementing LCA in product development and to reduce the environmental impacts.

[131] www.alfalaval.com
[132] Weighting is a controversial step in impact assessment. Weighting is the starting point of the Eco-indicator 99 – it works top down to complete the method. http://www.pre.nl/eco-indicator99/eco-indicator_99.htm
[133] www.alfalaval.com

- Reduction of hazardous chemicals in production processes and hence waste streams to air, water and ground.

By improving their products and services Alfa Laval want to provide their customers with opportunities to not only reduce the operation costs but also be able to improve their environmental performance, the *Green Processes.*[134]

4.7.2 Business Principles

Alfa Laval's business principles are based on the principles of the United Nations Global Compacts (UNGC)[135] and the Organization for Economic Cooperation and Development (OECD)[136] Guidelines for Multinational Enterprises.

The four business principles:[137]

1. Environment – to optimize the use of natural resources.
2. Social – respect for human rights.
3. Business integrity – high ethical standards.
4. Transparency – an open dialogue builds trust.

The business principles that are concerning enviornment in any kind of way are:

Number 1 - Environment

" Alfa Laval makes a significant contribution to reducing the environmental impact of industrial processes.
Green processes: *Alfa Laval's core competences of fluid handling, separation technology and heat transfer are at the heart of many industrial and environmental protection processes. Our products and expertise contribute to the efficient utilization of energy, cleaning of water and fluids, efficient production of food and pharmaceuticals. We are committed to continuously improving our products and services to provide our customers with an opportunity to reduce their operational costs whilst improving environmental performance.*

Green Operations: *Alfa Laval endeavors to perform its own operations as cleanly and efficiently as possible, and to take environmental aspects into consideration when developing, designing, manufacturing, servicing and marketing its products."* [138]

[134] www.alfalaval.com
[135] UNGC is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption.
[136] OECD brings together the governments of countries committed to democracy and the market economy from around the world to for example Support sustainable economic growth.
[137] http://www.alfalaval.com/about-us/sustainability/reports/Documents/BusinessPrinciples.pdf
[138] http://www.alfalaval.com/about-us/sustainability/reports/Documents/BusinessPrinciples.pdf

Number 4 - Transparency is "communication":

*"**Communication:** Alfa Laval will engage in open dialogue with all interested parties. However,Alfa Laval will not inappropriately divulge information that is commercially valuable. Also, any information that could have an impact on the share value of Alfa Laval will be released in strict compliance with the regulations governing such information."* [139]

4.7.3 Development of Life Cycle Assessment

During the extra effort made in the environmental related work, as an initiative of Group Management and the Board at Alfa Laval during 2006, they decided to develop a LCA. Alfa Laval had the goal that the LCA should be easily, and fairly fast, done. The aim was that the LCA would be an easy tool to use, so they decided to implement the software application called; EcoIT.

Daniel Klint (Material Specialist at Alfa Laval in Lund, working within Alfa Laval since 2004) did an investigation within Alfa Laval to see if and how the LCA was to be implemented and used within the company. Together with Björn Wilhelmsson (R&D Manager at Alfa Laval in Lund, worked since 1995) they came to the conclusion that this could be used not only internally but also to provide customers with certain LCA related information. They took the initiative to start developing an EPD for Alfa Laval in 2006.

There has been two different ways of doing LCA within Alfa Laval:

1. Full LCA
   According to Daniel Klint there are three extensive LCAs made within Alfa Laval.
   - A master thesis made by Asmo/Myrén
   -LCA for a milk separator made by Sahlin/Wiik
   - LCA for EC650
   These LCA are very wide, the documents are including around 20-30 pages each.

2. Screening - The NPD projects
   LCA is used in the NPD-projects (New Product Development) and the LCA results are presented according to a result template made within the company. The goal is that one LCA, made according to the NPD project, is to be done in one day. The report of will be around 3 pages long.

The LCA calculations are made in the computer program ECO-it. The calculations are generated in Eco-indicator points. The problem is that such points often are too abstract. For that reason they are trying to generate the calculations in Carbon dioxide equivalents, since it is more common as a way to express the environmental effects. According to Daniel, a lot of the customers ask for carbon dioxide equivalents.

[139] http://www.alfalaval.com/about-us/sustainability/reports/Documents/BusinessPrinciples.pdf

If the LCA are used as a base for the EPD is all depending on the type of EPD. LCA is only required for the Type III declarations. For Type I and Type II there are no need for LCA, however in the future it can be possible for Alfa Laval to use LCA with Carbon dioxide equivalents as a support within the development of a Type II EPD. In an LCA the functional unit of the product is the base, so when incorporating the LCA in the EPD, the EPD will be more specific for each product. That will demand one EPD per product and application – which is a huge amount of EPDs. The only information that will be the same in the different EPDs is the base information such as the company information.

When comparing LCA data between different products, there has to be a frame of reference (for example PCR) to be able to know what to include and how. The functional unit is the base for the calculations, so if you want to compare the LCA from two different products from two different companies you have to have the information about the production process. Such information is very hard, if not impossible, to get. It is only possible if the two companies are making their LCA based on the same PCR.

At Alfa Laval there are a lot of catalogue products, it is much more efficient to make LCA and EPDs for these products, since it is only need to be done once. However most of the products sold by Alfa Laval is unique since it is designed for a single customer.[140]

4.7.4 The Development of Product Category Rules

As we mentioned earlier in the text; if there are no existing PCR documents that suits the product, these documents have to be done by a company or organization. Alfa Laval wanted develop an EPD for the products within in the product group: Compact Heat exchangers. For these products did it not exist any PCR; Alfa Laval had to create one.

In relation to the earlier description of the different phases during the development of the PCR document, this is how Alfa Laval did:

Figure 23: How Alfa Laval developed their PCR

- *Initiation* – The project was initiated in 2008 by Daniel Klint, Alfa Laval Lund. Such as appoint a PCR moderator, consider available PCRs and seek cooperation with other parties.

- *Preparation* – Includes definition of product category and criteria to use in the LCA study. When Alfa Laval started was it the regulation MSR 1999-2 that was in use, and Daniel got help from Marcus Wedin at Miljögiraff to develop the PCR.

[140] *Interview with Daniel Kling between 2010-02-15 until 2010-05-10*

- *Consulting – PCR documents must be subject to an open consultation before it can be officially approved.*
  Alfa Laval contacted other producers to plate heat exchangers within the industry and sent them the PCR documents to get their opinions on it. None of the competitors replied with any comments. The PCR document, Compact Heat exchangers Draft version, was published on the international EPD website, www.environdec.com, as an open document for others to comment and inspect. No one has so far made any comments about it.

- *Approving* – After the document has been studied by organizations and companies within the same industry, the documents have to be approved to follow the PCR standards and rules. Unfortunately the PCR-regulations were changed during the time of the consulting part in 2009, so the PCR that Alfa Laval had made was no longer according to the regulations - the documents could not be approved.

- *Publication* – There was never a publication of an approved PCR document.

- *Updating Phase* –Since it has a pre-determined period of time, there can be a need for the document to be revisited in the case for an update.[141]

4.7.5 "The Onion Layer Model"

Daniel Klint and Björn Wilhelmsson are working with the project "Products and Environment". To visualize their thought on how to communicate environmental information to the customers did they in the beginning of 2010 develop a model ("The Onion Layer Model") for how to provide the customers with the environmental information and how much they would have to pay for it.

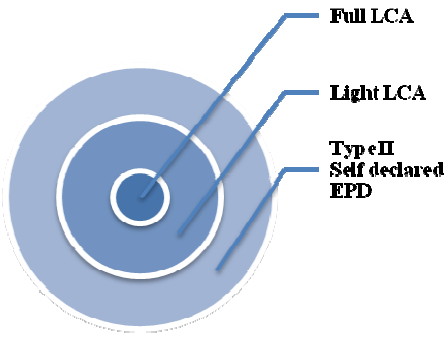

Figure 24: "The Onion Layer Model" – Shows the three different layers on how one may work with LCAs at Alfa Laval

First Layer) the outer layer of the model, is the Type II declaration.

Second Layer) provide the customers with a "light" LCA – more product/model specific information.

Third Layer) the center of the model, is a fully developed LCA.

[141] *Interview with Daniel Kling between 2010-02-15 until 2010-05-10*

This model is constructed to work for more products than just Plate Heat Exchangers, but since an EPD demands a PCR, would there be a need to develop PCRs for the products, but not for developing a complete LCA. And since it is really not an EPD type III that demands both a PCR and a third part certification are none of the Layers are under subjections of a third part or verification.

Daniel Klint means that the first two layers can be provided to the customers without them have to pay for it. But for the last layer, a complete LCA, the customers have to pay for it. This cost will be as much as it is to develop a complete LCA which is approximately 100 000 SEK (10 000 SEK per day in 10 days).

At this very moment (May 2010) they are developing a type II EPD. Those EPDs are completely generic, that is; they can be used for a complete product group Compact Heat Exchangers or Brazed Heat Exchangers and so on. The LCA in layer 2 is developed for new products that consists of the companies NPD-processes (New Product Development) and is a simplification of LCAs that are developed with the help from the ECO-it tool.[142]

4.7.6 The first EPD at Alfa Laval

In totally there have been two EPDs at Alfa Laval:

The first EPD was created in 2001. It was made by Ekonomisk Ekologi AB. The involved persons from Alfa Laval was; Björn Olsson and Anders Knutsson. The reason behind the first EPD is not documented, but according to the involved persons there was a customer asking for it. From the time when the EPD was created to 2005, Anders Knutsson was the person with the main responsible of it. According to him there have been customers asking for the EPD about 10 times per year. When Anders Knutsson left Alfa Laval in 2005 Björn Olsson took his position. From 2005 and until today (2010) Björn Olsson has had about 10 inquiries on the EPD, which is about 2 customers asking for it yearly.

See Appendix B: Alfa Laval's first EPD

The second EPD was made as a part of the environmental work within Alfa Laval. According to the status report of January 2009, made by Björn Wilhelmsson at Alfa Laval, the company is capable of making Type II declarations. The Type II declarations will be made only if there is a market need for this type of EPDs among the customers of Alfa Laval. The decision will also be made upon the value of the competitive advantages that the EPD will provide.
See Appendix C: Alfa Laval's second EPD

After the decision to develop LCA Alfa Laval identified EPDs as a way to let the customers take part of the environmental information from the LCA. They started to develop a Type II EPD. The mainly involved persons from Alfa Laval was; Björn Wilhelmsson, Daniel Klint. The EPD was made by the environmental consult company; Miljögiraff.[143]

[142] *Interview with Daniel Kling between 2010-02-15 until 2010-05-10*
[143] *Interviews with Daniel Klint, Björn Wilhelmsson and Björn Olsson, 2010-02-15 until 2010-05-10*

Person	Title/department	Part of the EPD work	Knowledge about the reasons behind the EPD
Björn Wilhelmsson	R&D Manager.	Initiator in the process to make an the second EPD.	Thought there might be a market value in EPDs and that was the reason to try and do such a declaration.
Björn Olsson	Product manager heat exchangers (BHE).	Product manager of the product the first EPD was made for.	Most likely it is a customer demand. Do not know who asked.
Daniel Klint	Material specialist MACC (Materials and Chemistry).	Participant in the project "product and environment", involved in the development of the second EPD.	Customer demand. Do not know who asked for it.
Anders Knutsson	Worked at the same position as Björn Olsson. No longer at Alfa Laval.	Developed the first EPD at Alfa Laval.	Customer demand. Do not know who asked for it.

Figure 25: Interviewed persons at Alfa Laval with keyknowledge about Alfa Lavals work connected to EPD

4.7.6.1 One of the first requests for an EPD

During the internal interviews at Alfa Laval we managed to identify at least one company asking for the second EPD. The company's name is Sunda Hus i Linköping AB and they have been calling to ask for the EPD "a couple of times" during at least the three last years. No further information was available at Alfa Laval so to be able to go deeper into the reason behind the customer demand we made contact with Sunda Hus i Linköping AB.

Sunda Hus is an environmental consultant in the building trade. The company has the biggest database on environmental data concerning building materials and products. They evaluate the materials in an environmental point of view and the database lists about 20 000 unique products. The database is used by customers in whole Sweden.

They offer their customers counseling about environmental management within the building processes. The customers get access to the database of the building materials/products to make the right decisions when building an environmental friendly house.

The products are evaluated from A to D. A means that the product is fulfilling the environmental requirements and are well developed to be a part of an environmental friendly building. B means that the product is ok. C means that the company has to motivate why they will use it. Since the product is not the best one in consideration of its environmental influences. D means either that Sunda Hus AB is missing an evaluation on the product or that the product is bad concerning the environment. The D products are not used by many customers. For example if a Swedish county council is considering the products to be used in their houses, they avoid D products as far as they can, since they are not allowed to use these products.

The grading is based on the judgments in different areas:
- The materials, raw materials and matter in the product
- The product's effect on the environment and health during its' life cycle (production, building process and time in use)

- The demolition and end material
- Documentation

Sunda Hus AB evaluate different buildings and provide them with environmental labeling according to the Swedish method; “miljöklassad byggnad” (environmental classification of buildings).

Sunda Hus AB has requested environmental data about Alfa Laval’s heat exchangers. The database is totally listing 56 different heat exchangers, 15 of them are made by Alfa Laval. None of the 56 heat exchangers are market with the grade A. According to Anna Olsson, responsible of the general administration at Sunda Hus, an A is impossible for a product made of metal, that is the reason for that no heat exchangers have been A listed. Out of the 15 heat exchangers from Alfa Laval 4 is market with a B and 10 is market with a C. That means that 4 out of 15 have the best grade a heat exchanger can get. One of Alfa Laval’s listed product is market with a D, for this one Sunda Hus have no information which is the reason for the D. Sunda Hus does not recommend companies to buy D listed products.

Producer	**Amount of products (heat exchangers)**	**Amount of each Classification (A,B,C,D)**	**Classifications in percent of total products from the producer**
Alfa Laval	15	A=0 B= 4 C= 10 D= 1	A = 0 % B = 27 % C= 67 % D= 7 %
Armatech	11	A= 0 B= 4 C= 3 D= 4	A= 0 % B= 36 % C= 27% D= 36%
Danfoss District Heating	3	C= 3	C= 100 %
Emotron	1	D =1	D= 100 %
Retermia	1	D =1	D= 100 %
Sondex	17	C= 17	C= 100 %
SWEP	6	C= 6	C= 100 %
SweTherm	2	D=2	D= 100 %

Figure 26: The heat exchangers in Sunda Hus database

The companies and products are listed, and when using the database you are able to “click” on one of the products/companies to read more about them. In the further information, which is more detailed, the reader can get information about different materials. Product descriptions are

also to be found in the database, and if there are any existing EPDs these are most likely to be published here. When looking through the heat exchangers most of their product descriptions are published. For a few products there are environmental reports.

Alfa Laval's second EPD can be found in the database. There are also a lot of product descriptions on the Alfa Laval products. For one of Alfa Lavals heat exchangers we could find another environmental data, this is totally new to us. This one is a one paper long document, called "environmental declaration" made by Anders Arnell.
See Appendix D: Alfa Lavals EPD in Sunda Hus Database

4.8 Alfa Laval's Customers Perspective on Environmental Issues

Alfa Laval serves a wide range of customers; the company is represented in the following industries:

Food and beverages	Biofuels	Biotech and Pharmaceutical (Biopharmaceutical)	Chemicals
Engine and transport	Fluid power	HVAC[144]	Industrial fermentation
Latex	Machinery	Marine and Diesel Power	Metal and minerals, extraction
Metal working	Mining and pigments	Oil and Gas	Oil refinery
Power	Pulp and paper	Refrigeration and cooling	Semiconductor systems
Semiconductor systems			

Figure 27: The different industries that Alfa Laval have customer in

During this project we will narrow down the investigation of the customer need of EPD to one or two customer group/industry. As a starting point we were recommended to look deeper into the Biopharmaceutical industry, but during the interviews within Alfa Laval we got suggestions about the Marine and Diesel industry. According to Alfa Laval's coworkers there have been more customer requests of EPDs within Marine and Diesel than within Biopharmaceutical.

For these reasons we made the decision to look further into these two industries. ***First*** we have looked into ***Alfa Laval's performance*** and the ***regulations and laws concerning the environment*** within the industries. ***Secondly*** we did a brief ***investigation of the two industries***. The investigation was made by phone calls to different companies and the main actors within the industries in Sweden. We made 8 telephone calls to Biopharmaceutical companies and looked at 80 different Marine industries homepages and 4 telephone calls to companies in the Marine and Diesel industry. The main goal was to get a better knowledge about their need of EPDs and environmental information and to see if they have any existing guidelines about EPDs or not.

[144] Temperature control is to achieve a pleasant indoor climate; heating, cooling and air-conditioning

4.8.1 Biopharmaceutical

When it comes to the pharmaceutical industry, Alfa Laval focus on three areas:
- performance
- hygienic design
- documentation

As a result of an increasing Biopharmaceutical industry in the world, the request for Biopharmaceutical solutions is getting bigger. To meet this demand Alfa Laval has improved their portfolio of Biopharmaceutical products. The company has also made investments to improve the design and documentation of their Biopharmaceutical products.

The future prognoses within the Biopharmaceutical industry indicate an increase of 12.4 percent in the new investments of equipment, during the following five years. Considering the increasing amount of investments in the industry, inquires made by customers and an extensive investigation, Alfa Laval decided to make the Biopharmaceutical industry a top priority. The existing products have been improved to fulfill the strictly standards made by institutions within the industry, for example the Food and Drug administration (FDA). Alfa Laval has also released new Biopharmaceutical products and there are more to come during the year of 2010.

According to Jesper Holm, Segment Manager Nordic, the products are designed to guarantee a consistent performance during the whole life cycle and to prevent contamination. These are factors that are essential within the Biopharmaceutical industry.

Pharmaceutical companies often require documentation about the product to make sure the demands about a consistent performance and minimal contaminations are fulfilled. To be an attractive supplier within the business, Alfa Laval offers their customers a wide documentation about the product; from the raw material to the delivery and installation. As a part of a long-term investment Alfa Laval will adjust their portfolio of Biopharmaceutical products to the dynamical industry.

4.8.1.1 Regulations in the Pharmaceutical Industry

There are a lot of regulations in the Biopharmaceutical industry. In Sweden the pharmaceutical law (läkemedelslag 1992:859) deals with regulations about everything from the general demands on pharmaceuticals to how to store, import and produce it.[145]

Since America is the biggest market for pharmaceutical products the U.S. Food and Drug Administration (FDA) is one of the strongest controlling organization in the world. FDA's Center for Devices and Radiological Health (CDRH) regulate all companies that design, manufacture, repackage and relabeled medical devices in the U.S. and all companies importing medical devices into the U.S.

In Sweden the Medical Products Agency (Läkemedelsverket) is doing inspections in the pharmaceutical industry. The inspections are usually made once every second year to prove that

[145] http://www.notisum.se/rnp/SLS/lag/19920859.htm

the quality of the pharmaceuticals is high and the regulations made by the European Union (EU-GMP) are fulfilled. the Medical Products Agency inspect everything concerning the industry; for example the organization, staff, equipment and laboratories.[146]

The only pharmaceutical regulation covering the pharmaceutical industry is Good Manufacturing Practice (GMP). GMP is focusing rather on the quality of the end-product than the single equipment/system/process. The manufacturer has to be able to prove that the single equipment/system/process is able to constantly produce an end-product of the right quality. This has to be done through validation and documentation.

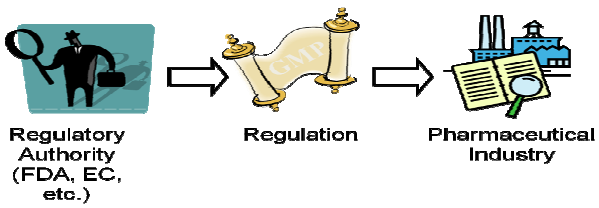

Figure 29: The regulations in the pharmaceutical industry

The two main GMP's:

- USA - CFR (Code of Federal Regulation) 21 part 210 and 211 http://www.fda.gov/cder/dmpq/cgmpregs.htm by FDA (Food & Drug Association).
- Europe - Commission Directive 91/356/EEC, principles and Guidelines of good manufacturing practice for medicinal products for human use. http://ec.europa.eu/enterprise/pharmaceuticals/eudralex/index.htm by the European Commission.

Summary of the rules for equipment used in the pharmaceutical industry:

- Cleanness – the equipment has to be cleaned according to drug demands and cleaning programs.
- Contamination – There are regulations about the contaminations from surroundings, from component material, from substances for operation, from drugs, during the use of the equipment.
- Performance – The equipment shall operate as intended and to facilitate maintenance for repeatable operations.
- Documentation – There is a great demand for documentation. It is made to facilitate validation and to be able to verify for the inspector.

[146] http://www.lakemedelsverket.se/malgrupp/Foretag/Lakemedel/Tillsyn-och-uppfoljning---GMPGDP/Inspektion-av-lakemedelstillverkning/

Validation of a GMP

"Validation is a *documented* program providing a high degree of assurance that a process/system consistently meets pre-determined specifications" *Defined by the Food and Drug Administration (FDA)*

There are four different types of validation: Process Validation, Cleaning Validation, Change Control and Revalidation All activities have to be properly documented. The two main reasons for the valuation are:

- To confirm that the processes work consistently and for its intended use, before starting manufacturing.
- To confirm that the processes fulfils the GMP, to be able to get acceptance from authorities to start manufacturing. [147]

Environmental labeling in the pharmaceutical industry

There are a lot of rules and legislation concerning the pharmaceutical industry. First of all there are guidelines for the pharmacies when selling drugs; they have to give the customer the drug that is sold to the lowest price, independent of the company making it. This makes it hard for pharmaceutical companies to use environmental information as "green branding". [148]

Secondly there is no environmental labeling or other environmental information concerning the production process of pharmaceuticals. The Medical Products Agency has made the judgment that it is not consistent with the rules about pharmaceutical labeling declared in the pharmaceutical legislation, to mark a pharmaceutical with an environmental label in consideration of its' production process. Only a change of the EU legislation could make it possible to give a pharmaceutical an environmental label. It is a controversial question if giving a product related to public health such label or not. Today no one of the Swedish companies developing environmental labels is planning to start developing environmental labels of pharmaceuticals.

Today the GMP (Good Manufacturing Rules) does not contain any environmental demands. The Medical Products Agency in Sweden has presented a proposal to add such rules in the GMP, so that good manufacturing practice also shall be seen in an environmental view.

The Pharmaceutical Industry Association (Läkemedelsindustriföreningen, LIF) has made an initiative to develop a national system for environmental classification of pharmaceutical substances. The system is voluntary and evaluate the use of the product not its' production process. The purpose of the system is to communicate relevant and understandable environmental information to different parties. The information is published on the Swedish website for FASS (Pharmaceutical Specialties in Sweden). [149]

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[147] Power Point presentation; Regulations and certificates, Internal training week 16 2008, Sanna Bernhardt, Alfa Laval ESE

[148] Email from Bengt Mattson, PhD, Manager CSR & Environmental Affairs, Pfizer AB.

[149] Medical Products Agency (Läkemedelsverket), 16 december 2009, Redovisning av regeringsuppdrag gällande möjligheten att skärpa miljökrav vid tillverkning av läkemedel och aktiv substans.

4.8.2 Biopharmaceutical Companies

To investigate if there is a need of EPDs or other environmental information in the pharmaceutical industry and how they are evaluating such information, we decided to look at some of Alfa Laval's customers within the field. They are all bigger companies, with one or more sites in any of the Nordic countries. In the following chapters we will give a brief introduction to the companies and their environmental approach.

In general there is an increased interest in sustainable development of Pharmaceuticals, for example in 4th of May 2010 there was a conference, at the Swedish embassy in Washington USA, called "HEALTH & CARE Sustainable Development of Pharmaceuticals". The conference was dealing with different aspects within sustainable development in the industry and there were 20 attendants from both pharmaceutical companies and public authorities.

The questions are: The pharmaceutical industry demand and appreciate all information and documentation but do they value environmental information? Will they really use the environmental information or is it just a check point? If we look one step further in among the customers. The end customer is the consumer; the person who needs the pharmaceuticals to stay or become healthy. Do they evaluate the environmental information?

4.8.2.1 Astra Zeneca

The company was founded in 1999, when Astra AB and Zeneca Group PLC united as one company. Astra Zeneca is one of the biggest pharmaceutical companies in the world, with over 65 000 employees and 26 manufacturing sites. The manufacturing sites are located in 18 different countries. Astra Zeneca had a R&D department in Lund, according to a decision made in mars 2010 the whole site in Lund will be phased out until the last of December 2011.[150] The sale in 2008 was USD 31.1 billion.[151]

"With a global business comes a global responsibility for consistently high standards of behavior worldwide"[152]

Astra Zeneca has a great commitment in a sustainable development. They have several solutions to improve communication related to environment and to enable to reach the goals within global warming and waste. To make sure they choose the right products, to minimize waste and maximize energy efficiency, when selecting systems and services Astra Zeneca have a sustainability checklist. The checklist is including for example high energy-efficiency plants, building management systems, lighting controls and low water use toilets. All construction projects are designed to minimize the environmental impact. They have several ways in which they try to reduce their carbon footprints; both with renewable energy such as wind power but also through a sustainable building concept.[153]

[150] http://www.sr.se/cgi-bin/ekot/artikel.asp?Artikel=3480402
[151] www.astrazeneca.com
[152] www.astrazeneca.com
[153] http://www.astrazeneca.com/responsibility/code-and-policies/

According to Jan Setréus, working with purchasing at Astra Zeneca, they do not ask for EPDs during the purchasing process of production equipment. But they do ask for LCA related information and other environmental information when it is relevant.

Astra Zenecas' guidelines for "Responsible Procurement Expectations of Suppliers" see http://www.astrazeneca.com/_mshost3690701/content/resources/media/responsibility/policies/AZ_SP_Procurement.pdf

4.8.2.2 Pfizer

Pfizer is one of the biggest pharmaceutical companies in the world. The company have over 85 000 employees and are represented in more than 150 countries. Pfizer have a history that goes as far as to 1849. The company expanded to Europe during the 1950's. In 2003 the Swedish company Pharmacia became a part of Pfizer. The sale in 2007 was USD 48.8 millions. The total amount of manufacturing sites is approximately 70 all around the world. Pfizer has around 600 Swedish employees and a production site in Strängnäs.[154] Their office building in Silverdal, Sweden has gotten awards of being a so called "GreenBuilding" og being one of the most energy efficient office buildings in Europe.[155]

In the beginning of 2010 Pfizer introduced their global Environmental Sustainability Program. The program includes environmental issues such as how to integrate environmental thinking and strategies in the company. They focus mainly on three priorities:
- climate and energy related issues,
- product stewardship (minimize the environmental influence from the products)
- the world wide supply of clean water ("water footprint").

Pfizer has goals related to carbon footprint; the total amount of carbon emissions has to reduce with 20 percent during 2007 to 2012.[156]

According to Bengt Mattson, manager of CSR and environmental affairs at Pfizer, environmental performance is evaluated when making investments and purchasing. The environmental information does not necessary have to be certificated declarations, EPDs, it can be a description of the product and the supplier's environmental performance. A factor, which is becoming more important, when making bigger investments or purchasing is the life cycle cost, such as the energy efficiency.[157]

4.8.2.3 Novo Nordisk and NovoZymes

NovoZymes is a part of Novo Nordisk. The head office of Novo Nordisk is located in Bagsvaeg in Denmark. The company has over 29 000 employees world-wide. Novo Nordisk has production sites in six different countries and affiliates or offices in 76 countries. They have two main business segments: diabetes and biopharmaceutical. Their vision is to be the world leading company in

[154] www.pfizer.se
[155] http://ansvarsblogg.pfizer.se/
[156] http://ansvarsblogg.pfizer.se/
[157] *E-mail conversation/interview with Bengt Mattson, 2010-02-25. The Pfizer office building in Sollentuna.*

the diabetes treatments. The goal is to find ways to cure diabetes by preventing, detecting and treating. Novo Nordisk has products and services also in other fields, such as bleeding therapy, growth hormone therapy and women's health.[158]

"Environmental Policy- In Novo Nordisk we will continuously improve our environmental performance. This means that we will:

- promote environmental awareness and integrate environmental considerations into our business processes
- develop and apply sustainable processes and products
- reduce our use of resources and strive to prevent pollution
- monitor and evaluate environmental performance throughout the entire supply chain
- engage in stakeholder dialogue and partnerships and report on our performance
- comply with environmental legislation and relevant requirements" [159]

The highest authority working with environmental issues at Novo Nordic is the Environment and Bioethics Committee. They make sure that the company's needs and interests within environmental and bioethical issues are met, and that Novo Nordic fulfills the commitments in the Novo Group's charter. There are four priorities:
- Climate Change
- Environmental assessments in R&D
- Transportation
- Health and safety

The first environmental report, published on the website, was made in 1995. In 2001 the company made their first "the triple bottom line report", since then the triple button line has been their concept of how to work towards a sustainable development. The triple button line is Novo Nordics interpretation of how they are working with sustainable development. It is made to balance financial growth with CSR, short-term gains with long-term profitability and shareholder return with other stakeholder interest. All decisions shall balance the three considerations: Is it economically viable? Is it socially responsible? And is it environmentally sound?[160]

In 2001 they also developed their first sustainability agenda. In 2002 and 2003 they started to make sustainability reports, presenting their environmental, social and economic performance. In February 2009, at the World Economic forum, Novo Nordic was rated as one of the 10 most sustainable companies in the world and in September 2009 Novo Nordisk was ranked among top five in Dow Jones sustainability Indexes. [161]

[158] http://www.novonordisk.se/documents/article_page/document/aboutus_fact.asp
[159] http://www.novonordisk.com/about_us/novonordisk-way-of-managment/nn-way-of-management-the-policies.asp
[160] http://www.novonordisk.com/sustainability/default.asp
[161] http://www.novonordisk.com/sustainability/news/news.asp

4.8.2.4 GE Healthcare

GE Healthcare

GE Healthcare have five main areas:
1. Cardiology, 2. Neurology, 3. Emergency medicine, 4.Oncology,
5. Women's health

GE Healthcare is making computer tomography, magnetic cameras, ultra sound cameras and other products within the imaging technique for making diagnostics. The site in Uppsala is focusing on development and production of products used in the production of biotechnological medicines for example human growth hormones and insulin. The company has about 45 000 employees world-wide. They have a yearly turnover of around 15 million USD. GE Healthcare is a part of General Electric Company. [162]

The company has developed guidelines when working with environmental, health and safety (EHS) related issues; an EHS vision and program.

"Our expectations are simple and clear":

1. Complying with the EHS laws and regulations that apply to our operations

2. Providing a safe working environment

3. Minimizing the use and emission of toxic chemicals or materials

4. Applying GE global tools and programs consistently everywhere we do business " [163]

4.8.2.5 Biovitrum

biovitrum.

In january 2010 Biovitrum and Swedish Orphan International Holding AB joined and became Swedish Orphan Biovitrum. Swedish Orphan Biovitrum is focusing on development of orphan drugs and specialized medicine for patients with rare diseases and high medical demands. The company is based in Sweden and is an actor on the global markets. The products portfolio is including 60 specialize medicines. The yearly turnover of 2009 is esteemed to 2 billion SEK. They have 500 employees and the head office is located in Stockholm, Sweden. Swedish Orphan Biovitrum has still no website, the following information will be based on the information at Biovitrum's website.

Biovitrum have a EMAS according to the ISO 14001 standards. The environmental responsibility is delegated; this is made so that environmental issues will be integrated in all parts of the company. All parts have to make sure they are working according to the environmental policy of the company.

[162] http://www.gehealthcare.com/sesv/about/ge_factsheet.html
[163] http://www.gehealthcare.com/eueu/about/environment.html

The environmental policy:

"To achieve long-term, sustainable profitability, all employees within Biovitrum will:

- Comply with safety, health and environmental legislation and monitor developments in the field
- Manage environmental work systematically by means of Biovitrums environmental management system
- Conduct all activities in such a way that employee health and environment are protected, energy and natural resources are saved
- Work proactively and take environmental considerations when we develop or alter the processes, facilities and products
- Improve the environmental performance internally and in interaction with customers, suppliers and contractors as well as integrating environmental considerations into purchasing goods and services
- Provide open and objective information on our environmental performance to our employees, the public and the authorities
- Continuously educate themselves so that they can apply this policy and perform their duties in an environmentally conscious way
- Promote a safe and healthy working environment with an acceptable workload
- Contribute to a work environment that allows for creativity and innovation" [164]

4.8.3 Marine and Diesel

Alfa Laval has a long experience, about 100 years, within the Marine and Diesel business. They are today the leading supplier of equipment used in the Marine and Diesel industry. The customers are represented by shipyards, ship operators and ship owners.

Alfa Laval's products fulfill many of the needs onboard; everything from purification of fuel- and lubrication oil to air conditioning and cooling of the engine. Alfa Laval has decided to provide their customers with solutions that not only have a great performance but also are as friendly as possible to the environment. For example they have solutions that can separate oil and carbon from the air, to reduce the air pollution.[165]

There is a fact that all transportation affects the environment in some way. Even though the marine transport can be seen as an energy-efficient means of moving cargo, since the fuel consumption is lower per transported unit than other ways of transporting cargo. And shipping has a very small infrastructure impact on the environment, but these reasons do not mean that shipping is an exception to this fact, it too affect the environment.

The shipping industry affects the environment in many different ways, such as:

- *Carbon dioxide* contributes to climate change.
- *Nitrogen oxides* in exhaust gases contribute to acidification as well as eutrophication.
- High levels of *sulphur in marine fuels contribute to acidification.*
- *The use of ballast wate*r transfers organisms between the world's oceans which may disturb the bio-diversity.
- Toxic substances in *antifouling coatings* affect the marine species.[166]

So being one of the most polluting industries in the world, the Marine and Diesel industry face a lot of issues related to pollutions and environmental influence. During the use of a marine and

[164] http://www.biovitrum.com/templates/InformationPage.aspx?id=192
[165] www.alfalaval.com
[166] http://www.walleniusmarine.com/en/Sustainability-Report-2008/Legislation/

diesel engine there are a lot of emissions such as nitrogen oxides (NO_x), sulphur dioxide (SO_2), greenhouse gases and particulate matter (PM). The emissions result in greater acidification, eutrophication and effloresce of buildings. Some of the substances are also harmful to the human health. Since the marine diesel is considered as an unclean industry, the external pressure is a lot bigger, not only from the legal system but also from the customers and environmental organizations point of view. United States Environmental Protection Agency (EPA) is dealing with matters concerning the environmental influence from the marine diesel industry. EPA sets up certain regulations in matter of fuels and emission limits.[167]

According to an article on the Internet, the newspaper called the Guardian stated that there are huge health risks as a result of the shipping pollution. The amount of cancer and asthma-causing emissions from the three biggest ships in the world is equal to the emissions from 760 million cars. An US academic research showed that the emissions from all cargo ships in the world (about 90 000 ships), yearly leads to 60 000 deaths, only in the US. In Denmark the correspondently amount is 1000 people yearly. During 280 days of operating, *one* the world's largest ships generate about 5 200 tones of SO_x.

When the US government in 2009 imposed low emission zones along the US coast the pressure increased on UN's International Maritime Organization and EU to tighten their laws and regulations concerning ship emissions. According to plans made by the EU there will be at least two low emission zones in 2015.[168]

4.8.3.1 Regulations in Marine Industry

The marine industry is considered a dirty industry and from not having any laws or regulations are organizations developing an even more controlled industry with regulations and recommendations for how the marine companies shall act seen from an environmental perspective.

4.8.3.1.1 International Marine Organization

Shipping is considered to be the most international of all industries in the world, due to the fact that more than 90 percent of the global trade is done over the seas. The ownership and management chain surrounding any ship involve and connect many countries and in that way many different laws and jurisdictions, for these reasons there is a need for standards and regulations that can be adopted by everyone in the shipping industry.

The Convention in Geneva established the International Maritime Organization (IMO) in1948, whereas IMO first met in 1959. IMOs main task is to develop and maintain a regulatory framework for shipping and its environmental, legal and technical matters. They ensure that lives at the sea are not put at risk and that the marine environment is not polluted by shipping. IMOs mission statement: "*Safe, Secure and Efficient Shipping on Clean Oceans"*.

[167] http://www.epa.gov/OMS/marine.htm#regs and http://www.portgot.se/prod/hamnen/ghab/dalis2bs.nsf/vyFilArkiv/landelIVLslut.pdf/$file/landelIVLslut.pdf
[168] http://www.guardian.co.uk/environment/2009/apr/09/shipping-pollution

Today there are 169 member states involved with approximately 300 people that works for them. Inspection and monitoring of compliance are the responsibility of member States' but the so called "Voluntary IMO Member State Audit Scheme" is expected to have a great impact on enhancing the implementation of IMOs standards.[169]

4.8.3.1.2 Legislations in the Marine Business

Since there are many countries involved in the IMO there are many laws and regulations to consider before making a decision. This makes the whole decision process very long for IMO, and therefore it takes an even longer time to change laws in the shipping industry.

The Kyoto Protocol does not apply to international shipping and there are no international organisations regulating these CO_2 emissions. But IMO is working on an index that will regulate the CO_2 emission for new vessels.

EU have done calculations upon the nitrogen oxides, which have shown that between 2000 and 2020 the nitrogen oxide emissions on shore will decrease with 49 percent, while the emission from shipping will increase with 67 percent. This provides the fact that the shipping emission will exceed the total emissions of shore-based industries by 2020 if nothing is done in the shipping industry. The main reason for this is that there are tougher and stricter laws adopted on shore than within the shipping industry, where it more or less standstill.

When looking on the same calculations done on sulpher emissions it shows that between 2000 and 2020 it will decrease with 68 % on shore, while increasing with 45 % in the shipping industry, off shore.

For the last years more focus have been put on the problems concerning the management of ballast water, which is one of the reasons for drawing up a convention addressing this. The convention is currently *(2010.03.03)* waiting to be approved upon and will come into force one year after the day it will be approved.[170]

4.8.3.2 Lloyd's Register Quality Assurance

Lloyd's Register Quality Assurance (LRQA) was established in 1985 in response to the first quality standard, BS 5750, which was launched by the UK Government. LRQA is a consult company that operates all over the world, offering assessment of environmental and health and safety management systems in many different industries. They help companies with different challenges that they may face in assessing management systems, for example; meeting objectives, improving competitiveness and controlling risks.

LRQA has an independent advisory board, the LRQA General Technical Committee, which takes on the role as an impartiality committee. They work actively to avoid situations where

[169] http://www.imo.org/
[170] http://www.walleniusmarine.com/en/Sustainability-Report-2008/Legislation/

there can be a conflict of interest connected to work done on certification and verification, so they can ensure that the information is impartiality.[171]

Magnus Friberg, Technical Manager LRQA Central Europe & Nordic Area said that LRQA get once or twice per year specific questions from companies that want them to create an EPD for them. The first EPD they were verifying was for the new Volvo S80, back in 1998/1999. Since then there have only been a handful of questions for EPDs. The main factor to why the EPDs not always have been successful is due to the lack of PCRs.

The interest in certification has been going in waves, but has increased a bit lately, maybe among all because of the project "Clean shipping" run from Gothenburg. However LRQA have had no queries from any marine companies regarding EPD.[172]

4.8.3.3 The Industry Working Together - Clean Shipping Project

The Swedish shipping industry is considered to be one of the leaders when dealing with environmental issues and developing and implementing new environmental measures.

The clean Shipping Project is driven by public authorities in western Sweden; Gothenburg Region Association of Local Authorities, the Region of Västra Götaland, Västra Götaland County Administration and Business Region Gothenburg. The project is financed by EU but it is a non-profitable project with the goal of a cleaner shipping industry.[173]

4.8.3.3.1 The Letter of Intent

In 2008 twelve of Sweden's biggest importers and exporters signed a letter of intent to place demands on their shipping suppliers. The twelve companies require the shipping suppliers to report their environmental data so that it could be used in a new index that was developed by the Clean Shipping Project in the end of 2008. The twelve companies were; *ABB, Astra Zeneca, Ericsson, H&M, Preem Petroleum, Skanska Sweden, SKF, Stora Enso Logistics, Tetra Laval, Vattenfall, V&S Group and Volvo Logistics.* Together they asked 77 of the world's largest shipping operators to report environmental information for the index. This was the first time an environmental index was developed to evaluate shipping companies as a whole.[174]
See Appendix E: The Letter of Intent

[171] http://www.lrqa.com/about-us/
[172] *Magnus Friberg, Technical Manager LRQA Central Europe & Nordic Area, 2010-03-10*
[173] http://www.cleanshippingproject.se/pdf/CSP_Pressrelease080626.pdf
[174] http://www.cleanshippingproject.se/pdf/CSP_Pressrelease080626.pdf

Since 2008 additionally eleven companies have joined the network – so as a total they are today 23 companies that have signed the Letter of Intent[175]:

1. ABB	2. ALFA LAVAL	3. ASTRA ZENECA
4. ERICSSON	5. FINDUS SVERIGE	6. GUNNEBO
7. H&M	8. INDISKA	9. KAPPAHL
10. LINDEX	11. NEW WAVE GROUP	12. PERSTORP
13. PREEM	14. SANDVIK MATERIALS TECHNOLOGY	
15. SCANIA	16. SKANSKA	17. SETRA GROUP
18. SKF	19. STORA ENSO LOGISTICS	20. TETRA LAVAL
21. VATTENFALL	22. VIN & SPRIT	23. VOLVO LOGISTICS

Figure 28: List of the companies that have signed the Letter of Intent

4.8.3.3.2 The Clean Shipping Index

The Clean Shipping has developed a completely new environmental index – "The Clean Shipping Index" – which major shipping customers can use during process to evaluate the environmental performance of shipping operators. The index addresses 20 different factors that can affect the environment, such as; *marine fuel, lubricates, bilge water, ballast water, antifouling paint, reformates* and *waste*. [176]

The questionnaire that Clean Shipping Project use for their index is designed based upon these 20 different factors and gives information on vessel level, it has information in terms of:

- *the addition to mean value*
- *the percentage of total*
- *the grading is based on environmental significance and on cost implementation*

The questionnaire results in a recommendation for the shipping operators on how they can strengthen their work to achieve a higher score over a time period of three years. The information that the shipping operators provide is verified by a third part, which is an important component of the index, since it becomes more credible.[177]

4.8.4 Marine Companies

To be able to find amongst all the companies working in the Marine & Diesel Industry, that are having Alfa Laval as a supplier, we contacted Mats Englund (Segment Manager in Marine & Diesel at Alfa Laval in Tumba). He told us that it is not the shipbuilders that sets the environmental demand but the shipping companies, which uses the ships for their shipping. Therefore we should focus on these sort of companies in the marine business and he gave us four company names (Wallenius, Broströms, AP Moller – Maersk Group and Odfjell) that would be worth looking deeper into it. And he says that Alfa Laval is marketing all of their core products to these Marine companies, that is; Separators and heat exchangers, and those system where these are components within.[178]

[175] http://www.cleanshippingproject.se/pdf/CSP_PP.pdf
[176] http://www.cleanshippingproject.se/pdf/CSP_Pressrelease080626.pdf
[177] http://www.cleanshippingproject.se/pdf/CSP_PP.pdf
[178] *E-mail correspondence with Mats Englund between 2010-02-25 until 2010-03-15*

4.8.4.1 Wallenius

One of Alfa Laval's customers is the shipping company Wallenius. Wallenius structured their environmental work in 1996, where as an environmental management system (EMS) was designed and the implementation process started. In 1998 where Wallenius the first shipping company, in Sweden, that could certify EMS according to ISO 14001.

They are considered to be working very well with environmental questions in their field of competence. They have worked actively for the past 15 years to reduce their environmental impact, and therefore they have long and short term goals.

Wallenius has a department working with environmental issues which is divided into different areas of responsibility, such as; departments including sea-going and how to implement new systems in the bore business. Then they also make sure that all of their employees are responsible for applying environmental thinking in their actions and therefore is environmental education mandatory for all of their employees.

When discussion environmental issues they prefer to see themselves taking following approach:

- Working with upstream solutions (since you do not solve an environmental problem by creating a new one).
- Take small steps in the right direction – you do not have to wait for the perfect solution, just start working.
- Be a forerunner and show what is possible – act not talk.
- Take a broader responsibility than just follow laws and regulations.

During the following years they:

- 1995: Obtain ISO 9002 certificate.
- 1996: Formed Environmental Committee.
- 1998: Implemented EMS and obtained ISO 14001 certificate.
- 1999 until Today: Working actively on installing new and more "environmental friendly" machines, decreased their emission, solar cells, recycling and so on.

They have some specific goals, such as:

- Decrease *carbon dioxides* by 30 percent from 2007 - 2012.
- The *sulphur* content may not exceed 1.5 per cent on average at sea and not exceed 0.2 per cent in port.
- *Nitrogen oxides* shall be reduced by 40 percent from 2008 - 2012.
- *Ballast water* treatment system shall be installed on all vessels by 2015.
- Reduce the environmental impact from *antifouling* coatings.
- Their long term goal is to minimising the quantity of chemical used onboard, this shall be done by finding other fuels than oil.[179]

[179] http://www.walleniusmarine.com/en/Sustainability-Report-2008/

Today Wallenius is providing their customers with environmental information in terms of:

- Environmental report is published on their webpage.
- All data of emissions is sent out to their customers.
- All other environmental measures, for ex ballast water treatment is reported to customers.
- They are participating in the "Clean Shipping Index".

4.8.4.2 AP Moller – Maersk Group

The A.P. Moller – Maersk Group is a global conglomerate headquartered in Copenhagen, Denmark, with offices in more than 130 countries, and with over 115,000 employees. Their revenue in 2009 was USD 48,522 billion. The Group deals with almost every aspect of container shipping: global transportation of containers by sea, planning efficient transportation for customers, and running container terminals in harbors' across the globe. Their main activities are in shipping and oil and gas exportation and production, but they own companies which are also operating in offshore services providing equipment and transportation services to the oil and gas industry. They own companies within container production and plastics manufacturing, ship building, air cargo and retail. Their shipping company is one of the worlds largest.

Sustainability Approach
They are committed to help fight against climate change and recognize that global problems require global solutions. Therefore their largest business unit and contributor to their carbon footprint, Maersk Line, have set an ambitious goal of a 20 percent reduction of CO_2 per container transported by 2017. They believe that they will reach the goal through efficient operations and technological innovation. And in 2009 Maersk Line got the distinction of being the "Sustainable Shipping Operators of the year".

Sustainability is very closely linked to the strategic and competitive needs in a business, whereas their sustainability efforts help them to cut costs and pursue new business opportunities. It benefits the business while becoming more responsible for ones actions. They believe that the main challenge for society in our time is transforming the world into low carbon economy. They want to engage with stakeholders to be able to learn, exchange views and improve understanding of their extended business environment through consultation and dialogue with relevant stakeholders.

In 2009 they joined the carbon disclosure project that is created and driven by institutional investors, in which over 2000 organizations in 66 countries around the world measure and disclose their greenhouse gas emissions and climate change strategies. In June the same year they joined more than 300 other companies in the caring for the climate initiative, a voluntary

business leadership action platform complementing the UN global compact. And in the end of 2009 they produced their very first sustainability report.[180]

Environment and Climate Change

Ship recycling offers a possibility to reuse significant parts and equipment of the ship. For example steel, aluminum and copper cables can be recycled and produced to new steel, aluminum and cables. This type of recycling can be dangerous and some prevention haven been done upon this, to make it more secure for those that are involved in the process.

They recently launched a new sludge and garbage management system that follow the ISO 14001 environmental standards. This system will give their stakeholders access to different information such as how they handle sludge and garbage in an environmental responsible ways.[181]

CO_2 has the biggest environmental impact of the A.P. Moller – Maersk Group, due to this fact did they put a greater effort on climate change and CO_2-emissions, and was selected as a top priorities in 2009. In April 2009, the Group issued its first climate change policy. They believe that by providing low carbon services to their customer it will enhance business opportunities.

Their efforts on climate change are divided into three levers:

1. Set GHG emission reduction target and their performance data is verified by a third party, and the results are openly published.
2. Work to enhance energy efficiency through innovation and operational improvements.
3. Engage with the policy setting community, advocating a sector approach to address climate change.

The traditional way to reduce NOx emissions is to make the engines less efficient which leads to an undesired side effect of greater fuel consumption and CO_2 emissions. Therefore they work actively to find new and innovative ways to reduce NOx emissions without increasing the fuel consumption and CO_2 emissions. And they wish to emphasize their activities within two areas: waste and ballast water management. Why they feel this is important is mainly due to the fact that ships carry ballast water to optimize operations, however, discharging ballast water originating in one marine environment into another can introduce unwanted organisms into a marine ecosystem, and thereby threatening the ecological balance.[182]

[180] **A.P. Moller – Maersk Group** (2009), *"Sustainability report 2009 – In a climate of change"*. A.P. Moller – Maersk Group.
[181] http://www.maersk.com/Sustainability/EnvironmentAndClimate/Pages/StrategyPolicyAndLegislation.aspx
[182] **A.P. Moller – Maersk Group** (2009), *"Sustainability report 2009 – In a climate of change"*. A.P. Moller – Maersk Group.

4.8.4.3 Broström

Broström is a logistics company for the oil and chemical industry. They mainly focus on industrial products, chemical tanker shipping and marine service and have approximately 1400 employs, all around the world. Their vision statement is the following:

"To be recognized as the most attractive logistics service provider based on performance, reliability and respect." [183]

Broström use some policies to ensure quality, safety and environmental protection and they try to continuously work to develop procedures both ashore and at sea, such as upgrading their fleet. As a result of this they created a quality policy which was an uncontrolled document in 2002, but which resulted in obtaining an ISO 9001 certificate, 2003.[184]

In January 2010, Maersk tankers acquired Broström, and by that they formed the world's leading product tanker company, with a combined fleet of approximately 275 product tanker ships. The integration of Broström was a main priority 2009 for both Broströms and Maersk Tankers, and for this reason do Broström have in general an identical sustainability approach as Maersk Tankers.[185]

Environment

The general trend of their performance is that they are improving from year to year. The main factor for this is their focused efforts to limit fuel consumption and emission levels.

Several achievements in regard to environmental performance they made in 2008/2009:

- ISO 14001 training was distributed to all vessels and got positive response.
- The US environmental compliance program was successfully completed.
- A sludge/garbage reporting system for all tankers vessels was launched in order to ensure environmentally responsible waste landing facilities in ports.
- Green passport has become the new specification on all tanker vessels except LNG carriers.
- Internal audits/surveys have been initiated.

[183] http://www.brostroms.se/Shipping-/Company-Presentation/Brostrom-in-3-minutes--a-handy-overview-of-Brostrom/

[184] http://www.brostroms.se/Shipping-/Company-Presentation/Policies--safety-quality-and-environmental-policies-at-Brostrom/ and http://www.brostroms.se/Global/Documents/Qualitypolicy.pdf

[185] Sustainability Action Plan 2010 – Broström and Maersk Tankers

The following metrics measure their performance in their sustainability strategy: Accident stats, environmental damage, audits, vetting, retention rates, sustainability compass.

- Management Commitment – Clear communication of sustainability commitment from top management to all employees.
- Supplier management – Collaborate with strategic partners and minimum sustainable requirements to suppliers.
- Integrate sustainability as a part of our business – Set high but achievable targets such as 15% relative CO_2 reduction by 2015.
- Partnerships with customers, academia and clean-tech companies – Be in the forefront with new technologies.
- Internal and external communication – Continuously enhance our communication on good sustainable performance.

The benefits from this strategy are the following:

- Cost savings and cost avoidance – save fuel, lower climate impacts and avoid compliance costs.
- Competitive edge – moving cargo more cost effective and more sustainability friendly.
- Positioning – Recognized as a sustainable leader in the tanker business
- Creates business opportunities
- Engaged employees – Sustainable development will attract and retain skilled employees.

They have introduced a new measurement system for Maersk Tankers and Broström, which include "balanced scorecards" to measure the overall performance by their Vessels, Fleet Groups and Marine Standards, and they are continuously carrying out gap analysis to assess own standards.

4.8.4.4 Odfjell

Odfjell is one of the leading companies in the global market for transportation and storage of for example; bulk liquid chemicals and oil. The company was originally set up in 1916 and has since then developed their business and became in the late 1960s a more of a tank storage business. Their strategy is to continuing on developing to become a company that can provide and act through efficient and safe operations of deep-sea and regional parcel tankers and tank terminals. They want to conduct their business to high quality, safety and environmental standards.[186]

Odfjell was one of the first companies in their field of area to receive and meet the requirements of ISO 9000 and Environmental Protection certifications. They focus their attention and priority to deal with issues concerning the Quality, Health, Safety and Environmental Protection (QHSE), and they want to make sure that their activities have minimum negative impact on the environment; that is taking low environmental risk.

[186] http://www.odfjell.com/ABOUTODFJELL/CORPORATEINFORMATION/Pages/CompanyInformation.aspx

Odfjell have an active part in both national and international regulatory and industry organizations and committees, in that way they can contribute to develop regulations that apply for all ships over the globe.

Thanks to their acquisition of large, energy-efficient ships, and sale of older ships, they have managed to reduce their CO2 emissions, and are systematically monitoring the speed of their ships and the fuel consumption. This information is later analyzed to see in what areas they need to improve to decrease their emission. Odfjell also have a modern self-polishing anti-fouling paint so that they can ensure that the smoothness of the hull is well maintained between the dry-dockings. Their tank terminals in Rotterdam, Houston and Dalian are certified in with both ISO 9001:2008 and ISO 14001:2004. [187]

4.8.5 Global Perspective

To get a broader picture of the environmental situation in the marina business, we contacted Lena Sundquist and Niclas Dahl; both of them are Market Unit Managers - Marine & Diesel at Alfa Laval in Lund. To get some names on companies in the shipping industry did they recommend us take a look at a website from the international Marine Trade Fair in Hamburg 2008 (the Hamburg-Messe). They also recommended the Marintec fair in Shanghai and Norshipping (a Marine fair in Norway).[188] From these websites did we choose 80 different shipping companies, which we were to investigate.

See Appendix F: Marine Companies with Certificates and/or ISO

[187] http://www.odfjell.com/AboutOdfjell/CorporateSocialResponsibility/Pages/OurEnvironment.aspx
[188] *E-mail correspondence with Lena Sundquist and Niclas Dahl 2010-02-23*

5. Analysis

In the following chapter we will present our analysis, which will be followed by our conclusions and finally a recommendation for Alfa Laval.

5.1 Consults, Research Organizations and Swedish Companies using EPDs

Ecowise Consulting → *Analysis*: There is a need for more information, but not necessarily EPD – some specific information from LCA or similar data to be provided.

Ragn-Sells Environment consulting AB → *Analysis*: The demand for EPDs has decreased and probably will continuing doing so.

Miljögiraff → *Analysis*: The demand for EPDs will sustain, mainly since it is considered rigid and have a high credibility.

Good Point → *Analysis*: There is no real use of EPDs, the most important information can be found in safety data blade. But one advantage with EPDs is that it can be used in the in the marketing strategy.

Raul Carlson → *Analysis*: LCA based information is hard to understand and EPDs are many times only used by the customers to fill out a box in a "checklist", but it creates an information flow and an increased environmental awareness. There is a need to have some sort of certification, but not necessarily by a third part. Easier information is requested, such as carbon footprint, it provides information that most people can understand and use in a concrete and satisfying way.

SEMCO → *Analysis:* Increased interest for them, much thanks to the climate change and to those companies that strive to make a difference and improve in the environmental area.

Swedish Environmental Research Institute (IVL) → *Analysis*: EPDs are not as popular as it was before, the new thing Climate Declarations which focus on the environmental part from the EPD – that is; it gives more specific and easier information to digest then the EPD does. No demand of an EPD from the pharmaceutical industry.

The Environmental Report → *Analysis*: One should wait to provide environmental information in terms of tools such as EPD or Carbon footprint – since these are not fully developed and thereby not exact in its information they provide to the customer and differ in terms of design in industry to industry - it can be hard to compare one to another. EPDs are not a very strong document and many times only used to fill out a check box by the companies customers, in the purchasing process. Next focus area will probably be the water issue.

ABB → *Analysis*: By providing EPDs could a company get good PR. It gives an enhanced knowledge within the company and gives a competitor advantage.

Volvo → *Analysis:* As long as the company is considered to be trustworthy and reliable there will not be any request/demand for third part certified EPD. EPDs can be used in the marketing strategy and attract more customers. They are tricky to produce due to fact that they require that the whole industry to provide one, so that those EPDs from different companies can be compared to each other.

Tetra Pak → *Analysis*: Interest of EPD have been going in waves and for the moment there is an increased interest for them, mainly thanks to the climate congress in Copenhagen 2009, and the interest will probably continue increasing. Few customers ask specifically for the EPD, usually are the questions more generally concerning information about the environment, and less complex information such as carbon- and water footprint are requested.

Atlas Copco → *Analysis*: The information in an EPD is hard to interpret therefore there is a need for more specific information that is easier for the customer to digest, such as energy effectiveness. While at the same time tools as carbon footprint is not an exact methodology and thereby uncertain to use, due to the information in one can differ a lot depending on what country or industry that has produced it.

The compilation from the conclusions above – shows how many of the 12 interviewed that believes the following statement is true:

- Hard to understand/easier environmental information is requested – such as: Carbon- and water footprint, Climate declarations and Energy Effectiveness; 7 out of 12 mentioned this during the interview
- No use of EPD; 1 out of 12
- Demand for EPD has increased; 2 out of 12
- Demand for EPD has decreased; 2 out of 12
- Demand for EPD will sustain; 1 out of 12
- Good for marketing strategy; 2 out of 12
- Can provide an competitor advantage; 1 out of 12
- Customer only use it to "check a box"; 1 out of 12
- Creates an information flow and increase the environmental awareness within the company; 2 out of 12
- No real need for third part certification; 2 out of 12
- Hard to compare one EPD from one company to other EPD from a different company; 2 out of 12

5.2 Funds in Sweden

There is an increased interest and awareness in environmental issues, but the fund managers states that a lot of people just want to have a clean conscious and thereby they do not really care what the environmental funds really contain, as long as they are classified as "Environmental".

5.3 Competitors to Alfa Laval

ITT Industries are the only one of Alfa Laval's competitor that actually mentions "Environment" in a bigger context on their homepage, but on the other hand do they not have any information if they have obtained any ISO certificates on their homepage.

Over all there is a lack of environmental information on their homepage and a will of giving any further information upon the subject. So whatever Alfa Laval is doing on the environmental aspect to add value in terms of environmental information to their external interested parties, it will still be more than their competitors are doing right now, at least what is communicated externally.

5.4 Internal Interviews

To get the right sense of the internal attitude towards EPDs within Alfa Laval and what market to investigate we decided to do some internal interviews with some of Alfa Laval's employees, that we found could be to our help.

5.4.1 Interviews with Coworkers in Lund

5.4.1.1 Interview with David Ford

David started at Alfa Laval in 1993 as a Senior VP Human Resources. In 2005 did he start working as the Corporate Social Responsibility Manager at Alfa Laval and been doing so since then.

David says that today the environmental reporting and overall process within Alfa Laval is in place, it has been developed since 2003. Much has been done on saving energy but also in the product development process in reducing the environmental impact from new products. However David believes that Alfa Laval has come to a crossroad when it comes to the environmental work and how to proceed with it. The main question is; how do we use the processes that we got in the future?

Investors have a positive attitude towards Alfa Laval's environmental work, which David sees as a good starting point. But he feels that more need to be done in communication towards both customers and employees.

Environmental information is communicated both in the annual report, on the website and in the customer magazine HERE. They got responding request for reporting environmental information so thanks to that they added a sustainability part in the annual report for 2009, David hope that this will lead to a positive response from interested parties.

The GRI-report (Global Reporting Initiative)[189] has become more comprehensive than before, and this sort of environmental approach is something that need to be spread in the company, for example in the manufacturing, production, service workshops and sales companies.

The main areas that all Alfa Laval sites need to focus on are; the water use, the energy use, hazardous- chemicals and waste. Since the bigger sites have greater capacity than the smaller once (5-15 employees) they also have to take much more under consideration in their environmental work.

When it comes to environmental communication tools, David sees that there are many obstacles that need to be taken under consideration. For example; when producing carbon footprints there are different methodologies which make it hard to compare one result to another, even within the company.

The first time David heard about EPDs was from two of his coworkers at Alfa Laval in Lund, Björn Wilhelmsson and Daniel Klint, this was in 2008 during the LCA project. He had never heard of EPDs before and did not know much about it. When considering EPDs for externally use David does not see the need of such declarations for Alfa Laval. However he does see the need for some kind of environmental statement which could come in a form of an EPD. But speaking in general terms he believes that EPDs could serve a function internally. It could help provide a common language for the sales- and marketing employees to be able to fully understand the environmental aspects within the company. It could be used as a frame work for the sales people when they are communicating environmental information to customers. But in the sense if the customers will actually need an EPD, he believes it would be more used as a check point before the actual purchase of a product.

The LCA work has been developed for some products during the past years, which is good since all parts in the value chain is under consideration and the environmental awareness in the whole organization thereby increase.

David believes that EPDs are too complex, even Alfa Laval as a company would not have the competence and knowledge to be able to handle all the information in such declaration. There are disadvantages such as the potential costs, the complexity and the document itself; one more document to keep track of and update.

Implementing EPDs at Alfa Laval would create a need of a group of people that could deal with these potential issues. However to build up this sort of competence within the company is

[189] The Global Reporting Initiative works to create conditions for transparent and reliable exchange of sustainability information. It is the world's most widely used sustainability reporting framework and is committed to its continuous improvement and application worldwide.

not only a difficult task but also quite complex. The implementation would be the tricky part, but once it is implemented it will be easier to handle. [190]

5.4.1.2 Erika Nilsson

Erika is Environmental coordinator working with environmental related issues in the Lund, and has been working for Alfa Laval for the past 2.5 years.

Erika has not seen any interest at all for EPDs. She is questioning: is the market really ready to adapt EPDs and do the customers really know that EPDs even exist? There are a lot of list to fill in and demands to fulfill, is there a place for EPDs on the list?

The "Safety Data Sheet" is today a routine and a part of the company's policies. If companies integrate environmental information in their policies, then such information will be evaluated even in the purchasing process. The purchasing routines have to be a part of the environmental management system. The grade of including environmental issues in the purchasing process often depends on the person that is responsible for the environmental management; if the person is driven then of course the integration will be made more effective and faster.

The information in an EPD is on a very high ambitious level. Today there is a gap between purchasing and EPD. Another issue related to EPDs is that it is sometimes hard to evaluate the information in the declaration and especially comparing different EPDs.

The would be a point in educating the persons involved in the purchasing process, however this is very depending on the ambition of the purchasing management.

Erika thinks that the Black and Grey list is a useful tool. Carbon footprint and water footprint are interesting. This type of environmental information is easier to evaluate compared to the EPDs. For example carbon footprint can be very interesting in a lifecycle perspective. When calculating carbon emissions from most of Alfa Laval's products the carbon footprint would most likely be minus, since most of the products results in decreased energy consumption. When customers are asking for ISO 14001 they seldom ask for details, they just want to check that we are working according to the standards and then more or less tick it on their list.

Concerning EPDs, it would be a strategically advantage in being first on the market. Such a first step would be an indicator of a serious environmental commitment within Alfa Laval. However it can be very hard to create EPDs that are easy to compare with other companies. But if we are first we have the advantages of being able to create an EPD standard within the industry. The questions are: can the EPDs be compared? What will be the differences? The value of an EPD is bigger if there are more companies making them – the more companies making EPDs for one type of product, the more valuable would the EPDs be! Erika do not know in how many years it would be of interest to provide the customers with EPDs, it depends on the maturity on the market.

[190] *Interview with David Ford 2010-05-10*

The customer demands today are very depending on the different industries. For example if the customers have an industry that have a lot of carbon emissions then of course carbon footprint are valuable. Erika does not have any experiences of customers asking for carbon footprint, water footprint or EPDs. The most common customer demand today is some kind of evaluation within Health Safety Environment (HSE).[191]

5.4.1.3 Linda Karlsson

Linda is Product Manager for Plate Heat Exchanger in Lund and has worked for Alfa Laval during the last 11 years.

Linda says that she gets requests concerning environmental decelerations, but it comes and goes. There Marine industry is the only industry that has shown an increased demand for EPDs, and she believes that this trend will continue. For this reason she believes that Alfa Laval should develop standards for their products group so that the customers can get a clear picture of the products environmental affect.

Linda says that Alfa Laval is in general good when it comes to working in for a sustainable development. Many of Alfa Laval's factories are ISO 14000 certified. Linda believes it is important that Alfa Laval start marketing themselves in a more environmental way.[192]

5.4.1.4 Björn Olsson

Björn is the Product Manager for Brazed Plate Heat Exchanger in Lund and has worked for Alfa Laval for the past 12 years.

Concerning the future within environmental information such as EPDs Björn believes that the demand for such declarations will increase in the future. It will be an advantage for Alfa Laval to be able to give EPDs or other environmental related documents when it will happen.

It might just be a checkpoint for the customers, if a supplier has EPDs or not. The customers might not even use the information; they just want to know that they are able to get it.

Björn does not believe that a third part certification is necessary, especially since the demand for EPDs today is rather small and the customers asking for such declarations do not evaluate them too high. During the last five years Björn have sent the EPD to around 10 customers. In relation to the total amount of customers of Alfa Laval that is an extremely small percent.

The customers that have been asking for EPDs are:
- Building trade companies, for example Sunda Hus AB. Building companies building environmental friendly houses.
- Heat pump companies. The companies that have an environmental profile.
- The customers that are working with environmental policies, especially within industries where they are very demanding in what they put into their products, so that no inappropriate substances are used.

[191] *Interview with Erika Nilsson 2010-04-14*
[192] *Interview with Linda Karlsson 2010-03-01*

Heat exchangers are environmental neutral, they only consume little or no energy, there are no emissions, no chemicals etcetera.

5.4.1.5 Johan Huber

Johan is working in the Applications & Sales Management in Lund, and have been working for Alfa Laval during the past 10 years.

Johan says that they get request from Alfa Laval's shipyards customers concerning Green Passport (inventory of potentially hazardous material). He believes that such demand has most definitely increased due to the fact of IMOs suggestions on new guidelines.

Johan interpret that it is the shipyards together with the supplier that creates the Green Passport and they decide the amount hazardous material a product can contain. If Alfa Laval decides and believes that their Plate Heat Exchanger application does not contain any dangerous components should that be enough to certify this with a document that specifies what materials that have been used and that those materials are completely un-harmful.[193]

5.4.2 Interviews with Coworkers in Tumba

5.4.2.1 Conny Thorsson

Conny is working as the Market Unit Manager with Life Science Technology in Tumba, and have been working for Alfa Laval since 1977. He works mainly with establishing contacts with the sales companies which are working towards the customers.

Conny do not know of any customer demands or questions for EPDs. The only customer asking indirectly is Novozymes, they ask about ethics, but he says that Marine and Diesel have gotten some questions for EPDs and recommend us to look further into this.[194]

Conny also asked the people working for him if they have experienced any demand on EPDs within the Biopharmaceutical industry. He also send e-mail to the sales companies in USA, Japan, Germany, the Nordic countries and France, to see if they have heard anything about the subject. The reply he got was that no one had really heard about it, and had never gotten any requests for an EPD.

He also recommended us to look further into the Food and Drug Administration (FDA), since they inspect all production sites in USA and all productions of pharmaceuticals that are exported to the USA. FDA is one of the most demanding regulatory organizations within the pharmaceutical industry.[195]

[193] *Interview with Johan Huber 2010-02-26*
[194] *Interview with Conny Thorsson 2010-02-16*
[195] *Interview with Conny Thorsson 2010-03-03*

5.4.2.2 Henrik Larsson

Henrik is working with Life Science Technology in Tumba and has worked for Alfa Laval for the past 8 years.

Henrik says it would be easier for Alfa Laval to produce EPDs for products that are standardized, not made for one single customer after the customers' needs. Questions to be asked during the investigation: Where lays the value in an EPD? Is there any financial advantages? We need to find factors that the customers evaluate and are willing to pay for.

He recommended us to get in touch with the sales companies – they have direct contact with the customers and report to the segment managers at Alfa Laval and he also says that Marine and Diesel are big segments that might be interested in EPDs.

5.4.3 Interviews with Coworkers in Kolding

During our time at Alfa Laval in Kolding, the 3 and 4 of March 2010, we got the chance to do interviews with following four people in the matrix below:

Namn	Position	Age and years of experience within Alfa Laval	Attitude towards EPD
Sanna Bernhardt	Portfolio manager; tubes fitting & Basic Valves	Age ~ 30 years, 6-8 years at Alfa	Have never heard of any customer demands on EPDs. Do not know much about it. Do not think there is a need today but there might be in the future, in maybe 5-10 years. Do not think the customers are willing to pay for such information.
Peder Fonnesbaek	Project Management	35-40 years old. ~ 3,5 years at Alfa and 13 years at the competitors	Positive attitude towards EPDs and believe that in the future (5-10 years) there will be a demand for it. It might even be a matter of course for the customers, something that they expect to get like a standard document. He does not think the customers will be willing to pay for it.
Rikke Byskov	R&D manager	35-40 years 4 years at Alfa (since 2006)	Positive towards LCA. Have never experienced any demands on EPDs. Does only work internally (with R&D), since she do not have any direct contact with customers it is harder for her to know about their demands. Believes that EPDs will be interesting in about 5 or more likely 10 years.
Preben Esbensen	R&D; Time to market. Automation	~ 50 + 26 years at Alfa	Doubtful about the subject. Do not think there is a value, for the customers, in the LCA. The only reason for a future need of EPDs would be if there is a law about it.

Figure 29: Summary of the interviews in Kolding

There are no directly demands on EPDs from customers, but the coworkers at Alfa Laval Kolding think there will be in a future of about 5-10years.

There are two main reasons for the customers to ask for environmental information such as EPDs:

1. ***Economical benefits*** *– the company are able to gain a profit from the information.*
2. ***Laws and regulations*** *– the company have to get such information to be able to follow the law.*

According to Preben the absolutely main reason for the customers to demand EPDs is laws and government authorities. And the governments are the main pressure behind the demand.

A third part certification is not necessary, the customers trust Alfa Laval's words, but the information have to be comparable, there has to be some kind of standard.

5.4.4 Internal Interviews Analysis

The co-workers at Alfa Laval seem to have a positive picture of how Alfa Laval is dealing with environmental issue. Many of them bring out the importance that they need to start marketing themselves in a more environmental way and that it is still much to be done, such as putting a greater focus on water- and energy use, hazardous- chemicals and waste.

When discussing EPD it differ allot from whom we talk to, to how long they been in the company. At first we got the impression that those that had worked for Alfa Laval a longer time were less positive towards EPDs compared to those who more recently started at the company. However, this showed to be a wrong assumption; those that are more involved in the purchasing and sales process believe more in EPDs and that there is a future market for them.

Some of the co-workers believe that the demand for EPDs will increase in the future, (5-10 years), mainly due to regulations and governmental authorities. Alfa Laval should develop standards for the products group so that the customers in that way can get a clear picture of the products environmental affect.

EPDs can be helpful by provide a common language for sales- and marketing employees and in that way they can fully understand the environmental aspects within the company. And by internally understand how Alfa Laval is dealing with environmental issues will they be able to communicate it externally to their customers.

A few of the interviewed co-workers at Alfa Laval believe that EPDs is not the right way to communicate environmental information externally. But they do believe that Alfa Laval needs to have some sort environmental statement, which could be an EPD or something like vise. Some persons are even questioning if the market is mature enough to adapt EPDs. The question is if the customers really know what an EPD is, and that such declarations even exist. When asking the coworkers of Alfa Laval most of them believe that the customers are not willing to pay for an EPD, since most of them believe that EPDs would be more used as a check point than anything else.

EPDs are also considered rather complex, and thereby there is a lack of competence and knowledge to be able to handle all the information in such declaration. There are disadvantages such as the potential costs, the complexity and the document itself; one more document to keep track of and update.

Another issue brought to light from the interviews is that the information in an EPD sometimes is hard to evaluate and that there are some difficulties when comparing different EPDs, due to the fact that there are different methodologies to create an EPD which make it hard to compare one result to another, even within the same company. The same problem occurs when producing carbon- and water footprints (tools many co-workers recommend for Alfa Laval to produce), however; these tools are less hard to interpret and understand then an EPD.

5.5 Interviews with Alfa Laval's Sales Companies

We got some recommendations and suggestions from co-workers at Alfa Laval to get in touch with the sales companies. The reason to this is that the sales companies have direct contact with the customers and report to the segment managers at Alfa Laval. The sales companies might bring another perspective on environmental issues from the customers' perspective by helping us answering some questions.

Alfa Laval has a customer orientated organization. The main sale channel is through the sales companies. The sales companies are the main communicators to the customers, especially in the purchasing process. If a customer has any special requirement or demand, it will be communicated to the sales companies. If the sales persons do not have the knowledge to answer the requirement they report it to the sales manager at the site. Each sales manager report to Alfa Laval's segments managers to make sure to be able to respond to the requirement. Sometimes such communication is not made in an effective way and sometimes the report processes between the different parties are not the most optimal. To be able to find out if there are any environmental demands and to get a knowledge about the sales managers opinions on environmental information we decided to interview each sales manager. The questionnaire consisted of seven questions, and it was sent to totally to 34 sales managers. Finally, 29 sales managers had sent us the answers.

See Appendix G: Questions for the Sales Companies

The questions asked to the managing directors at the sales companies are

1. *Which one of your customer segments do you believe have the highest demand when it comes to environmental information about our company (for example do we have ISO 14001 etcetera)?*
2. *Have any of your customers asked for information regarding the environmental performance of Alfa Laval's products? If "Yes"; which customers are the most demanding?*
3. *Does it seem like the customers consider the environmental information when they choose a product? How?*
4. *Do you think the demands for environmental information about Alfa Laval and our products will increase in the future?*
5. *If Alfa Laval was to provide more environmental information would this give us any competitive advantage?*

6. *What environmental information do you believe would be most useful for your sales company (in the sales process)?*
7. *What can the Environmental Council at Alfa Laval help you to do in order to meet the customer demands on environmental performance?*

Number	Name	Country
1	Vit Pekarek	Bulgaria
2	Uri Keynan	Israel
3	Reginaldo Macedo	Brazil
4	Cibele David	Chile
5	Ashley David	Canada
6	Daniel Ng	Malaysia
7	Goran Hedbys	Italy
8	Alexander Perekin	Russia
9	Tayfun Aydemir Ahsen Findik	Turkey
10	Patricio Lezica	Argentina
11	Peter Carlberg	Sweden
12	Rico Katalbas	Philippines
13	Joakim Vilson	Germany
14	Bosco Cheuk Sandy Pratiwi	Singapore
15	Jan Hedemann	Australia
16	Jose Hernanz	India
17	Andre Tjhai	Indonesia
18	Gennadiy Rudenko	Ukraine
19	Anders Pentelius	Japan *1. F&P= Food&Pharma,* *2. Marine,* *3. Process* *4. Industrial*
20	Chor Hiong Tan	Thailand
21	Patrick Roggemans	Belgium
22	Gerardo Hernandez	Mexico
23	Malgorzata Moczynska	Poland & Baltic States
24	Marios Petrou	Dubai
25	Cristian Lazar	Romania
26	Gyula Szekeres	Hungary
27	Alessandro Terenghi	US
28	Casper Andersen	Denmark
29	Richard Kelly / Steve Twinn Andrew Panting (QSHE Manager) Ben Green (Segment Manager – Sanitary) Wilfred Pereira Key Account Manager, Marine & Diesel Power/OEM Engine New Sales	United Kingdom

Figure 30: Name of Sales Managers and their country

5.5.1 Question 1

Which one of your customer segments do you believe have the highest demand when it comes to environmental information about our company (for example do we have ISO 14001 etcetera)?

Analysis; The segments that are mentioned in the answers are:

Organisation map and responses					
Division	**Segment**		**Market Unit**	**MU Count**	**seg. Total**
Equipment Division	Industrial Equipment	EIE	None mentioned	1	
Equipment Division	Industrial Equipment	EIE	Comfort	2	
Equipment Division	Industrial Equipment	EIE	Refrigeration	2	
Equipment Division	Industrial Equipment	EIE	Fluid & utility		
Equipment Division	Industrial Equipment	EIE	Engine & Transport	2	
Equipment Division	Industrial Equipment	EIE	Engine Filter (Moatti)		7
Equipment Division	OEM (Original Equipment Manufacture)	EOM		3	3
Equipment Division	Sanitary Equipment	ESE		1	1
Equipment Division	Marine & diesel	EMD		6	6
Equipment Division	Parts & service	EPS			
Process Technology Division	Energy & Environment	PEE	None mentioned	3	
Process Technology Division	Energy & Environment	PEE	Power	2	
Process Technology Division	Energy & Environment	PEE	Oil and Gas	9	
Process Technology Division	Energy & Environment	PEE	Environment	1	15
Process Technology Division	Food Technology	PFT	None mentioned	3	
Process Technology Division	Food Technology	PFT	Brewery	2	
Process Technology Division	Food Technology	PFT	Vegetable Oil Tech.		
Process Technology Division	Food Technology	PFT	Beverages, Viscous Food..		
Process Technology Division	Food Technology	PFT	Olive Oil		5
Process Technology Division	Life Science	PLS		1	1
Process Technology Division	Process Industry	PPI	None mentioned	3	
Process Technology Division	Process Industry	PPI	Inorganics, Metals, paper	1	
Process Technology Division	Process Industry	PPI	Natural Resources	3	
Process Technology Division	Process Industry	PPI	Petrochemicals	3	
Process Technology Division	Process Industry	PPI	Refinery	2	
Process Technology Division	Process Industry	PPI	Evaporation and Condensation		12
Process Technology Division	Parts & Service	PPS			
Total count:					**50**

The two most mentioned segments are:

1. Process Technology Division – Energy and environment : PEE
2. Process Technology Division – Process Industry : PPI

Among all segments there are especially two market units that are mentioned most times:

1. Oil and Gas (PEE)
2. Marine and Diesel (EMD)

Except for the segments mentioned, there are a few other facts that are stated. More than five managers have answered that ***bigger, stock listed*** and ***international companies*** are more demanding when it comes to environmental information.

The most mentioned standard in the answers is the ISO 14001 standards.

The companies that are mentioned are:		
Petrobras	Repsol YPF (O&G Company)	Hyundai Heavy Industries (HHI)
Samsung Heavy Industries (SHI)	Daewoo Shipbuilding & Marine Engineering (DSME)	Daikin
Shinwa	Volswagen	Mærsk
Mitsubishi Electric	Novozymes	Statoil

5.5.2 Question 2

Have any of your customers asked for information regarding the environmental performance of Alfa Laval's products? If "Yes"; which customers are the most demanding?

Analysis

	Yes	**No**	**Unsure/ indistingt answers**	**No answer**	**Total**
Number of answers	16	10	2	1	29
Percent of total	55 %	35 %	7 %	3 %	100 %

55 percent of the managers know that there have been customers asking for environmental information. 35 percent have not experienced customers asking for such information. Some of the managers answering "no yet" are stating that such demand does not exist today but there will probably be a demand in the future; the answer is indicating that they believe there is potential that there will be a §demand in the future. Two of the sales managers have given indistinct answers, we cannot tell from the answers if any customers actually have been asking

for environmental information directly. The customers care about environmental issues since they are asking for energy consumption, but the question is if they do it because of the fact that they really do care about the environment or if they just want to save money.

The customers (mentioned in question number two in the questionnaire) that have been asking for the environmental performance of the products are within the segments:

- *Some major **OEM's** (air condition) are occasionally demanding it for projects.*
- ***Ship owners** because of the IMO rules*
- ***Oil and gas***
- *Some **distilleries***
- *Steel producers have put the questions about AL products in terms of CO2 reduction*
- *The only customer asking for this info is **Repsol YPF** (Company developing energy solutions)*
- *Within the **EMD** segment; the BIG 3 **shipyards**, eg. Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI) and Daewoo Shipbuilding & Marine Engineering (DSME)*
- *Offshore clients. Owners & Operators of **drilling production** rig will need very concise information on our oily water separator's discharge overboard, less than 15ppm according to MARPOL.*
- ***Mineral processing, Marine, Oil & Gas** industries are most likely to focus on environmental issues.*
- *For products such as **Ecostream and PureBallast in the marine industry** customers will be more specific.*
- ***Oil and Gas***
- ***Petrochemical***

There are two main reasons for customers to ask for environmental information:

1. Legislations and rules (example REACH, MARPOL, IMO rules)
2. Because they know that it will decrease their costs (for example by decreased energy consumption) and other reasons that are related to cost savings and economy.

Future expectations:
One of the sales managers is mentioning the O&G & Marine customers to be most potential of being demanding in the future.

5.5.3 Question 3

Does it seem like the customers consider the environmental information when they choose a product? How?

Analysis

	Yes	No	Total
Number of answers	13	16	29
Percent of total	45 %	55 %	100 %

When answering "Yes" the answers are often combined with a comment. The most common comments when answering yes are:
- Depending on the segment/industry
- Only if they are forced by rules or legislation
- Only if it results in cost savings
- Only when everything else is equal

45 percent of the sales companies believe that the customers are evaluating environmental information when they choose a product.

55 percent believes that they do not evaluate environmental information when they choose a product.

The main reason for customers to consider environmental information when they choose a product is if they can gain any profit from choosing a more environmental friendly product. Such a gain from choosing an environmental friendly product can for example be:

- The customer can get a lower energy consumption , which results in:
  → lower cost

- As a result of a more environmental friendly production the customers business can get a lower environmental impact in total, which can be used for:
  → Marketing
  → Certificates (the customer can fulfill demands so that they can get certificates such as ISO 14001)
  → Reaching internal and external goals, such as goals within the company and goals set by external parties, for example the Kyoto Protocol
  → Being able to follow rules and regulations. If there are greater limitations, laws and regulations, concerning environmental issues within a business the customer have to adapt to the limitations.

- Being a responsible part of the sustainable development, which can make the company more attractive as:
  → Employer – The company will attract more competent people.
  → Distributor – The company will attract more customers.
  → Customer – If there are many different interest parties in a special asset the company can get a better position compared to other interest parties if they have a green profile.
  → And towards many other parties.

5.5.4 Question 4

Do you think the demands for environmental information about Alfa Laval and our products will increase in the future?

Analysis

	Yes	Maybe	No	Total
Number of answers	23	3	3	29
Percent of total	80%	10%	10%	100%

Out of the 29 answers 23, which is 80 percent of the sales managers believe that the demand for environmental information will increase, in the future. Only three sales managers, 10 percent of the answers have answered that they do not believe that the demand will increase. These three managers are located in the Philippines, Romania and Mexico. 10 percent do not know.

There is a clear believe among the sales managers that environmental information will be more important in the future. This statement is according to the general opinion that we have gotten through the interviews with both external and internal parties.

5.5.5 Question 5

If Alfa Laval was to provide more environmental information would this give us any competitive advantage?

Analysis

	Yes	Not now, but in the future	No	Total
Number of answers	16	7	6	29
Percent of total	55%	24%	21%	100%

Out of the 29 answers 79 percent is positive towards the fact that environmental information can generate competitive advantages. Out of these persons, the ***55 percent*** is more or less convinced that it would gain competitive advantages ***today***. The rest, ***24 percent*** believes that such information will be useful in matter of competitiveness in the ***future***.

Some of them believe that environmental information might gain competitive advantages, but it is depending on different circumstances, such as the situation and the customer.

Someone believes that such information can be useful for bigger companies, worldwide, but not for smaller more local companies. The fact that environmental information will result in competitive advantage but only depending on the size of the companies goes along with the fact that bigger/international companies have the highest demands when it comes to environmental information.

The interest for environmental information and the advantages from adding such information into the purchasing process is according to the answers depending on the size of the company; the bigger company the bigger advantage in environmental information. Smaller companies do not have the ability to care about the environment as much as the bigger ones, since the profit and advantages from doing it are not as big. Smaller companies are often more limited since they do not have a lot money and as a result of that they cannot care about the environment as much as the price or other more important factors when it comes to saving money.

A few answers are stating that environmental information can strengthen the brand and the image of Alfa Laval, and that it can be helpful when promoting different products. The competitive advantages in that case would be a stronger brand compared to the competitors.

If legislation about environment would force the customers to evaluate such information, then it will be an advantage for Alfa Laval. If Alfa Laval can communicate the right information to fulfill the demands that such legislation would imply, and the competitors cannot, then the customers will have to choose Alfa Laval instead of the competitors. However an advantage like this is often eliminated as soon as the competitors find out what to do in order to meet the demands, but it can be a clear advantage for Alfa Laval in being first.

Three out of 29 sales managers 6 of them (21 percent) believe that it will not gain any competitive advantages for AL. One of the six persons believes that the customers evaluate the performance of the product and do not evaluate environmental information of the company. However for this answer it is possible that the person answering did not understand that the environmental information will be concerning the product, not Alfa Laval as a company. The sales manager of the Philippines does not believe that it will result in competitive advantages, at least not in the Philippines. What if he/she would think more globally, would the answer be different? Some of the “no-answers” are mentioning something like “Not in the near future”. This could be an indication that the person believes that it will be, one day, but much further in the future.

5.5.6 Question 6

What environmental information do you believe would be most useful for your sales company (in the sales process)?

Analysis

Environmental information believed to be most useful for the sales companies	**Number of persons mentioning it**
Reduction of: - Energy - Emissions for example CO_2	9
Certification of ISO 14000 series or other society.	6
Information about how Alfa Laval is working with environmental related issues and what Alfa Laval is doing to protect the environment, both in Service centers and **with**in **the** production **processes**.	4
Information highlighting the environmental benefits when choosing AL products. Statistics about the environmental performance of the products.	3
Link between environmental information and profit. Savings in monetary terms	3
Recycled material and waste treatment	3
Information about development of new environmental products	2
Carbon Footprint	1
Information about safety	1
General marketing get the right profile	1
Proven case studies from independent research firms or governmental agencies, certifying Alfa Laval's performance and environmental aspects about the products.	1
Savings compared to competitors	1

Information that the sales managers believe are valuable for the customers are:

- Profit related:
  A link between environment and gained profit.
  Cost savings in monetary terms.
  Increase the customer's income and reduce their costs of today.
- Marketing and strengthen brand; communicate information about Alfa Laval's work related to environment and the corporate image that Alfa Laval concern about environmental issues.
- Product focus: Highlighting the unique environmental advantage of Alfa Laval's products.
- Official approval: need of accreditation and certificate by some recognized environmental society/group.
- Environmental effects made by the products:
  Energy savings. How the customers can reduce their energy consumption.
  Reduction of the emissions. How the customers can reduce their emissions.
  Reduction of the water consumption
- Comparison: Carbon footprint to be able to compare Alfa Laval's products to the competitors.
- Recycle: Percentage of recycled residues and other facts related to the recycle of the products.
- Safety of the products

The tools that can be used to communicate the information that the sales managers believe are the most important are for example:

- Carbon Footprint – to show the reduction of carbon emissions.
- Climate Declarations – a declaration focusing on the climate and the emissions that affect the climate.

However there are a lot of tools missing, the tools do not exist on the market. We believe that there is a need for tools that can communicate:

- The link between environmental friendliness and cost savings.
- Highlight the environmental benefits compared to other products and products that are exactly the same but from different producers. Then highlight the economical benefits from the different products.
- A waste and recycling guide. Both if there are any recycled material in the product but also how to treat the product when its' lifetime ends.

Other environmental information that can be communicated to the customers but not necessary have to be communicated in an environmental communication tools is:

- The general environmental work within Alfa Laval. How Alfa Laval is working with environmental related issues, what Alfa Laval is doing to protect the environment and work in a sustainable way. Such information can for example be communicated through

a blog, like the CSR manager, Bengt Mattsson, at Pfizer is doing.[196]
The website is an important tool in the communication process to external parties, but it can be difficult to update the website often. To give the impression of the continuous environmental work done within Alfa Laval a blog would be better.

5.5.7 Question 7

What can the Environmental Council at Alfa Laval help you to do in order to meet the customer demands on environmental performance?

Analysis

What the environmental council can do in order to help the sales companies	Nbr of persons
Nothing/ do not know	10
Information and resources for best practice.	
Assist in certification process	
Design environmental protection logo and print in brochures	
Interesting case stories Case stories attached to new products Proven case stories from independent research parties	3
Provide the Sales Companies with information about - the economical affects of environmental data - the latest actions taken at production points - what Alfa Laval is doing related to environment	6
Provide the Sales Companies with information that can be directly forwarded to the customers. Showing Alfa Laval as a green company. Information sheets and power point presentation slides that can be attached to presentations for customers. For example information about environmental friendly materials and chemicals, workplace practice and procedures in the manufacturing.	2
Put more information on Alfa Laval's website	
The green profile shall be an integrated part of the sales material	
Training material for internal use. Highlighting the positive environmental impact of the products.	
Helpdesk or someone to ask - Easier to find the speaking partner.	
Assist in providing, preparation and coordination of environmental information.	
Assist in the risk assessment.	
Brand Alfa Laval around the environmental issues related to: saving energy and reducing emissions. Environmental publicity and PR. More press activity.	2
Regular industry feedback about environmental legislation and regulations.	2
Assist with paper works and documentations.	

[196] www.ansvarsblogg.se

According to the answers there seems to be:

- Quite bad knowledge, among the sales companies, concerning the environmental work done within Alfa Laval. The sales managers do not have enough information and knowledge to be able to communicate environmental information to the customers. Maybe it is a point in getting the sales managers more committed in the environmental work and keep them updated on the environmental work within the company. This can be done by both by educations and information posted on the internal net or through email.
- There is no communication towards the customers today, the only way they communicate the environmental friendliness in Alfa Laval's products and procedures is through the webpage, the annual report, sustainability report and in the customer magazine HERE . This means that if the customer wants to get any environmental information from Alfa Laval they have to look at the webpage.
- There seems to be some problems to find the right person to ask questions about environmental information, and a rather low knowledge about environmental issues related to Alfa Laval's business. Some of the sales managers are asking for environmental information such as brochure to provide the customers with, others are asking for internally education within the subject. We believe that internal education can be a great way to get a good base so that they can be able to communicate environmental information externally from the sales companies. The sales managers or persons are the ones that are facing the customers and therefore they shall also be aware of environmental issues and how Alfa Laval is working with the environment. Lack of knowledge can result in less interest in environmental related issues; which makes it hard to communicate the information to the customers. If the sales managers have better knowledge about environmental aspects there will be a smaller need for a helpdesk. However there might be a point in providing them with such a helpdesk or anything close to it, so that they more easily and quick can communicate the right information to the customers asking for it.
- Another way to make the customers aware of the advantages related to environmental friendliness is to provide them with success stories and examples of best practice. If the environmental council can provide the sales managers with such success stories they can forward it to the customers.
- One of the managers is suggesting an environmental logo to print in all the Alfa Laval folders. This is not a bad idea. We believe that the Green Processes and Green Solutions can be made stronger when providing them with a logo. The logo will be a logo designed for Alfa Laval and used when communicating environmental information. (It will not be a Type I declaration; environmental labeling.)
  Such logo can also be used when producing Type II declarations. A logotype is probably more easily adapted and better in the branding of a green company, than just the words: Green Processes and Green Solutions.

For example: 

To get a stronger "green"-image Alfa Laval can not only work more on the webpage, they also need set up a better profile and strengthen their green branding.

The layout of the sustainability webpage[197] is according to us, quite uninteresting. Look at for example at NovoZymes sustainability website[198]. This website really gives an impression of environmental friendliness.
On Alfa Laval's webpage there are three pages concerning environment:
- Green processes
- Green operations
- Greenhouse gas effect
All of them can be made more attractive for the readers.

- One sales manager is expressing a need for assistant in certification processes. This might be something to look closer at. Are there any sales centers that will gain a profit from having a certification? Are there certifications that are valued in different ways in different countries? ISO certification might not be the best choice for all centers.

The way for the Environmental Council to provide the Sales Companies with environmental related information, expressed in the answers are:

- The economical affects of environmental data. This shall be presented to the sales companies so that they can provide their customers with such information.
  →Environmental friendliness expressed in profit and gained value.
- Give the managers and sales companies a chance to see the big picture and be part of the environmental work within Alfa Laval by providing them with updates on the latest actions taken at productions points and other work made by the Environmental Council. If they have the big picture they will be able to better communicate it to the customers.
- The environmental and green profile of Alfa Laval shall be integrated in the sales material and not something extra. The Environmental Council can make sure there are ways for the sales persons to provide the customers with environmental information, this is best done by giving them information that they can directly forward to the customers.
- According to us the communication can be made both close to the customers but also further from them
  - It can be done in the sales process, during the actual purchasing point, when the sales persons already have contact with the customers. This is most easily made by giving them the information directly, for example through a brochure.
  - When the communication is made on a further distance for example when the

[197] http://www.alfalaval.com/about-us/sustainability/pages/sustainability.aspx
[198] http://www.novozymes.com/en/MainStructure/Sustainability/

customers make their own evaluation of the products, it is important to provide the right information on the website.

- Provide the sales companies both with information on the environmental work within Alfa Laval but also make it easier for them to highlight such information to the customers.
- Provide them with material that is highlighting the positive environmental impact of the product range.

Comments from one sales manager:

- Anders Pentelius, Japan:
  *"Environmental concerns are increased in all sectors, however there are differences among the customer groups. All industries considered to be "**polluting**" have in general a higher demand from their customers which is transferred to their suppliers (like Alfa Laval) hence the questionnaire was shared with those differences in mind. …*
  *The answers are rather similar across the segments. **Marine** have the most outspoken demands and I believe this refers to the specific of the business, Ships driven by diesel engines and the risk of pollution both to the air and the water. The answers are only slightly edited by me in order not to dilute the message from the different customer categories. It **looks also that we have to make more information about the environment council about the work and the role** (Env. council was established 2006 by Alfa Laval to promote green operations)."*

5.5.8 Sales Companies and EPDs

To relate the answers from the sales companies to the possible customer demand for EPDs we, first of all, investigate if any of the 29 sales managers are mentioning EPD spontaneously; No one is mentioning EPDs in any kind of way. The closest answer to EPDs is one sales manager's wish for: *"Environmental data starting from production stage till to the delivery of product to end-user. Emission reducement, minimum waste; energy recovery issues will be more powerful tools."*

Most of the sales manager believes that there would be a value in communicating environmental information related to the products and Alfa Laval, to the customers but they do not know or mention how this can be done. We believe that if they had more knowledge within the subject they would use it as a argument in the sales process. Alfa Laval can be able to educate their customers about the environmental benefits from Alfa Laval's products, but first the persons maintaining the customer relationships have to be prepared and willing to do so.

5.6 Interviewing Customers

5.6.1 Biopharmaceutical Industry

The Biopharmaceutical industry is facing a lot of rules and regulations. In the Biopharmaceutical documentation is very important and they often ask for a lot of information in the purchasing process. After interviewing two global companies within this industry we were able to summarize what they had said, which leads us to an analysis for the industry.

5.6.1.1 Pfizer

See Appendix H: Interview Pfizer

The pharmaceutical industry is pressured by legislation, rules and regulations. After all, when it comes to it, they are producing preparations that are used to cure illness, prevent diseases and favor healthiness. Using such preparations in the wrong way might be dangerous and even result in people being hurt or dying. These facts makes some of the processes harder for the pharmaceutical industry; for example in the purchasing process and in within marketing. They are not allowed to market the drugs, since the drugs are suppose to be used only when they are needed. Environmental information is harder, if not impossible, to use within marketing. The demand on the exactitude within the production also makes it harder for the pharmaceutical industry to evaluate environmental information when purchasing. Since the production processes have to be made in certain ways and there are only small margins the demands on the performance of the products are extremely high.

When pharmaceuticals are sold in Sweden, the pharmacy has to give the customer the pharmaceutical with the lowest price, independent on the producer. The customer can of course choose another drug but this is not very common. When you are ill you want to get your medicine, no matter of the brand or producer. There is no such thing as rejecting medicine because it is not environmental friendly. Environmental information can be hard to use within the pharmaceutical industry.

When mentioning EPDs, the coworkers at Pfizer did not have any greater knowledge about it. Both of them believed that it would not be important in the purchasing process and the only reason for them to get an EPD from Alfa Laval is curiosity.

Even if they do not have any interest in EPDs today there seems to be believes that environmental information will be more evaluated in the future. As mentioned in the interview if can be an argument in the selling process when the pharmaceutical industry in the low-wage countries becomes larger. Then it will be hard to have the price as the most important sell argument, and other facts will be more important – maybe environmental information. When the market becomes more adaptable and open to environmental information such information will also be more valuable.

We do not see a need for EPDs within the pharmaceutical industry today. They are not ready for such declarations yet since they do not know how to use it and do not see the value of it. The information in an EPD is probably too complex to adapt, especially for the purchasers.

5.6.1.2 Novozymes

See Appendix I: Interview Novozymes

Novozymes have a rather strong green profile. They are selling products that can be used to decrease the environmental effect of their customer's products, which makes the environmental information important. As Lars-Gunnar said during the interview: "Novozymes have to educate their customers about environmental"

Especially interesting about Novozymes is the evaluation/ranking system they use when choosing suppliers. When evaluating a supplier they have five environmental checkpoints that they look at; Is/does the supplier:
1. documenting their impact on the environment.
2. following the environmental rules and regulations within the industry.
3. have any type of eco-labeling.
4. make Life Cycle Analysis (LCA) on their products.
5. sure that they do not contaminate the groundwater and the ecosystem.

The most interesting out of these, and that can be related to EPDs, is that they evaluate suppliers on the fact if they do LCA or not.

At the moment they do not see the need and value in an EPD, but they do believe that they will in the close future.

5.6.2 Analysis; Interviewing the Biopharmaceutical Industry

Priorities in the purchasing process

The priorities in the purchasing process today are the same for the two pharmaceutical companies; the most evaluated fact is Performance. Then Price, Length of life and Environmental friendliness during usage. Least evaluated is if the product is recyclable or not. The priorities in five years differ between the companies; but the most evaluated is still the performance, then Price and Length of life. Environmental friendliness and Recyclable is still priority 4 and five. In ten years there seems to be more evaluation within the environmental friendliness (ranked as second and third priority). Performance is still the top priority. During the interview the representatives from the two companies experienced it harder to answer this question (Question 1) when considering the priorities later in the future.

The conclusion from this is that the two biopharmaceutical companies do believe that environmental issues will be more prioritized in the future and in ten years the companies will be more involved in the environment. The most evaluated environmental tool is the ISO standards. When making an investment decision today, both companies are asking their suppliers if they have such certification. Then Carbon footprint and Black and Grey list are ranked as number two. Then LCA and EPD is ranked is number three.

Evaluation of environmental communication tools
Novozymes meant that if the customers have ISO certification, then they shall have been thinking of such things as the black and grey list. But Carbon Footprint and LCA is not involved in the ISO standards and for that reason they have given them priority 2 and 3. In general when looking at the answers they seem to evaluate the more focused and narrow tools (focusing on only one environmental issue) more than the wider ones (LCA and EPD that are focusing on the whole lifecycle).

Evaluation of declarations, in relation to certification
When choosing between environmental declarations both of the companies evaluate the third part certificated declaration with summarized information the most. The secondly evaluated declaration is the one that is consisting of 2-3 pages with no third part certification. Least evaluated is the declaration of 20-50 pages.

The conclusion of this is that they evaluate a third part certification and prefer summarized information. A long report about the product would not be interesting at all.

Evaluation of declarations, in relation to price and certification
When the third part certificated declaration with summarized information have a price Pfizer is not interested in any declaration at all, but Novozymes would be interested in the one that is consisting of 2-3 pages, but only if it is made by a well known and big company.

Third part certification
Pfizer demands a third part certification but Novozymes are more flexible when it comes to that point. If the company producing the EPD is big, well known and has a good reputation then such document would be reliable even without a certification.

Evaluation of declarations from Alfa Laval, in relation to price and certification
Novozymes, would not like to pay for the declaration, even if that means that a third part certification is included. They trust in Alfa Laval as a company and would evaluate a declaration from them.

Pfizer do not want to pay for the declaration and they want to have a third part certification, so none of the suggestions fulfill their requests.

5.6.3 Analysis; Biopharmaceutical Industry

Many of the pharmaceutical industries do consider the environment in their processes and are working towards a sustainable development. They evaluate environmental information from their suppliers, as long as it is understandable, concrete and rather short. Long and complicated documents of information are nothing that they wish for. Most of the companies do not seem to be mature enough to adapt EPDs and the information within such documents. They do not have any or much experience of EPDs from before and do not work with it in their organization.

The pharmaceutical companies seems to put an effort when it comes to green branding. So they do by, for example, well-made homepages with an environmental approach and sustainability blog.

In general among the companies, the future assumption seems to be that environmental aspects will play a bigger role in the future, both during the purchasing and the sales process.When considering a supplier's environmental commitment, ISO standards are most important. The attitude is that if a supplier has got an ISO certificate, then they care about the environment in their processes.

In the pharmaceutical industry it is very important that the products and equipment is 100 percent secure and that the information concerning the processes is well documented. After all it is a matter of life and dead. The pharmacy industry is asking for all information that is required and if there is more information they are positive to take part of it too. Most documentation is very important.

Most focus today, within a sustainable development in the pharmaceutical industry, is on the substances; they shall not get out in waters or harm the ecosystem.

5.6.4 Marine and Diesel Industry

The Marine & Diesel industry are actively working with environmental issues and finding more sustainable solutions. After interviewing two global shipping companies we were able to summarize what they had said, which leads us to an analysis for the industry.

5.6.4.1 Wallenius

See Appendix J: Interview Wallenius

Wallenius do not have any specific environmental policy, but instead they have some policies stated in their Quality Manual. For these reason do they not have any requirements on their suppliers on any specific information. But all of their suppliers that have been approved are placed in a so called "Suppliers Register". This register covers all suppliers that have been approved and is updated when needed. If a supplier has an ISO certificate (both quality and/or environmental certificate) is that a plus for them of becoming a supplier to Wallenius. And those suppliers that for some reason no longer are approved are deactivated from their "Suppliers Register".

The mainly reason on why Wallenius is working with environmental issues is thanks to strategic reasons – they see there can be added value when working with sustainability. Not only seen from a marketing reason, but there is cost reeducation to be made, when for example decreasing emissions. They have also noticed an increased pressure from legislation, that they recently started putting some pressure on the shipping industry. There have also been increasing interests in environmental performance from customers which is a development they truly welcome.

They are working to enhance their “Suppliers Register” – with information that also concerns the environment, such as LCA (would use key-numbers from it), but this kind of information would probably be used more as a guide than anything else. Like in the process of considering what supplier to use, in the sense of making a correct environmental friendly choice, which is information they would never pay for. They want information based on common understanding about creating a sustainable future for everyone.

An EPD would be of interest to them and such document would be read and stored in their database. It could be a tool to help them evaluate different suppliers of similar products. The EPD would be read by someone in the environmental department, then others who are involved in that specific process the document would provide. If a supplier could not provide them with an EPD they would find value in water footprints or a Black and grey list or some other tool, just as long as the information provided is easy to understand by anyone. This kind of certificates does not need to be third part certified as long as the supplier is considered trustworthy.

They will probably start asking for EPDs when more than just one supplier can provide that kind of information to them, since there have to be more suppliers offering EPDs to be able to compare the information in them with each other.

5.6.4.2 Broström and A.P. Moller - Maersk Group

See Appendix K: Interview Bröströms and A.P. Moller – Maersk Group

Since Bröströms is a part of the parent company A.P. Moller – Maersk Group did we not find any reasons to make any dividends between the two of them, since they both act under the same environmental policies. This assumption was confirmed to be correct by Christian Shell at Bröströms.

They believe that there will be an increased demand of EPDs in the future, and that the legal aspect will be the main reason for it, but also to some extent customer demands. Since Bröströms and Maersk Tankers are only in the beginning of their environmental work they do not have any requirements about EPDs on their supplier today. Most likely is that they will demand EPDs from their suppliers within 1-3 years.

Some customers to Bröströms have asked specifically for EPDs (around 10 percent of all inquires), however; Bröströms and Maersk Tankers do not provide any EPDs today.

They believe that environmental information would be useful for them in since it would provide them with valuable information about the products they purchase and use. In that way they can make sure to act in a more environmental friendly way. They would store the information in a database that is connected with other marine companies and wholesaler such as; Caterpillars. In that way there can be collective benefits from it. They would use the EPD (not only for filling out a box in a check list). The cost of the EPD shall be included in the original price, not something to pay extra for.

They would prefer if the EPD was a document on maximum 20 pages and even though they do find that a third part certification would add value, they do not believe such certification would be necessary; they would still find the information valuable. The information they would like to receive is environmental data such as useful numbers on different values of substance, the amount of NOx, SOx, water footprints, and the key numbers from the LCA.

5.6.5 Analysis; Interviewing the Marine and Diesel Industry

Priorities in the purchasing process
Both of the shipping companies have performance as their top-priority; now, in five and in ten years time. Recyclable is also a parameter they have scored the same, with being the least important for today and in five years. Environmental "friendliness" during usage will be more important in the future then it is today, where Broströms could not make a dividend between the environment and the price in ten years, which is also the only question they have answered differently from each other.

Evaluation of environmental communication tools
It differs allot between the two of them. It seems like Broströms starts from a greater perspective with scoring ISO-standards to be the most important, since there is in general a lack of them within the marine industry. Wallenius on the other hand is scoring Carbon footprint as the most important, since they give more specific information from their supplier then ISO-standards do. But in general, both of them value carbon footprint and some sort of LCA or Climate Declarations.

Evaluation of declarations, in relation to certification
They both evaluated summarized information about the environmental performance of the product during its life cycle with a third party certification, the most. Broströms had a neutral approach towards an overview of the environmental performance, while Wallenius did not care for this type of document at all.

Evaluation of declarations, in relation to price and certification
Wallenius would not pay extra for any kind of environmental information and they would never read a document of 20-50 pages. Broströms could pay for information depending on its price, but then it should be third part certified.

Third part certification
They both say that it depends on the relationship with the supplier, whether or not the supplier is considered to be a reliable company. If they are, then a third part certification is not as necessary.

Evaluation of declarations from Alfa Laval, in relation to price and certification
They think alike here, they would value a summarized information with a third part the most, but as Broströms says; it could be a price to it, as long as the purchaser do not notice it. They do not see the use of a short document, on 2-3 pages, while on the other hand 20-50 pages is too long.

5.6.6 Analysis; Marine and Diesel Industry

There are specific requests and demands concerning EPD from the Marine industry, whereas some of these requests have reached the employees at Alfa Laval. From the interviews held with Alfa Laval's employees, do they claim that the demand for EPDs actually has increased for the past 2-3 years. .

Request from shipyards concerning Green Passport (inventory of potentially hazardous material) has most definitely increased much due to IMOs suggestions on new guidelines. And at Marine & Diesel at Alfa Laval have they been in contact with the product center and where they will try to develop a document for Alfa Laval's products.[199]

The industry would prefer if the EPD would not be longer than approximately 20 pages, and preferable shorter. It shall contain the main information from the LCA and key-numbers such as; NOx, SOx and carbon- and water footprints.

Out of 80 shipping companies' homepages were there only 16 that had information related to the environmental, such as; certificates and emission, which tells us there is still much to be done in the Marine and Diesel industry.

For these reasons are there potential profits to be gained, such as being the first on the market within the Marine and Diesel industry.

5.7 Analysis; EPDs

Most experts **do not** believe that the demand for EPDs will increase but they **do** believe that the demand for environmental information, for example from the LCA, will increase. The general opinion among the persons that have had any type of work related to EPDs seems to be that such declarations were a hot topic in the beginning of 2000 but is not anymore. The information in the EPD is too complex for most people to take in.

The only external party that is recommending their customers to produce EPDs is Miljögiraff (the company that made Alfa Laval's EPD). The reason for this might be strategically as well as the environmental approach of Miljögiraff.

EPDs are mostly made for companies that are in the front row of environmental work. Some companies will probably use the EPD as a tick off in a check list, which means that the information itself, much likely, will not be further and deeper examined. But an EPD can create an increased internal flow of environmental information which will increase the environmental knowledge, commitment and awareness in the company.

[199] *Interview with Johan Huber, 2010-02-26*

5.7.1 EPD – Type II/Type III

When considering the choice of declaration (Type I, Type II or Type III) for Alfa Laval there are a few things to reflect on:
- ***Best fit*** – Which one of the declarations are best for Alfa Laval's business type?
- ***Costs*** – Which one is best considering to the cost compared to the value it gains for Alfa Laval?
- ***Credibility*** – Which one is most credible?
- ***Customers*** – Which one does the customers ask for and value the most. Does it differ between different customers?

Best fit

When looking closer to the three types of declarations Type I is used primary for consumer goods in a business to consumer (B2C) relation such as cleaning products, shampoo, dishwashers, heat pumps, TVs, refrigerators, computers, light bulbs, vacuum cleaners, shoes, textiles, etcetera. We do not believe that a Type I label is something that fits Alfa Laval's products. Type I do not include the environmental influence during the life cycle of a product, so we do not believe that it gives Alfa Laval enough opportunities to communicate environmental information to their customers. The customers will need more than just a small label on the products.

When excluding the Type I declarations there are two left; the Type II and Type III. The biggest difference between these two is that the Type III is third part certificated. This also means that Type III is harder to develop since there are more regulations, and thereby has more cost connected to it. When developing a Type II, self declared declarations, the company has a wider choice of information to include in the declaration.

When considering the Best Fit; Alfa Laval can choose between: Type II or Type III.

Cost

After considering the best fit, there are, as always, the cost to consider. We have turned down the choice of a Type I declaration, so when evaluating the cost the only look at the Type II and Type III.

In consideration to Type III, do Type II cost less in consideration for the following reasons:
- the rules are more loose → easier to put into practice
- there is no third part certification →less cost connected to the development
- the time of development is shorter → faster delivery time to customer

Type III has the advantage of being third part certified which can be a argument on why producing an EPD, both for the internal and external marketing – which is hard to put a price tag on, it all comes down to ones willingness of making these sort of extra payments and if the customer would be ready to pay for it.

As a conclusion from the cost analysis there are still two choices; Type II and Type III. The choice depends on how much Alfa Laval is willing to invest in the EPD development, what they can gain from it and if the customers are willing to pay for the EPD or not.

Both Type II and Type III has the benefits of having its contents changed (for example if the processes are changing over time), the company can add and change information when it is required and necessary. This creates an opportunity for the company to communicate and add up relevant information along the value chain. But it is also has a burden connected to it, since this process of adding and changing information in the EPD would add an extra administrative cost to it, and at this point is it crucial to consider how many of the company's customers that actually reads the EPD, and in that way if it would be worth adding the extra cost connected to the updating phase.

Credibility
When evaluating the credibility of the two types it is obvious that a third part certification declaration is more credible than a declaration without any certification. Type III is the most credible type of the two. However, when being a big company as Alfa Laval most costumers have faith and find the information to be creditable, even if it is not certificated by a third part, thereby the will be enough in producing a Type II declaration.

Customers
Considering the type of declaration due to the customer need there are some different aspects: Are the willing to pay for the declaration? What kind of information do they ask for? How do they evaluate and use the information? And is it important with a third part certification?

Our decision of which type of EPD the customer would value the most is done considering both what the coworkers and sales companies at Alfa Laval believe that the customers wants but also considering the customers themselves. To be able to get a better knowledge from the customers' point of view we have made interviews with some important customers within different customer segments.

Even if there will be an EPD demand among the Biopharmaceutical customers, we believe that there might be another industry where the demand is bigger today. Since most of the coworkers believe that the demand within the Biopharmaceutical will be actual first in 5 to 10 years we think it is better to start in another industry.

If Alfa Laval starts developing EPDs in the industry where there is an obvious demand today, they will learn how to do it the most effective way and then they can start implementing the development of EPDs in the whole company. Biopharmaceutical might be one of the most demanding industries, especially when it comes to documentation and there is probably a future need of making EPDs for this industry, but the most effective way for Alfa Laval would, according to us, be to focus on the industry where the demand is biggest and then gradually start working with other businesses. This would be the way to create the highest value for Alfa Laval.

But if Alfa Laval would create an EPD they would probably be the first company within their business to create EPDs (none of their competitors have, at this moment, created an EPD), and thereby Alfa Laval has a great chance to develop the standard. Being the first on the market gives Alfa Laval a chance to set the standard that goes best with their organization and product portfolio. Being first would be an indicator of a serious environmental commitment within Alfa Laval. The downside is that it can be very hard to create EPDs that are easy to compare with other companies.

5.8 Analysis; Other Types of Communication Tools

There are different ways of communicating environmental information. The communication does not have to be made only with EPDs, even if such declarations are the topic for this thesis. During the investigations we have found out that the most commonly mentioned communication tools are Carbon footprint and Water Footprint. Climate declarations are a development of the EPD focusing on the climate. The advantage with these documents compared to EPDs is that they are much easy easier to understand. First of all they do not contain as much complex information as the EPD and secondly they are less complicated to compare between different companies. These types of communication tools are also easier to develop and for the customer to understand and relate to, especially since they are focusing on one environmental issue.

Carbon footprint and Water footprint are the easiest document to compare between different companies, since the user can compare percentages, in key numbers, to each other. However they are still not an optimal communication tool. Mainly because they are based on different methods and the different methods can give different footprint on exactly the same product. Even if they are easier when comparing different companies, they do not give a fair picture.

Climate declarations are not really mentioned among the general audience. The only advantage in such document seems to be that it is focused on only one topic, the climate, which makes it easier to understand. We believe that such declarations are too new to be evaluated (introduced in 2007). No one has really done climate declaration and given their approach of how valuable they are.

Some of the environmental experts, interview in the thesis, have mentioned that climate and green house effect is a topic of today. In the future the focus will probably change. Most of the experts within the field believe that water will be the next focus; mainly because of the European water directive. Water footprint is a good communication tool of such information.

Most of the environmental committed people believe that the communication tools shall reflect the truth about the environmental work within a company, but at the same time they shall not be too complex. Credibility, comparison and complexity are the three hardest facts when evaluating environmental communication tools.

Looking at Alfa Laval point of view we believe that the footprints can be used in the communication of environmental information. But it is rather hard to find a good method, to

make sure they really reflect the truth. Climate declarations are maybe better but still it is hard to see if they will go the same way as EPDs, being popular for a while and then the popularity will decrease.

6. Conclusion

There is an awareness and genuine interest in environmental issues all around the globe, both from the private and public sector and big or small companies. Customers are demanding more environmental information that preferable is easy to understand and easy to compared from one product to another.

6.1 Environmental Information to Customers

People care more and more about a sustainable development. Today the demand of environmental information is rather low, but in the future the demand will probably increase to the point where such information is seen as a matter of course. If Alfa Laval wants to be part of this development and have the chance to be first on the market***; they have to start communicating information about what they are doing in order to obtain a sustainable development.*** There are environmental advantages in Alfa Laval's products and such advantages need to be communicated in the right way. The following chapter, 6.1, will discuss the options when it comes to the communication tools.

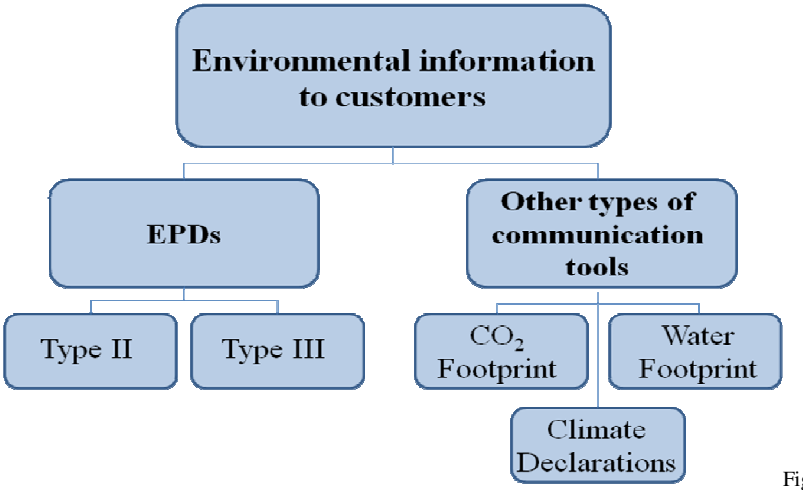

Figure 31: Information towards customers

What the customers ask for:

- The customers want to find the information by themselves and be able to do it whenever they want.
- The information shall be short and concise.
- The information shall be easy to understand.
- Preferable there is a link between the environmental data and economical profit.
- A third part certification is preferable to make the document totally reliable. But the information would also be reliable if it was made by a big international company with good reputation, for example Alfa Laval.
- It shall be possible to compare the information between different companies within the same industry. However most customers do know that such comparison is hard to do in a fair way.

There is a complexity when it comes to communicating environmental data. First of all, there are no, hundred percent, exact and fair methods to develop the data and evaluate it from. The result is depending on the method and the methods that are used differ among companies.

6.1.1 EPDs in General

Looking at the product lifecycle for EPDs (Figure 32.) we believe that EPDs have had its' palmy days, during the beginning of 2000. The EPD as a product is probably in the maturity phase in the life cycle, and will most likely, in a close future, start declining and later be phased out by some other environmental tool. We recommend Alfa Laval not to create EPDs.

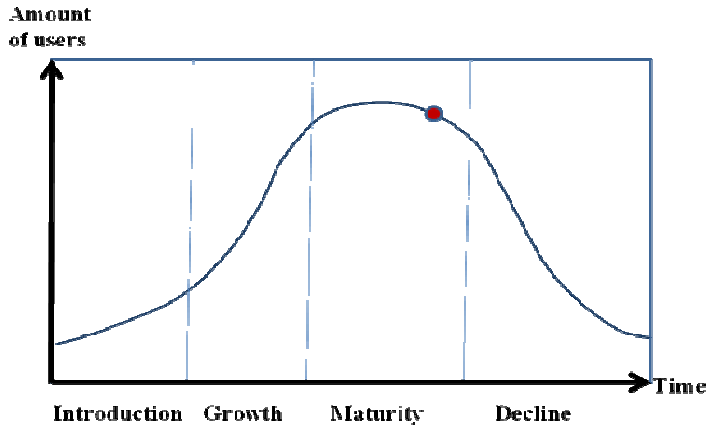

Figure 32: Product Life Cycle over the EPD as a tool

6.2 Biopharmaceutical or Marine Industry

6.2.1 Conclusion; Pharmaceutical Industry

There are not enough demands for EPDs in the pharmaceutical industry, since the end customers do not really value environmental information in the purchasing process of drugs. After all, the main objective behind an increased demand of environmental information is the consumers.

The pharmaceutical industry faces more important environmental issues when it comes to the actual products, so when looking at the environmental effects from their production equipment – the environmental focus is on the usage of the products not the production of them. Since most of the pharmaceutical products have an environmental effect even after they have been used, much focus is on these effects made by the substances when they reach the surroundings (after the usage). Much focus is also on freshwater and antibiotics resistance.[200]

Most of the pharmaceutical related production has, during the last years, moved to low-cost countries such as China and India. In these countries there is not as much environmental regulations and laws as in the western countries, for example in Sweden. This affects the demand for EPDs; there is more likely focus on other environmental issues that are greater,

[200] http://www.lakemedelsvarlden.se/zino.aspx?articleID=12978

than the environmental effects from the life cycle of production equipment. EPDs are more evaluated in countries where such document has an obvious purpose.

The fact that the pharmacies (in Sweden) have to sell the pharmaceutical with the lowest price, is unfair to the producers with an environmental friendly production. Since the process of integrating environment in the production often has a higher price, compare to not doing it, the more environmental friendly pharmaceuticals are more expensive than the ones that are not. The system where the pharmacy recommends the products with the lowest price is not supporting "green" production at all.

The biopharmaceutical industry is not mature enough to appreciate EPDs. However they do demand environmental information and also believe that it will be more important in the future. There is an advantage for Alfa Laval to communicate environmental information to them but probably not as an EPD.

6.2.2 Conclusion; Marine and Diesel Industry

Legislation in the Marine business has increased extremely for the past years and will continuing doing so, but there is still a lot of flexibility of what a company can do. It is important that the marine industry start getting up to dated and start working actively with environmental questions, something that many, especially in the Nordic area have shown big interest in.

When studying the industry today there are a few that put any real pressure on their suppliers; they just settle with ISO certificate from the suppliers (sometimes not even that), but this has started to change. Those companies that have begun their environmental work are committed to make change, and will do so. Since there are not any set standards on how to proceed with the environmental work is every method welcome in the marine industry, as long as it is not too complicated to use or understand.

The marine industry has the benefit that they can study other types of industries and how those industries have dealt with environmental issues and in that way get a hunch on what standards to aim for, which will give a valuable result for both the company and the environment.

In some context everything is pointing towards that EPD would be a hit, and there has even been a company specifically saying that they will demand it from their suppliers. On the other hand, much is pointing towards a phase out of EPDs whereas other environmental tools, such as; carbon- and water footprint will be the next focus. An interest for these tools has especially shown in the Marine Industry. However, the most important thing is that the environmental information not should be to complex when providing it to the marine industry. It should be easy to read and have information and key-numbers that anyone could understand. It is about providing the customer with actual numbers to compare to other companies and in that way be able to make appropriate decision, based on that fact.

6.2.3 Final Conclusion; Industry to Focus on

The two main drivers behind the demand of environmental information seems to be:
1. Legislations and rules (example REACH, MARPOL, IMO)
2. Decrease costs (for example by decreased energy consumption) and other reason which are related to cost savings and economy.

When trying to point out the industries to focus on at the very first step, in Alfa Laval's environmental communication to customers, we can look deeper into these two facts. The industries that are facing most rules and legislation are often the ones that either are have a big effect on the environment or industries within risky areas.

When it comes to the cost saving fact, most industries can cut costs if they focus more on environmental issues both externally and internally. Working in a sustainable way often means that the company has to look at all processes to make sure they do not consume more energy, material and so on than they really need. If Alfa Laval can communicate information related to cost savings in monetary terms, for example how much energy a new product from Alfa Laval is consuming in relation to an old one.

When looking into the two industries from the interviews we find that ISO certification is highly evaluated within both. We believe that the main reason for this is thanks to ISO being a well known and established method for companies to achieve certifications. It takes many factors in account and covers a lot of issues that the companies have to deal with before getting certificated.

When comparing the environmental affect from the two industries it differs a lot.

	BioPharmaceutical	**Marine and Diesel**
Main environmental issue	Emission of active substances	CO_x and SO_x emissions
Environmental labeling system	**No**. Not allowed for the end product.	**Yes**
Post experience of EPDs	**No**	**No**
Attitude towards EPDs	**No**. Not necessary, but would be interesting.	**Yes**. Positive. Would use and store it in a databank.
EPD only as a Checkpoint	**Yes**	**No**
Environmental information evaluated from the suppliers	**Yes**. Such as; if they do LCA and are ISO certificated.	**No**
Ability to change supplier of equipment	**No**. Most equipment has to be identical to maintain a safe production process.	**Yes**. Flexible to change supplier.

We would recommend Alfa Laval to focus on the Marine and Diesel industry, for the reasons of them being in the beginning of their environmental work. Alfa Laval has a great opportunity to offer environmental documentation that could become a standard to require within the whole marine industry. It would not necessary be an EPD, it would be more likely for them to demand Carbon- or Water footprint from their suppliers in a close future.

No matter what industry Alfa Laval chooses to start with developing an EPD, will they have the chance of being first on the market, which thereby creates an opportunity for Alfa Laval to set the standard in the industry.

In consideration of the customer interviews as well as the interviews with the sales companies we have tried to make a priority list of the industries where environmental information, such as EPDs, would be most evaluated:

1. Equipment division: Marine and Diesel
2. Process technology division: Energy and Environment (Oil and Gas, Power, Environment)
3. Process Technology division: Process Industry (Inorganic material, metals and paper, Natural resources, Petrochemicals, Refinery and Evaporation and Condensation)
4. Equipment division: Industrial Equipment (Comfort, Refrigeration, Fluid and utility, Engine and transport, Engine filter)
5. Process Technology division: Food technology (Brewery, Vegetable oil technology, Beverages, viscous and food, Olive oil)

6.3 Environmental Communication Model

6.3.1 The Future

The interest for different type of environmental information differs with the hot topics at the time being. Big environmental disasters make people, and companies, more aware of environmental issues and also increase the demand for information about it. It is hard to predict the future, but being up to date on environmental related issues, legislation and other facts makes it easier for Alfa Laval to meet the future demand of environmental related information. The trend, according to most environmental involved persons interviewed, seems to be an increased interest in the environment, not only by stricter laws and regulations but also in the general public.

6.3.2 Environmental Communication Model

During the investigations within Alfa Laval we found a lack of communication and information flow related to environment. We believe that Alfa Laval has the competence to build up a foundation to be able to communicate environmental information internally. First when such foundation is established Alfa Laval can more easily communicate the information externally.

We designed a model, The Step-Wise Model, explaining how Alfa Laval can work to be able to achieve most optimal environmental communication.

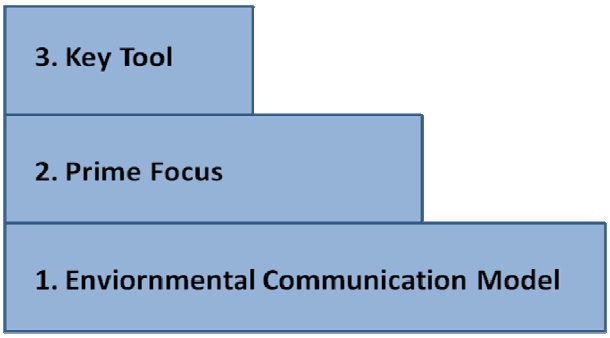

Figure 33: The Step-Wise Model– how to achieve environmental communication

The model consists of three steps:

Step 1. Environmental Communication Model – the foundation of the model describes how to achieve both internal and external communication.

Step 2. Prime Focus – find the right customers and industries to focus on.

Step 3. Key Tool – use the right tool to communicate the information in the most optimal way.

The following text will describe the three steps.

Step1 Environmental communication model

To be able to find the best focus and tools Alfa Laval has to start with the basis – the environmental communication model.

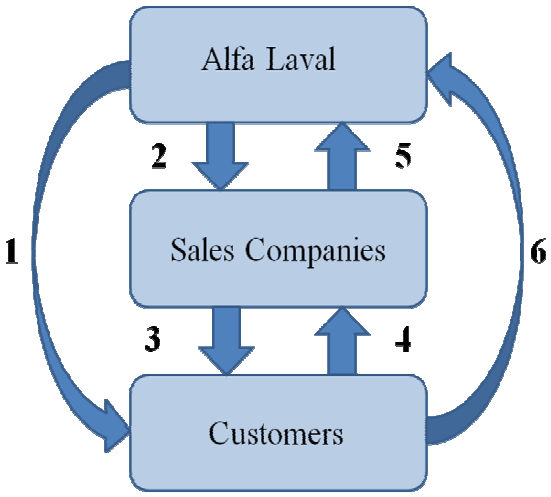

Figure 34: Environmental communication model

The communication flow of today:

1. Alfa Laval → Customers: Annual report, sustainability report (same as sustainability chapter in the annual report), HERE customers magazine.
2. Alfa Laval → Sales companies: Internal net, education?
3. Sales companies →Customers: Communication related to the sales process. During the process and after.
4. Customers → Sales Companies: Communication related to the sales process. During the process and after.
5. Sales Companies → Alfa Laval: Sales managers reporting to the segment managers.
6. Customers → Alfa Laval: Email

As seen in these points, there are still a lot of things to consider in the communication between the different parties. Our Suggestions to develop superior information flow:

1. Alfa Laval → Customers:
   - Develop the webpage so that it looks more inviting and environmental friendly.
   - Sustainability blog or internal net made for the customers. Alfa Laval customers will get a log in and password so that they can be able to see the environmental information. In that way important and sometimes sensitive information will not be communicated to competitors or other persons that can misuse it. When the customers want to find information they can go in to the net and look for it themselves. In such way the customers do not need to email or call to get the information, which often takes a lot of time.
   - Brochures made for the customers.

2. Alfa Laval → Sales companies:
   - Internal education.
   - Updates about laws and regulations.
   - Updates about the work done by environmental council and other environmental related work done within Alfa Laval.
   - Prepare information brochures for the sales companies to use in the direct communication to the customers.

3. Sales companies →Customers:
   - Information brochures.
   - Power point slides with environmental information to be added in the end of sales presentations.

4. Customers → Sales Companies:
   - First of all, if the sales managers have a greater knowledge about environmental information and communicate it to the customers in the purchasing process, there will probably be less questions regarding environmental issues. This means that the communication between customers and sales companies will decrease.

5. Sales Companies → Alfa Laval:
   - Internal reports.
   - Email or helpdesk for the sales managers to fast get information and answers to environmental related questions.

6. Customers → Alfa Laval:
   - Direct contact, in terms of filling out a sheet on the internal webpage or on the global homepage.

Step 2. Prime Focus
To find the right customers and industries to focus on we recommend Alfa Laval to evaluate the investigations made in this thesis. According to us the first step is to focus on the customers overall, by a creating a more "green" profile and work on the webpage and other general communication tools. When creating documents such as EPD or other enviornmnetal communication tools, it is preferable to focus on only one industry at a time. We believe that the first industry to focus on is Marine and Diesel. Then when Alfa Laval have a better knowledge about such environmental communication they have to broader the perspective and look into even more of the customers industries, for example the biopharmaceutical industry.

Step 3. Key Tool
Alfa Laval has to decide on which tool to communicate environmental information with. This is maybe the hardest decision and it demands research and an open minded approach. There is really not a clear way to know which communication tool that is most optimal. But in general the customers seems to prefer tools with focused information that is easy to understand and easy to compare between different companies.

6.3.3 Recommendations

In the close future Alfa Laval will have to communicate environmental information to their customers to keep a competitive edge, this is the best way to start the process in becoming a even more "green" and environmental profiled company.

The final recommendations are: First of an EPD is not the right communication tool for Alfa Laval, and therefore they should not create one. Secondly we recommend Alfa Laval to develop the internal communication and knowledge before finding the right target customer and tool.

Abbreviations

ANSI (The American National Standards Institute) is a private, non-profit organization that administers and coordinates the U.S. voluntary standardization and conformity assessment system.

CEN (European Committee for Standardization) is a non-profitable organization. Main fields of activity are for example; Chemistry, Consumer Products, Energy, Food and Mechanical Engineering.

CENELEC (European Committee for Electro-technical Standardization) is a non-profit technical organization with 31 European member countries.

CDRH (Center for Devices and Radiological Health) regulate all companies that design, manufacture, repackage and relabeled medical devices in the U.S. and all companies importing medical devices into the U.S.

DC (Distribution Center) is one of Alfa Laval's distribution center. They distribute products and spare parts. DC is divided into Warehouse, Materials Management, and Order-handling/Shipping.

ELU (Environmental Load Unit) is a method for calculating environmental load, which is used for comparison.

EMAS (Eco Management and Audit Scheme) works to enhance and increase the efficiency of the environmental work that is done by companies or organizations.

EMU (Environmental Monitoring Unit) offers data collection, analysis, interpretation and consultancy service relating to development and environmental issues in example seas. They provide professional services for developers and regulators involved with development projects in the marine environment.

EMS (Environmental Management System) is a practical tool on how to approach the environmental aspects of an organization.

EN (European Standard) is documents that have been ratified by one of the 3 European Standards Organizations, ***CEN, CENELEC*** or ***ETSI***. They are designed and created by all interested parties through a transparent, consensual process.

EPA (Environment Protection Agency) works to protect human health and a cleaner, healthier environment in USA. Their main work is connected to the laws that the congress writes. As soon as the congress has written an environmental law, they implement it by writing regulations.

EPDs (Environmental Product Declarations) are used by companies to provide parties, such as the customers, with quantified and verified information about the environmental performance of the company's products or services.

EPS (Environmental Priority Strategies) in product design is computer program that is used in LCA.

ESE (Equipment, Sanitary Equipment) is a part of the equipment division at Alfa Laval. They are responsible for the sales and marketing for heat exchangers, pumps, valves, installation materials, tank equipment and separators to dairies, breweries and the food, cosmetics and pharmaceutical industry.

ESO (European Standardization Organizations) it consists of ***CEN, CENELEC*** and ***ETSI***.

ETSI (The European Telecommunications Standards Institute) produces globally-applicable standards for Information and Communications Technologies

GHG (Green House Gases) are gases in an atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect.

GMP (Good Manufacturing Practice) is focusing rather on the quality of the end-product than the single equipment/system/process. The manufacturer has to be able to prove that the single equipment/system/process is able to constantly produce an end-product of the right quality.

GRI (The Global Reporting Initiative) works to create conditions for transparent and reliable exchange of sustainability information. It is the world's most widely used sustainability reporting framework and is committed to its continuous improvement and application worldwide.

IMO (International Maritime Organization) main task is to develop and maintain a regulatory framework for shipping and its environmental, legal and technical matters. They ensure that lives at the sea are not put at risk and that the marine environment is not polluted by shipping.

ISO (International Organization for Standardization) is the largest organization that develops standards in the world.

ISO 12100-1:2003 Safety of machinery -- Basic concepts, general principles for design -- Part 1: Basic terminology, methodology

ISO 13463:1999 Nuclear-grade plutonium dioxide powder for fabrication of light water reactor MOX fuel -- Guidelines to help in the definition of a product specification.

ISO 14000 is a set of ***standards*** and reports that help organization and companies to build up and operate a structural and systematic environmental work for an organizations ***EMS***.

ISO 14001 is a cornerstone standard within ***ISO 14000***. An organization that have used an environmental management system according to ISO 14001 can choose to let an independent third party verify that the organization fulfill all the demands in the standard.

ISO 14020 Environmental labels and declarations -- General principles

ISO 14021 Environmental labels and declarations -- ***Type II environmental labeling*** -- Self-declared environmental claims.

ISO14024 Environmental labels and declarations -- ***Type I environmental labeling*** -- Principles and procedures

ISO 14025 Environmental labels and declarations -- ***Type III environmental declarations*** -- Principles and procedures

ISO 9001 The group name for a type of certification that formalize that a business process are being practical - it represent an international consensus on good quality management and practices, with standards and guidelines to these issues.

IVL (Swedish Environmental Research Institute) is Sweden's leading organization for applied environmental research. They have a broad competence and cover the whole environmental field. They work with both research and contract assignments.

LCA (Life Cycle Assessment) is an analysis of overall environmental load done by the product, during its Life cycle.

LRQA (Lloyd's Register Quality Assurance) is a consult company that operates all over the world, that offer assessment of environmental and health and safety management systems in many different industries.

MC (Manufacturing Center) is the production center where Alfa Laval's pumps and valves are manufactured.

PCR (Product Category Rules) can be seen as a complementary to the general requirements of ***EPD*** programs.

OECD (Organization for Economic Cooperation and Development) brings together the governments of countries committed to democracy and the market economy from around the world to for example Support sustainable economic growth.

OSPAR regulates the discharges of chemicals into the marine environment in the Northeast Atlantic.

Reach (**R**egistration, **E**valuation, **A**uthorization and Restriction of **C**hemical substances) works to improve the protection of human health and the environment through better and earlier identification of the intrinsic properties of chemical substances. It gives greater responsibility to industry to manage the risks from chemicals and to provide safety information on the substances.

SETAC (The Society of Environmental Toxicology and Chemistry) is a not-for-profit, worldwide organization comprised of individuals and institutions dedicated to the study, analysis and solution of environmental problems, the management and regulation of natural

resources. Their mission is to support the development of principles and practices of sustainable environmental quality and ecosystem integrity.

SIS (Swedish Standard Institute) is the national organization for standardization in Sweden. It is responsible for development, revenues and sales of ***ISO***s standards.

SEMCO (The Swedish Environmental Management Council) works to provide an open and neutral platform for any organizations that whishes to build up or just strengthen their work connected to sustainability and they work to make it easier for different organizations, in both public and in private sectors, such as purchaser, suppliers and consultants.

Type I, ***Environmental Labeling*** a certificate marking of the product, for example; the flower made as an environmental label within the European Union. Type I declaration is made according to the ISO-standard ***ISO14024.***

Type II, ***Self-declared EPD's*** do not require any third part certification, they can be made by the company itself. Type II declaration is made according to the ISO-standard ***ISO14021***.

Type III, ***Environmental Product Declarations*** made according to standardized labeling schemes that are administrated by public or private sectors. Require PCR, LCA and must be verified by a third part. Type III declaration is made according to the ISO-standard ***ISO14025.***

UNFCCC (***United Nations Framework Convention on Climate Change***) is a treaty that most countries joined over a decade ago, to begin to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable. More recently, a number of nations approved an addition to the treaty: the Kyoto Protocol, which has more powerful (and legally binding) measures.

UNGC (United Nations Global Compact) is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption.

WBCSD (World Business Council on Sustainable Development and World Resource Institute) is a CEO-led, global association of some 200 companies dealing exclusively with business and sustainable development.

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http://www.naturvardsverket.se/sv/Nedre-meny/Fragor-och-svar/Klimat/Vad-ar-koldioxidekvivalenter/
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http://www.novonordisk.se/documents/article_page/document/aboutus_fact.asphttp://www.novonordisk.com/about_us/novonordisk-way-of-managment/nn-way-of-management-the-policies.asp
http://www.novonordisk.com/sustainability/default.asp
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O

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P

http://www.pfizer.se
http://www.pieralisi.nl/
http://www.portgot.se/prod/hamnen/ghab/dalis2bs.nsf/vyFilArkiv/landelIVLslut.pdf/$file/landelIVLslut.pdf
http://www.pre.nl/download/manuals/SimaPro7IntroductionToLCA.pdf
http://www.pre.nl/eco-indicator99/eco-indicator_99.htm

Q

R

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S

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http://www.sis.se/DesktopDefault.aspx?tabname=@iso14000&menuItemID=8865
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http://www.sr.se/cgi-bin/ekot/artikel.asp?Artikel=3480402
http://www.svanen.nu/Default.aspx?tabName=Om%20oss&menuItemID=6996
http://www.svanen.nu/SISMABDocs/EU_ecolabel_webb_sv.pdf
http://swedbank-nyhetsbrev.allready.net/ftg/2008/06/inte_helt_latt_att_marka_ratt.csp
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T

http://www.tcodevelopment.com/pls/nvp/DocumentShow?CID=4146&MID=572
http://www.tetrapak.com/se/miljo/pages/default.aspx

U

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V

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W

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http://www.waterfootprint.org/?page=files/home
http://wrightreports.ecnext.com/coms2/reportdesc_COMPANY_C39262210

X

Y

Z

Appendix A – Interview Questions to Fund Managers

Do you have any Sustainability Funds?
- If YES: What do they consist of?

Do you have any Environmental Funds?
- If YES: What do they consist of?

How many of your customers specifically ask for Environmental funds?
- What type of customers; Private or companies?

Those that buy Sustainable or Environmental funds do they ask for any additional information about the companies in the fund, such as:
- Do they have ISO-certificate?
- Do they perform LCA/EPDs?
- What environmental work do they perform?

Appendix B – Alfa Laval's First EPD

Environmental Declaration
Brazed Plate Heat Exchangers

Subject			Ref. No.	Page
Brazed Plate Heat Exchangers				1 / 8
Issued by	**Department**	**Date**	**Approved by**	
Ekonomisk Ekologi AB Revised by Alfa Laval	ECR PC CHE	2001-09-01 2005-12-07	Anders Knutsson Björn Olsson	
Recipient				
Alfa Laval customers				

SELF DECLARED ENVIRONMENTAL DECLARATION
Copper brazed plate heat exchangers type CB14 to CB300

1 COMPANY AND PRODUCT DESCRIPTION

1.1 The Company

Alfa Laval Sverige AB
Postal address: Box 63, SE-221 00 Lund, Sweden
Visiting address: Rudeboksvägen
Phone: +46-(0)46-36 65 00
Fax: +46-(0)46-12 36 90
Website: www.alfalaval.com
Contact: Product Manager Björn Olsson (bjorn.olsson@alfalaval.com)

The Alfa Laval core competences are separation, heat exchange and flow technology, where we do an intense research work.

The products and systems we supply in the field of industry and refrigeration markets are designed to be components in products with very different functions, e.g. applications in the heat pump, refrigeration and hydraulic fields. Our knowledge can however be used within most of the areas with a demand for refrigeration, heating and heat recovery.



The company is ISO 9001 certified since 1993.

Alfa Laval Lund AB has an environmental policy, approved by the company management. The company has no certified environmental management system but routines for Approvals and Environmental Report, Delegating Environmental Responsibility, Environmental Declarations, Environmental Account, Environmental Information and Environmental Communication, Supplier Register, Emergency Readiness, Waste Disposal, Chemical Handling, etc.

1.2 The Product

Product name: Copper brazed plate heat exchangers type CB14 to CB300.

By functional unit we mean one of the heat exchangers respectively and an average number of plates. The average is calculated by, for each model, the year production and the number of plates for each manufactured unit:

Copper brazed plate heat exchangers

	No of plates		
Model	Min	Max	Average
CB 14	10	50	20
CB 26, CB 27	10	150	40
CB 51, CB 52	10	150	50
CB 76, CB 77	10	190	100
CB 200	30	200	100
CB 300	30	250	130

The values below state weight% material, of which the heat exchanger in question consists, with the above number for average number of plates.

COPPER BRAZED HEAT EXCHANGERS						
Percentage part in weight% of the material contents						
	CB 14	CB 26,27	CB 51, 52	CB 76, 77	CB 200	CB 300
TOTAL WEIGHT (kg)	**1,66**	**7,20**	**14,62**	**53,67**	**85,62**	**206,61**
Stainless (weight%)	88,1%	82,5%	81,6%	81,7%	79,8%	76,1%
Copper (weight%)	11,9%	10,0%	10,7%	13,6%	13,7%	13,3%
Galvanized metal (weight%)					6,3%	7,1%
Freon-free polyurethane* (weight%)		2,9%	3,6%	2,5%		2,4%
Other plastic* (weight%)		4,6%	4,2%	2,2%	0,2%	1,1%

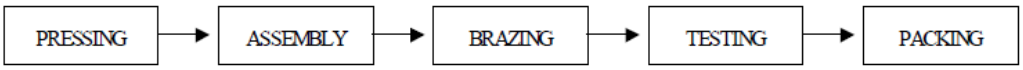
* All plastics are "environment friendly" and suitable for recycling or to fire in a local waste furnace / power station. Plastics are only used for transport protection and only when requested by the customer.

On the goods/goods group there is simple and durable marking (manufacturer, product name, No, etc). The marking connects to the technical documentation so that the product can be identified without any doubts.

The product is not included in the enclosure to "Regulation for chemical products and biotechnical organisms (1998:941)".

1.3 Manufacture

The manufacture of plate heat exchangers is performed according to the following steps from raw material to finished product:



2 Environmental performances

Processes and activities, which together do not contribute by more than 1% to the total environmental influence in any environmental influence category, have been directly excluded from this environmental declaration. Further definitions besides the above have been made according to the following description.

Information about the environmental performance of the product is divided into four parts. The parts, not presented in this environmental declaration are marked with a minus (-) and the parts included in the environmental declaration are marked with plus (+).

1. *Direct suppliers to Alfa Laval i Lund AB*

+ The supplier's wastage at production of components and material.
- The supplier's remaining resource use.
- Transports to Alfa Laval Lund AB.

2. *Production at Alfa Laval Lund AB*

+ All energy use at the plant.
+ Production wastage and use of lining material.
+ Emissions to air, water and ground.
+ Transports during production to gate.
+ Packing material.
+ All wastage generating at the plant.

3. *Use of heat exchangers*

+ Energy and resource use during the usage phase.
- Transport to customer.

4. *Recycling*

+ Recycling of heat exchangers.

2.1 Manufacture

Functional unit: Copper brazed plate heat exchangers type CB14 to CB300.

Resource use

Values stated below mean kg material used at manufacture of heat exchanger in question with above stated number for average number of plates. Supplier material usage for components used is included.

COPPER BRAZED HEAT EXCHANGERS						
Resource use for manufacture						
	CB 14	CB 26,27	CB 51, 52	CB 76, 77	CB 200	CB 300
Non-renewable resources						
Nickel in stainless (kg) (65% recycl.)	0,61	2,49	5,01	18,42	28,70	66,02
Chromium in stainless (kg) (65% recycl.)	1,14	4,63	9,30	34,21	53,30	122,61
Copper (kg) (75% recycl.)	0,21	0,75	1,64	7,64	12,32	28,85
Metal in galvanized metal (kg)					5,28	14,31
Zinc in galvanized metal (kg)					0,05	0,15
Chromium in galvanized metal (kg)					0,05	0,15
Freon-free polyurethane* (kg)		0,23	0,58	1,50		5,52
Other plastic* (kg)		0,36	0,67	1,29	0,18	2,56
Raziol oil (kg)	0,00	0,00	0,00	0,01	0,01	0,03
Helium (kg)	0,00	0,00	0,01	0,02		
Stop off (fixture paint) (kg)	0,00	0,00	0,01	0,03	0,04	0,10
Nitrogen (kg)	0,08	0,33	0,68	2,48	3,96	9,56
Fluxing material (kg)	0,00	0,00	0,00	0,00	0,00	0,00
Solder (kg)	0,00	0,00	0,00	0,00	0,00	0,00
Isopropanol in washer fluid (kg)	0,00	0,00	0,00	0,00	0,01	0,02
Renewable resources						
Water (litre)					67,00	90,00
Energy usage						
Other electrical energy (kWh)	39,30	39,30	39,30	39,30	39,30	39,30
District heating oil (kWh)	3,16	3,16	3,16	3,16	3,16	3,16
District heating chips (kWh)	12,63	12,63	12,63	12,63	12,63	12,63
Transports (kWh)	0,00	0,00	0,00	0,00	0,00	0,00
Total energy (kWh)	**55,09**	**55,09**	**55,09**	**55,09**	**55,09**	**55,09**

None of the substances listed by the Chemistry Inspection or the OBS-list are being used at manufacture of the product.

Pollution discharge
Below please find emissions to air, water and ground taking place at activities stated under 2 Environmental Performance for actual heat exchanger with above stated numbers for average number of plates.

COPPER BRAZED HEAT EXCHANGERS

Emissions to air, water and ground at manufacture, storing and transportation

	CB 14	CB 26,27	CB 51, 52	CB 76, 77	CB 200	CB 300
Carbon dioxide (g)	693,9645	693,9645	693,9645	693,9645	693,9645	693,9645
Nitrogen dioxides (g)	0,0148	0,0148	0,0148	0,0148	0,0148	0,0148
Sulphur dioxide (g)	0,0062	0,0062	0,0062	0,0062	0,0062	0,0062
Carbon dioxide (g)	0,0016	0,0016	0,0016	0,0016	0,0016	0,0016
Dust (g)	0,0013	0,0013	0,0013	0,0013	0,0013	0,0013
Other hydrocarbons (g)	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007

Other information
Amount of packing material in kg for actual heat exchanger with above stated numbers for average number of plates.

COPPER BRAZED HEAT EXCHANGERS

Information of packing material and waste

	CB 14	CB 26,27	CB 51, 52	CB 76, 77	CB 200	CB 300
Total weight packing material	**0,06**	**0,10**	**0,19**	**3,33**	**22,32**	**25,57**
Plastic plug (kg)	0,02	0,02	0,02	0,05	0,04	0,04
Polyethene (kg)	0,03	0,04	0,08	0,15	0,28	0,41
Expanded polystyrene (kg)	0,01	0,04	0,09	0,38		
Wood (kg)				2,76	22,00	25,00
Paper (kg)						0,12
Information of waste						
Hazardous waste (kg)	0,02	0,02	0,02	0,02	0,02	0,02
Other industrial waste (kg)	0,27	0,27	0,27	0,27	0,27	0,27

3 INFORMATION

3.1 Use

Energy use
No energy is being used during the use phase.

Emissions
No emissions to air, water or ground during the use phase.

Lifetime
The longer lifetime a heat exchanger has, the lower environmental influence. A heat exchanger has a technical lifetime of about 20 years. However, in practice the lifetime is shorter as other components in an equipment stop working before the lifetime of the heat exchanger has been reached.

Transports
Environmental influence in form of resource use and emissions to air are being accounted for, but not transports to customer.

Miscellaneous
Heat exchangers contribute to a reduced energy usage, compared with other alternatives, as the efficiency is much higher (normally >99%).

3.2 Recycling

The product is not prepared for disassembly. The manufacturer/or representative will not take the product back. The product material can be recycled by melting it down and each material respectively can be separated in a centrifugal furnace. The product or the product parts will not be defined as hazardous waste. Rejected products should not be dumped as they contain copper and nickel. When scrapping, the heat exchanger should be handled as mixed scrap.

The manufacture stage
At the Alfa Laval production plant in Ronneby.

The user stage
The handling of worn out heat exchangers is described above.

For the packing enclosed to the heat exchanger, producer responsibility is valid. Alfa Laval AB is a member of the REPA register.

3.3 Information from the certifying institution

This environmental declaration is not certified.

Ekonomisk Ekologi AB in Ronneby took part in the preparation of this environmental declarationin 2001. Tomas Wümer was external responsible for the project. He has more than 10 years experience from environmental managing systems and environmental declarations. Ekonomisk Ekologi AB has in this work been responsible that the environmental declaration, as far as possible, corresponds to the demands for certified environmental declarations. Ekonomisk Ekologi AB has also verified the information given by Alfa Laval Lund AB.

Revision 2005
This declaration was revised by AlfaLaval in 2005 due to the fact that Nickel Brazed Heat Exchangers are no longer produced by the company. Further all plastics used in the transportation of the product have been changed and are suitable for recycling or to fire in a local waste furnace / power station

For the Copper Brazed Heat Exchangers the production methods used are the same as in 2001 and thereby also the environmental performance.

Appendix C – Alfa Laval's Second EPD

EPD®
Environmental Product Declaration

The Company

Alfa Laval is a leading global provider of specialized products and engineering solutions based on its key technologies of heat transfer, separation and fluid handling. The company's equipment, systems and services are dedicated to assisting customers in optimizing the performance of their processes. Alfa Laval's products and solutions are used in areas of vital importance for humanity such as food and water supply, energy production and economizing and environmental protection.

Alfa Laval operates according to its Business Principles which is a Code of Conduct describing the company's approach to creating better everyday conditions for people in the areas of Environment, Social, Business Integrity and Transparency.

The product

AlfaVap 650 is a plate heat exchanger designed for evaporation duties. It is of the semi-welded type hence consisting of pairs of pressed plates welded together into cassettes. The number of cassettes depends on the actual conditions.

Environmental information presented in this EPD is based on an application as the evaporation of a sugar solution. The evaporation takes place under reduced pressure. Steam at 97°C is heating the sugar solution from 86 °C to 91 °C, increasing its concentration from 70% to 74%.

The functional unit (F.U.) is "heat exchange between two media with an effect of 3.2 MW during 20 years (as a total 0.56 TWh)". To fulfil its functional unit it is assumed that the plates pack is exchanged once and the gaskets are exchanged 4 times. The unit consists of 93 cassettes.

The EPD Programme

This EPD is in compliance with General Programme Instructions for environmental products declarations, EPD, version 1.0, 2008-02-29 (GPI), published by The International EPD Cooperation (IEC), as a part of the EPD® system.

The reference PCR document upon which the EPD is based is PCR 2009:02, UN CPC CODE: 43911, The

Semi-welded Plate Heat Exchanger model AlfaVap 650

Swedish Environmental Management Council, Version 1.0 2009-03-24. Registration number of this EPD

Date of publication of the Life Cycle Assessment (LCA) is 2009-03-11 and assumed to be valid during a period of 20 years which is the estimated lifetime of a product. The LCA is based on data on specific environmental aspects from the year 2007 and general data from the latest updated version of Ecoinvent.

Further relevant information may be found at www.environdec.com

Alfa Laval Lund AB, Postal address: Box 74, SE-221 00 Lund, Sweden –
Visiting address: Rudeboksvägen – Phone: +46 46 36 65 00 – Fax: +46 46 12 36 90 –
Website: www.alfalaval.com – Contact: Product Manager Björn Wilhelmsson (bjorn.wilhelmsson@alfalaval.com)

Reference Number: M-0810-73E
Page Number: 1 of 3
Date: November 25, 2008

Environmental performance

The environmental performance of ALFAVAP 650 is assessed from a perspective of the whole Life Cycle including raw materials, energy, manufacturing, use and end of life treatment. The impact categories being assessed are the general for EPD; contribution to global warming, ozone depletion, photochemical oxidation, acidification, eutrophication and use of non renewable fossil energy carriers. Adding to these are the specific impacts relevant to this product category; depletion of scarce metal resources and energy consumption. These impacts in relation to the functional unit, 0,56 TWh, indicate the environmental performance, that can be used to compare ALFAVAP 650 with other available options of heat transfer.

Key findings:

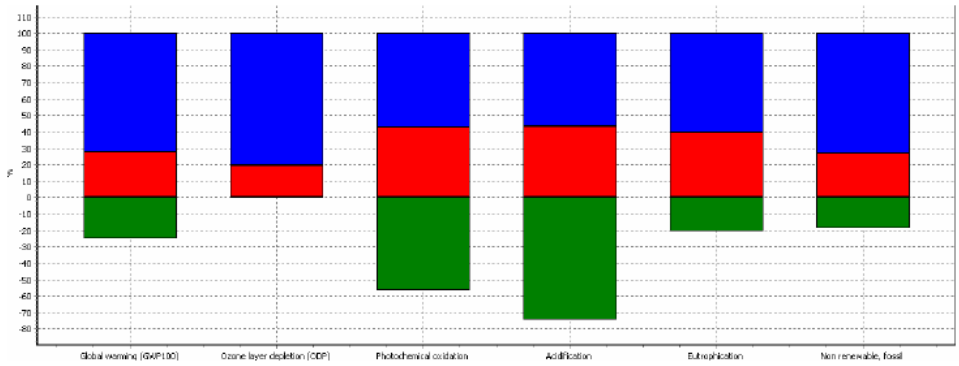
One ALFAVAP 650 contributes to emissions of more than 50 ton CO2 (equivalents). The total depletion of iron from the earth crust is 4520 kg. 100 kg of Molybdenum is consumed, although much of the metals are assumed to be recycled.

In the Life Cycle it is the use phase that has most potential environmental effect. It is mainly due to the electricity for pumping to compensate for the pressure drop. In the manufacturing phase, production of the low alloyed steel for the frames is having the largest environmental load, followed by production of molybdenum for the highly alloyed steel in the plates.

One major environmental effect, "respiratory inorganic", relate to the environmental aspect "emission of particulates". It is dominantly represented in European electricity and production of steel.

Comparison of life phases:

The relative results of the assessment of the environmental effect categories are displayed in the graph below per phase of the life cycle, manufacture (red middle), use (blue above) and end of life (green below). End of life is reducing the environmental load (negative) due to that recycling result in avoided use of virgin material in other product systems. For all the environmental effect categories the use phase has the largest contribution. For acidification and photochemical oxidation (known as SMOG and street level ozone), recycling has a large impact to reduce the environmental aspects that contribute.



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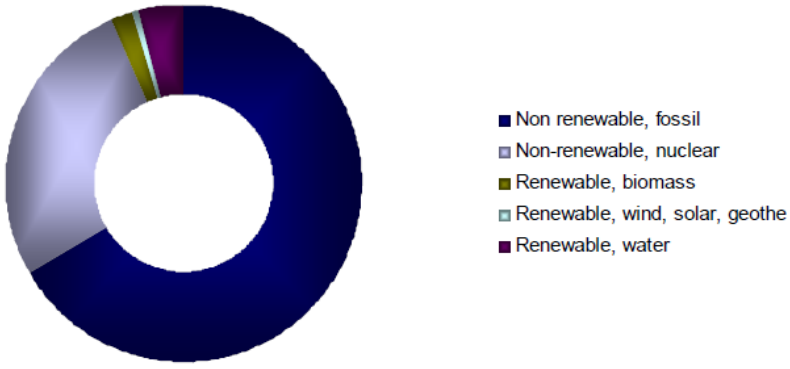
Website: www.alfalaval.com – Contact: Product Manager Björn Wilhelmsson (bjorn.wilhelmsson@alfalaval.com)

EPD results over all aspect in the Life Cycle

Impact category	Unit	Total	Manufacture	Use	End of life
Scarce metals					
Molybdenum (Mo)	kg	99	127	19	-47
Nickel (Ni)	kg	241	444	18	-220
Iron (Fe)	kg	4520	5465	433	-1378
Chromium (Cr)	kg	103	505	29	-432
Palladium (Pd)	µg	2,1	1,2	0,0	0,9
Renewable					
Wood	m3	2	1	1	0
Water (ground)	m3	57	9	48	0
Water (turbine)	m3	312928	77125	235733	70
Water (other)	m3	1532	225	1310	-3
Biomass	m3	0	0	0	0
Fossil					
Methane	m3	4841	1993	3793	-944
Coal	kg	22842	6590	17982	-1730
Oil	kg	4412	1497	3589	-674
Peat	kg	72	72	0	0
Uranium	g	983	146	835	1
Primary energy (inherent energy in resources)					
Total	MJ	1070305	341460	855592	-126747
Non renewable, fossil	MJ	712228	267399	553106	-108277
Non-renewable, nuclear	MJ	287914	37668	257849	-7603
Renewable, biomass	MJ	20054	11182	8870	2
Renewable, wind, solar, geothe	MJ	5318	557	4760	1
Renewable, water	MJ	44791	24653	31008	-10870
Environmental effect categories					
Global Warming Potential	Kg CO2 eq	51684	19425	41103	-8844
Acidification	Kg SO2 eq	259	447	197	-385
Ozone depletion	g CFC-11 eq	7	1	6	
Photochemical oxidant formation	Kg C2H4 eq	24	26	15	-18
Eutrophication	Kg PO4 eq	24	11	16	-3

In the table are listed the aspects and the calculated sum from the Life Cycle as a total and per phase. The diagram below illustrates the proportion of non-renewable energy, which in reality will depend to a large on the country specific conditions. If the user purchases only renewable electricity, there is a good potential for further reductions of global warming.



Appendix D – Alfa Laval EPD in Sunda Hus Database

Environmental Declaration

Product			Ser. No.	Page
Plate Heat Exchangers			See below	1 / 1
Issued by	**Department**	**Date**	**Approved by**	
Anders Arnell	PC CHE	2006-11-16		
Recipient				
To whom it may concern				

1. Material contents

Serial No	30106-04271		
PHE type	M10-BFM		
Total Weight kg	374		
Components	**Material**	**Weight kg**	**Weight %**
Plates	AISI 304	74,8	20%
Gaskets	NBRB	10,2	3%
Carrying bar	Carbon steel	10	3%
Guide bar	Carbon steel	10	3%
Balance	Carbon steel	269	72%

2. Painting

The main components in carbon steel are painted.
Primer: Two component water based epoxy paint
Top coat: Two component water based acrylic paint

3. General Comments

The design of the plate heat exchanger is such that all materials can be separated and then easily recycled.

Anders Arnell
Product Manager Small and Medium Size Gasketed PHE's
Alfa Laval Lund AB, Product Centre CHE

By: PC CHE / A. Arnell
File: EnvDecEmpeRör061116.doc
Date printed: 2006-11-16 / 11:19

Appendix E – Marine Companies with Certificates and/or ISO

Baltija Shipbuilding Yard. ***Have info***. ISO 9001 and ISO 14001

Klaipeda. They are ISO 9001

Vakarų laivų gamykla. ***Have info***. Have over all obtain 6 different certificates, where two of them cover ISO 14001:2004 and ISO 9001:2004

STX Europe ***Have info***. But nothing of ISO-standards

A&P Group ***Have info***. ISO 9001 and ISO 14001

ARNO DUNKERQUE Just explain how they operate and that most of their customers are close or with in France, and that they do not have a big negative impact on the environment.

Astilleros Gondan ISO 9001 and ISO 14001

Jose Valiña, S.A ISO 9001:2008 and ISO 14001:2004

Bourgas shipyards. ISO 9001:2000

Buckie Shipyard ISO 9001:2008

CNP ISO 14001 and ISO 9001 – they have ***some info***. About on their homepage – but cannot copy/past it.

Palumbo. 4 different certificates, one of them are ISO 14001

Vittoria. Have ISO 9001:2008 and ISO 14001:2004

Cassens Werft "Our shipyard is ISO 9001-certified"

CENTROMOST. They have 9 different certificates, but none are ISO ones

Cetena. They have a pdf-fil with their "Code of conduct" – but this document does not really say anything and link on their homepage called "Environment and Pollution", which is really thin, with no really information

Con-mar. ISO 9001 certified

Freire. ISO 9001 and ISO 14001

Crist. 6 certificates, but none of them are ISO ones

Alushiptechnology. They have ISO 9001:2000

ASRY wins prestigious GCC award for Best Industrial Organization Complying with the Environmental Standards for the years 2007-2008. They have ISO 14001 and ISO 9001

Balenciaga Shipyard. They have ISO 9001 and ISO 14001

Appendix F – Letter of Intent

Letter of Intent

Shipping has the potential to be a mode of transport with low environmental impact. However, due to its international character, the shipping industry has not been subjected to the same environmental demands that have been placed on landbased industry and transport systems. The shipping industry currently operates under the weight of major and growing environmental problems which it is time to solve.

One way to encourage the shipping industry to become more environmentally adopted is that cargo owners or shippers (exporters and importers) place demands or requests on their shipping suppliers or carriers. This may create a win-win situation for several parties. Cargo owners may benefit because they can demonstrate responsibility for handling of raw materials and products even outside of the production plants, carriers with a ´clean´ profile may benefit from more transports, long contracts and public ´goodwill´ – and last but not least the environment itself will benefit.

With the *Clean Shipping Index*, the Clean Shipping Project team has created a questionnaire covering the major environmental issues with shipping today. It covers five distinct segments: 1) CO_2, 2) NO_x, 3) SO_2 and PM, 4) Chemical products, and 5) Fuel, water and waste control. Carriers filling in this questionnaire will get a general ranking of their environmental performance. This information is imported into the *Clean Shipping Index Database* where data may be compared with data from other carriers. The objective with the Index is to be a tool for cargo owners in their process of procurement of sea transport.

The Clean Shipping Project is working from an impartial platform and is financed completely by public funding from the Gothenburg Region Association of Local Authorities, the Region of Västra Götaland, Västra Götaland County Administration and Business Region Göteborg. Substantial funding is also obtained from the European Union through their Structural Funds.

The Scandinavian import and export industry is large and strong and generally shows high environmental ambitions. We believe in the opportunities and advantages that arise when a large number of players place similar demands on shipping services. With this document we want to show our intention to place environmental demands on our shipping suppliers and that we intend to use the *Clean Shipping Index* as a support in our procurement process.

Place and date……..

For the company ……..

Appendix G – Answers from the Sales Companies

Question 1

1. *–*
2. *As per Alfa Laval's segments' definitions those are: PEE, PPI, PFT & ERC which have the highest demands.*
3. *Oil and gas segment (one big customer Petrobras) and subcontractors. Our ISO 14001 is expected for end 2010 today we va ISO 9001*
4. *Copper mining segment within PPI*
5. *All our sites in Canada are ISO9001:2008, Customer Segments- Nuclear Power, Oil & Gas*
6. *I rate PEE & EMD Segments having the highest demand.*
7. *REFRIGERATION WITH NATURAL REFRIGERANT (CO2)DEMAND IT.*
   Larger companies that typically are listed on the stock exchange ask for it occasionally - this is valid for all segments.
8. *PFT (MU Brewery) - from international breweries*
9. *In fact environment subject is coming more important. We got ISO 14001 certificate in year 2009.At the moment it is hard to say a segment have more demand but we believe that demand will increase in future. Some of our customers asking for ISO 14001 certificate but customers asking this has a very small percentage in total.*
10. *The main customer with env. demands is Repsol YPF (O&G Company)*
11. *In EMD it are the BIG 3 shipyards, eg. Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI) and Daewoo Shipbuilding & Marine Engineering (DSME) We believe that the two driving customer segments would be Biotech and Green Profile companies within Hydro carbon business*
12. *The segment with the highest demand is (inget svar!!!)*
13. *It is no obvious difference between segments but in general our big and global customers have the highest demands.*
14. *Our customer is more concern about the performance on the equipment itself. We don't see demand on environmental information about the company. (NO demand)*
15. *We've only seen a demand in recent years and it remains a scattered picture.*
    -Some will ask for environmental info as part of their pre-qualification tender process.
    -Mineral processing, Marine, Oil & Gas industries are most likely to focus on environmental issues.
16. *Within PPI Natural Resources. Mainly requesting to fulfill requirements of Central Pollution Control Board. Then also Brewery customers.*
17. *Petrochemical, Pulp & Paper, Energy (O&G) and it will continue to extend*
18. *No, any.*
19. ***F&P**: Big customers are often the demanding. For some customers require ISO 14001 as basic condition to participate the bid.*
    ***Marine**: Quite a lot of questions CO2, NOX , SOX and ship recycling are mostly on the agenda*
    ***Process**: EPC companies are the most demanding and especially International EPC companies(much depending on their clients) They always ask for if we are following any national or international Environment standards and our procedures set up to follow them.*
    ***Industrial**: 1) Daikin (OEM Key account) : ISO 14000 is mandatory requirement to supply to Daikin.*
    2) Mitsubishi Electric (OEM Key account) : ISO14000, RoHS, Reach
    3) Shinwa, SMC (Semiconductor Chiller system builders) : RoHS
20. *Energy business = Refinery follow by Petrochemical and finally Oil & Gas market units*
21. *In our company, there are very seldom such demands from our customers. The highest demand would be in our environmental segment. Or on a larger scale, in stock exchange listed companies.*
22. *Pharmaceutical. Car Industry (specifically from Volswagen)*
23. *PPI (Process, process industry)and Marine segment*
24. *Petrochemical / Oil and gas*
25. *Power, District heating*
26. *Vegetable oil, other food, Starch, Pharma, Breweries, Environment*
27. *Life Science - Food - Oil & Gas and Refinery*
28. *Very customer specific (e.g Mærsk, Novozymes, Statoil), but E&E and M&D are probably the most focused.*
29. *Oil/Gas, Environmental, Car Industry, Local Government*
    End users. They take on the day to day running costs of our equipment. Contractors are only interested in seeing the plant work for 12 months and then they relinquish responsibility.
    EMD - Marine & Diesel segment have products, where the demands are driven by current legislation to protect the environment.

Pure Ballast, is one such product which is designed to kill invasive species prevalent is seawater, by using light and catalysts to produce radicals that breaks down the micro organisms in ballast water during the ballasting-de-ballasting process, thus preventing the spread of invasive species which destroy marine life.
Pure Bilge is another AL Product designed to clean bilge water from ships to 5ppm, without the use of chemicals.
Pure Vent, our crankcase gas separator is another product which cleans the diesel engine crank case gases, releasing 99% oil free air, providing huge benefits for the environment and for ship's cleanliness when used on a seagoing vessel.

Question 2

1. *–*
2. *For the time being, the customers are mainly concerned with the benefits that the Alfa Laval's products and services bring, such as the opportunity to reduce their operation costs whilst improving environmental performance. There have not yet asked us about our own Green Operations processes.*
3. *Oil and gas and some distilleries*
4. *Not yet*
5. *No, although it is a benefit that we like to bring to our customers attention, specially for our heat exchangers*
6. *So far, no. However, we expect the O&G & Marine customers to be the most demanding.*
7. *SOME MAJOR OEM'S (air condition) ARE OCCASIONALLY DEMANDING IT FOR PROJECT*
   Ship owners because of the IMO rules
8. *Steel producers have put the questions about AL products in terms of CO2 reduction*
9. *No. We have not received such a question.*
10. *The only customer asking for this info is Repsol YPF*
11. *Same as previous question: EMD it are the BIG 3 shipyards, eg. Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI) and Daewoo Shipbuilding & Marine Engineering (DSME) No questions have been directly asked to us in the Sales Company, maybe customers are surfing our homepage for such information*
12. *No customer made any demand for information.*
13. *Difficult to answer but customers are off course interested in the performance of our products and when performance has an environmental impact, they off course indirectly ask.*
14. *Offshore clients. Owners & Operators of drilling production rig will need very concise information on our oily water separator's discharge overboard, under 15ppm according to MARPOL.*
15. *Same as above. (Mineral processing, Marine, Oil & Gas industries are most likely to focus on environmental issues.)*
    -Most PHE customers will ask about heat recovery but more from an economical point than from an environmental.
    -Typically asked questions relate to generic info such as Environmental Policy.
    *-For products such as **Ecostream and PureBallast in the marine industry** customers will be more specific.*
16. *Not to my knowledge if you mention the impact of the manufacturing of the equipment.*
17. *Yes, O&G and Petrochemical*
18. *No, any.*
19. ***F&P**: Yes . Some customers requires a certificate that our products are not included the controlled substance (chemicals) by REACH or Rosh etc., when our customer exports to Europe*
    ***Marine**: Yes, bigger customers show most interest, valid for both owners and yards*
    ***Process**: Very seldom but some American clients for our customers requires us to fill it in.*
    ***Industrial**: 1) Daikin (OEM Key account) : ISO 14000 is mandatory requirement to supply to Daikin.*
    2) Mitsubishi Electric (OEM Key account) : ISO14000, RoHS, Reach
    3) Shinwa, SMC (Semiconductor Chiller system builders) : RoHS
20. *Yes, mostly in the Refinery & Petrochemicals. We now has a case in Thailand, where the court stop all projects in Mat Tat Phut area pending further settlement of the environmental issue.*
21. *Yes, there have been questions on energy consumption for rotating equipment. Also the production of waste products (example AlfaVap, hold up volume) has been an important topic. But till now, these questions have only arisen in our equipment department, not in the process industry, neither from a service point of view.*
22. *No*
23. *Some of the customers are asking how we utilize used spare parts e.g used gaskets*
24. *Oil and Gas customer are most demanding. 4-5 customers have asked for such information*
25. *Not yet*
26. *Yes, in a case of a CIP (Cleaning in place) station - food industry*
27. *This happens all the time our customers have to satisfy Federal or local legislation. In many other cases more than specific product information, we receive questions about environmental performance of our factories and operations. The most demanding customers are those larger in size and have a global presence.*
28. *Yes, though environmental performance is a somewhat unprecise term. Some are considering life cycle costs. Same segments as above, I would say.*
29. *Oil/Gas, Environmental*
    Some end users who are conscious of water usage during the cleaning processes of their plants have requested information on our products.
    All marine customers are keen to ensure that the equipment we propose meets the current day legislation and where

applicable that it is certified, by the relevant bodies, for instance our Ballast Water Treatment system is IMO approved and certified.

Question 3

1. *For our customers any kind of environmental information plays very small role in their decision to buy from us and not from the competitors, as the environmental awareness is rather low.*
2. *Same as the above reply. (Question 2: For the time being, the customers are mainly concerned with the benefits that the Alfa Laval's products and services bring, such as the opportunity to reduce their operation costs whilst improving environmental performance. There have not yet asked us about our own Green Operations processes.)*
3. *Theoretically yes but is a big questions mark on the practical side when price, delivery time and payment conditions are too.*
4. *Not yet really*
5. *No*
6. *Price is still the main consideration. Environmental information is still less concern in the decision when choosing a product, especially for local & small company.*
7. *Only if it is enforced by legislation - otherwise not.*
8. *Not yet in Russia*
9. *Customers do not consider this at the moment. Because it is not a criteria for them at the moment.*
10. *Not and not at all. Value perception of customers in our region is very low*
11. *Yes, it is part of their policy for "green growth" One major concern for customers is energy efficiency, because energy is MONEY. Beside the energy, there are no apparent considerations.*
12. *No, our customers will always look for technical and price competitiveness*
13. *No, not really. They are interested in the quality and performance. Bigger customers might evaluate our sustainability as a supplier but when passing that evaluation further evaluations are seldom made on product level. Some customers have a strong environmental profile but when you ask project engineers and purchasers on lower level they comment that "**environmental issues are not really considered on operational level, we based selection on performance, price and availability**".*
14. *No*
15. *Mostly for marine products only - generally to comply with regulations formulated by the Int'l Maritime Org.*
16. *Only if they have a request by any Regulations*
17. *For some customers, especially the segment I mentioned above. (Petrochemical, Pulp & Paper, Energy (O&G))*
18. *Customers do not consider the environmental information when they choose a product, not yet.*
19. ***F&P** : Yes, customer requires the certificate.*
    ***Marine**: Yes, it is considered but they are **normally not ready to pay if it is not a request by legislation**. Only times when they are ready to pay is for reduced energy consumption and the reason is not CO2 but the operational savings they can make*
    ***Process**: To have the certificates and the procedures is enough, <u>you will not</u> <u>get any added value if you</u> have a better system or <u>a more defined environmental performance of the products</u>. However many companies also put in personal environment (HSE) into environment management. Number of accidents, procedures etc and this is more important and can make a difference.*
    ***Industrial**: 1) Receive survey document from customer for the validation of film regarding Green Procurement.*
    2) Submission request of the compliance with RoHS directive - declamation
20. *Yes, as the environment impact will affect the progress as well as it may increase their cost substantially, including closing down of the factory or stopping of the project. They will look for reliable brands or suppliers, study the technical details and may even imposed strict conditions on appliances and performance guarantee, including CO2 emmission rate, etc...*
21. *Depending on the segment/department (see above), they do consider the information, but in our opinion it is treated more as a formality today.*
22. *No*
23. *Yeas, but it's not main decision factor (it's rather additional value)*
24. *No. Environmental compliance is a pre-qualification. Final product / service selection from amongst pre-qualified suppliers is purely based on price and other merits.*
25. *No*
26. *Not yet and specially not at the moment (crisis time)*

27. *Yes, particularly all the customers that are dealing with waste streams and fluids that are placed back into the environment. Energy saving is an important aspect, even if at the moment is more driven by cost reduction than environment protection.*
28. *When all else is equal, yes.*
29. *Dependent upon the Segment/Industry, the responses range from 'Not a major factor' to being 'Central to the Contract'!*
    - Some ask for energy efficient motors and discuss efficiency levels during the quotation process.
    - Customers do not have a choice, they have to comply with environmental legislation, especially when such legislation has been ratified. Furthermore some countries like USA, Norway, may ratify such legislation independently, meaning ships cannot operate in those waters if they do not comply.

Question 4

1. *I think so*
2. *Yes*
3. *Yes*
4. *Yes, indeed*
5. *Maybe*
6. *Yes eventually when environmental legislation & enforcement are more stringent.*
7. *Yes*
8. *Certainly , yes*
9. *It is related with legislations. If legislations forces of course everybody will consider environmental face of us. And we can say that in Turkey in future environmental legislations will be applied more strictly and of course than demand will increase.*
10. *Yes*
11. *Yes, of course. BUT is is very hard to estimate how fast. The President of Korea is pushing "green" so it is one of the buzzwords in the market*
12. *No, we do not see this happening in the Philippines yet*
13. *Yes*
14. *It might be for Oil & Gas application but don't see any demands for others*
15. *Yes. Certain large MNC's will want to demonstrate & enforce environmental consciousness & awareness but we believe an expected gradual increase in demand will largely be driven by legislation.*
16. *Yes*
17. *Yes*
18. *I think it will be the same level of demands within the next 1-3 years then it will increase due to the general importance of Environmental protection problem*
19. ***F&P**: Yes. it will be increased*
    ***Marine**: Yes*
    ***Process**: Yes but slowly. I see that it is our procedures that are important not that actual performance.*
    ***Industrial**: Yes*
20. *Yes and this will becomes more important.*
21. *Most likely yes, if environmental info will become a part of local legislation.*
22. *Not in the near future. But it should come in the medium term (not less than 10 years from now)*
23. *Yes*
24. *Yes, to some extent*
25. *No*
26. *It is hard to judge, but most probably yes*
27. *Yes*
28. With no doubt: Absolutely yes
29. YES, YES AND YES The consensus of opinion is not if we need the information, but when this information will be required and central to any Customer's Purchase Order.
    It will*, we are seeing it more and more. The UK government offer incentives for low water usage cleaning heads and also tax breaks on their installation. This is also the case for efficient pump motors.*
    The protection of the environment is gaining increasing importance and this driving force will increase the pressure on suppliers to produce environmentally friendly products.

Question 5

1. *Yes, why not.*
2. *Yes, From our image point of view yes but affecting the volume of business*
3. *In the future, yes.*
4. *It would with a few customers*
5. *Yes (but only to certain extend) especially when dealing with international & large company. No, if we are dealing with local & small company who will not pay premium or care little for such information.*
6. *Not today. The trend is clear and will most likely be so in the future. (it will most likely be the entrance ticket to some bid's)*
7. *Not now but in the future*
8. *Of course it will help but at these conditions it cannot be a primary selection criterion. If legislations forces customers; then environmental information of Alfa Laval will be more important.*
9. *Not in the near future*
10. *Yes, probably not for our customers right now*
11. *No, not in the Philippines*
12. *It might qualify us to quote but will not give an advantage to win an order.*
    It might also improve and strengthen our brand image. For specific product advantages it might be of value to make the environmental impact more visible, eg improved heat recovery -> less emissions etc). This would help us to promote the product but not necessary give us an competitive advantage (as environmental impact often is similar for competitors offerings and seldom AL unique)
13. *Not really as end user is more concern about the performance of the product itself and not much requiring environmental information of the company.*
14. *Only marginally at this stage and very dependent on the situation/type of customer.*
15. *It is improving our image, which is part of the competitive advantage*
16. *Yes*
17. *It could be in near future*
18. *Not now. Probably in future.*
19. ***F&P**: The environmental information is needed. But not increase the our competitiveness*
    ***Marine**: Yes*
    ***Process**: No*
    ***Industrial**: Yes, I believe. Easy access to information and easy understanding is important to be understood by Sales and Customers.*
20. *Yes, however I am sure the other competitors will follow shortly.*
21. *It could give a differentiation to the mentioned customer groups. (professional image)*
22. *No for the time being. As I said we have had a request from VW nut the purchasing behaviour it is the same not giving a real difference to you when it is time to buy and compare prices.*
23. *No*
24. *If the features are unique, then yes. Otherwise this will be a minimum requirement for pre-qualification*
25. *Not for the moment*
26. *Probably not for time being (this is not looked as competitive advantage now).*
27. *Yes, it does when it is related to the performance of the product*
    (energy saving and emission reduction). In many cases is required to provide information, if we do not comply is a clear disadvantage.
    Another advantage is to stress our production environmental certifications and investment in this direction.
28. *All else equal yes, but it is not worth that much of a premium yet*
29. *Again the responses were dependent upon Segment. From NO to YES*
    In some segments. Not so much in Sanitary!!
    Any campaign, with products whose use are focused on protection of the environment would raise our profile as a company, but would not give us a competitive edge unless there were no other suppliers who were able to offer a similar product.

Question 6

1. *If we can show link between the env. info and their profits.*
2. *Outlining the effect on reduced use of energy sources, expressed as well by a value of CO2 emission reduction.*
3. *Gas emissions, percentage of recycled residues*
4. *CO2 emissions, energy recovery, recyclables*

5. *Savings in monetary terms*
6. *Reduction of CO2 emission and how this will qualify them for CDM application.*
7. *Certification 14000 of service activities, but only in the future. today it is too early*
8. *How to increase customers` income and reduce their running cost*
9. *Environmental data starting from production stage till to the delivery of product to end-user. Emission reducement, minimum waste; energy recovery issues will be more powerful tools.*
10. *None for the time being*
11. *Information regarding development of new environmental products, and information regarding what AL is doing in their SC's, factories etc, to protect the environment*
12. *For Philippines, what will be useful is our corporate image that we are very concern about the environment.*
13. *Today environmental information is mainly to strenghten our brand image and needed when customers are making supplier evaluations. In the sales process (on project level) we do not today see a need for additional information (unless the product is giving an unique environmental advantage which is part of the basic value package)*
14. *Not too sure as we don't see demand at this stage, but I assume is some accreditation certificate by some recongised enviornmental society/group.*
15. *-Training material highlighting environmental benefits in choosing AL's product range.*
    -Water and Energy consumption/cost savings to operate our products.
    -Perhaps a statement to the effect of documenting the carbon "foot-print" involved in the manufacturing process or a calculation of the carbon foot-print of our products vs competition.
16. *Potential energy savings, contribution to clean technology and CO2 emissions reduction*
17. *Safety*
18. *–*
19. ***F&P**: The explanation or statements how AL work for the subjects*
    ***Marine**: Technical general information where we have products that can contribute. An example is the Advices for heavy fuel oil treatment which indirectly promotes our separators. General marketing to give the right profile but also new products in the environmental portfolio on a regular basis*
    ***Process**: Our procedures, how we actually work with the subject.*
    ***Industrial**:*
    " Clean technologies" : CHROME&UTILITY : High efficiency solutions. Natural refrigerant solutions. EMD : Innovative solutions PPI & PEE : Energy saving, Natural resources
20. *Information and guaranteeing water comsumption, CO2 emmission rate, Energy comsumption. How we can treat the waste, etc..*
21. *Since energy consumption & CO2 emissions are high on the customers agenda, we could think about energy labeling and information on waste (pollution) and noise.*
22. *Not in the near future. But it should come in the medium term (not less than 10 years from now)*
23. *Yes*
24. *Product performance compliance with environmental standards/requirements i.e. Pure Bildge and IMO certification. Information as to how our products will assist in meeting the environmental standard applicable to their industry.*
25. *Providing ISO 14001 would be enough*
26. *"ISO 14001 certified" logo in the footprint of our letterhead/proposals/leaflets*
27. *Proven case studies from independent research firms or governmental agencies certifying our performances and how our products help the environment either by saving energy or reducing pollution.*
28. *See ppt from Novozymes, (attached file)*
29. *Statistics on A-L's Product's 'environmental performance' Lifecycle costs in CO2 consumption and performance .Data on how much energy can be saved by using A-L products. How much recycled material is used in the manufacture of A-L products*
    Clarification of what end users can save directly compared to our competitor products.
    Environmental information that proves the green credentials of our products will definitely assist the sales process, as it helps customers raise their profile by proving their green credentials.

Question 7

1. *Nothing in particular for the Israeli market. Just a general request to closely monitor environmental demands globally, which we will embrace locally as they are made readily available.*
2. *Keeping us posted regarding the legislation in Europe specially since they are ahead giving us a chance what will be in the future, provide information and resources for best practices*

3. *At the moment nothing is required*
4. *Assist in certification processes for example Canqual, a local certification involving health & safety as well as quality process required by some Oil & gas companies for repair of their equipment.*
5. *–*
6. *As a suggestion, to design an environmental protection logo and in-print them in all our brochures.*
7. *Do not know at this point, as stated above the customer need at this point is limited.*
8. *More interesting case stories*
9. *Economical affects of environmental data should be presented to Sales Companies. By this way it can be a tool to present to our customers. Beside our local applications; it may be helpful to be informed by Alfa Laval Environmental Council about latest actions taken at production points. By this way we may have chance to see big picture and we can also present these information to our customers.*
10. *We have very little demands from only one customer out of 400 today*
11. *Provide us with environmental information which we can directly forward to our customers, or put it on the AL-website. Make sure that our green profile is an integrate part of the sales material and not something extra.*
12. *They should generate more information as to what we are doing relate to environment.*
13. *I do not know*
14. *N.A as we don't see customer demands on it.*
15. ***Internally** through training material highlighting the positive environmental impact of our product range.*
    ***Externally**, by providing a concise information sheet or a few slides that can be attached to presentations showing AL as an environmentally aware company that has taken steps to reduce environmental impact; e.g.*
    -through the use of environmentally friendly materials,
    -through the use of work place practices and/or procedures in the manufacturing process
    -supply of environmentally friendly chemicals for maintenance of our products.
16. *Sometimes it is not easy to find the speaking partner. Maybe a helpdesk for questions coming from customers would be a good support.*
17. *Standarlization*
18. *–*
19. ***F&P**: When we get questions from customer , we can directly ask Council and get reply from them. Its system is useful.*
    ***Marine**: Have not heard about it before*
    ***Process**: Make it easy to find the information about the work in English and also in a way that we directly can use towards customers.*
    ***Industrial**: "Clean Technology" 1) Update information of "Clean technology" 2) Case stories, PPT presentation "Green Operation" 1) Setup of Yearly CO2 reduction target. Information of CO2 reduction statistics 2) Information of CO2 reduction activities, Scrap reduction activities and Waste recycle activities Easy access to ISO14000 certificates by each production site Easy access to "Declamation of conformity" for RoHS by each products*
20. *Assist in the preparation, providing and coordinating the information need during the feasibility studies stage. Assist in the risk assessment, competitors' intelligence during the quotation and negotiation stage, especially when come to stringent performance guarantee, tough terms and conditions, providing unique information depending on the type of projects, etc...*
21. *Customers will be interested in saving energy and reducing CO2, NOx and SO2. Branding Alfa Laval around these subjects can help the commercial process.....the customer will think first about Alfa Laval when confronted with these challenges. If you're contacted first, you can influence the project. Currently our message (branding) around energy, CO2 and NOX has been limited and often false. Plate heat exchangers do not save energy compared to S&T.....plate heat exchangers have a better Opex/Capex, energy/Capex, CO2 saving/ Capex ratio than S&T in some applications*
22. *Keeping us informed of the situation and progress.*
23. *Finding and presenting cases like in the point above.*
24. *Get regular industry feedback on the new environmental regulations, provide input to sales companies on these and also on the opportunities for Alfa Laval to provide customer solutions on these new regulations*
25. *No action for the time being*
26. *Case stories attached to new products about successes in this area, which can help to quantify how we minimize the environmental impact of our products. Of course all of these efforts have to be sowed into good soil - this do not really matters now-a-days.*
27. *Provide actual data on what we are doing as a company to improve the environment. Continue to have our Environmental Policies part of our day to day business strategies and corporate governance.*

28. *Provide something like the above and make what we already collect marketable*
29. *General environmental publicity & PR. Press activity. Plus, all the above.*
    Once a local sales company has identified a scheme that can benefit the customer, it could assist with the documentation and paperwork registering with that scheme.
    I am not aware of this council, but I guess greater communication to our customers through various means will benefit us.

Appendix H – Interview Pfizer

Attending:
Barbro Hellström - Compliance Lead, Pfizer Health AB
Anna Liljedahl - Procurement Site Strängnäs

The production site in Strängnäs is working with biotechnical production for pharmaceutical substances.

Part 1

Question 1: How does your company work with environmental issues today?

Pfizer is working a lot with environmental related issues. The company is "Working for a healthier world". Since 1996 the site in Strängnäs have been working with EMAS. They were the 11th company in Sweden working with such environmental management system.
They are working according to the ISO14000 standards. In 2008 the stopped using EMAS, mainly because a lot of costumers are Americans so working with EMAS was not the most optimal since they had to translate a lot to English and understandable standards. They are today working according to ISO14001.

At Pfizer in Strängnäs they have policies on both working environment and outer environment. They integrate the environmental work among all the employees; every worker shall feel responsibility and participation to work for a better environment. To do that Pfizer in Strängnäs have internal educations and all the managers have a certain tasks and responsibility when it comes to the environmental work within the company.

Question 2: Have you defined an environmental policy within your company?

Yes, Pfizer has an environmental policy, both for the production site in Strängnäs but also for the whole company. They advocate an open and honest cooperation between different parties to work for a sustainable development and responsible business. Pfizer are committed to United Nations' Global Compact (directions about how to work with human rights, working environment, environmental issues and against corruption).

Question 3: Do you require suppliers to have any sort of environmental certifications and/or standardizations?

When purchasing Pfizer always asks for ISO 14000 or EMAS.

Question 4: Do you have a department/group of people working with environmental questions?
- How is the environmental work divided between different persons and/or different departments?

The Environmental Management Team (EMT) is the highest part of the organization working with environmental related issues and how to increase the environmental effects of the production. The environmental work is then integrated and spread in the organization.

Question 5: What are the main reasons for your company to work with environmental related questions?

The main reasons are transparency and an open conversation to the customers, shareholders and other interest parties. The County Councils (Landstingen) are asking for environmental related information in the purchasing process.

Working with environmental issues goes hand in hand with cost savings. When looking through how to decrease the effect on the environment, there is often a way to reduce costs for example; lower energy consumption is not only good to the environment but also cost less.

Big environmental related issues such as the greenhouse effect is a pusher behind the environmental related work.

Question 6: What kind of environmental information do you value:
- When producing? - When purchasing? - Within marketing? - When selling?

When purchasing the suppliers have to show that they are working with environmental related issues and how they do that; if they have any certificates or if they have environmental management systems. Not all companies have certificates, but still work along with a sustainable development.

Question 7: What kind of environmental challenges do you need to improve?
For what reasons; (why is it important?) Internal reasons? External reasons?

We need to improve and optimize the handling of chemicals, we have a zero tolerance when it comes to accidents.

Question 8: How do you store environmental information from;
- internal parties - external parties

Documents are stored in the files for purchasing. They are files for 10 years. Environmental information is also stored in commercial papers, reports and on the internet. Environmental information can also be found in the economical systems, for example in the data concerning energy consumption. Documents from external parties such as reports from sewage treatment work or reports made by the governmental authorities also gives certain information concerning environment and Pfizer's work concerning the environment.

Question 9 : Do you feel any external factors that pressure you to deal with environmental issues? If yes; what kind of factors and how do you deal with them?

When purchasing – No. The main external factors pressuring are concerning legislation. These demands are made by the county administrative board, EU: REACH and other authorities.

Question 10: In what way would environmental related information from your suppliers be to any value for you?

Environmental related information from suppliers to be able to list and evaluate them- Today Pfizer has an evaluation system; they look at the different suppliers and give them points on different criterias. Out of the grades and the evaluation Pfizer will be able to give them a final grade to compare the companies. Today there is one evaluation criteria concerning environmental information; how the companies are working with environmental related issues. In the future there might be more environmental information integrated in the evaluation system.

Question 11: What kind of environmental related information from your suppliers would you like to have?

The company has to have a good reputation when it comes to environmental behavior. Certificates and environmental reports are also useful. Information about the transports and carbon dioxide emissions would be interesting to get. Pfizer prefer if their suppliers work active with decreasing the environmental load and towards a sustainable development, for example if they choose energy from renewable resources.

The suppliers have to be able to give Pfizer a safety data sheet, that is an important criteria. The suppliers also have to have a understanding for legislations concerning the industry. It is important for Pfizer to be able to rely on the information given by the suppliers.

When it comes to Alfa Laval, information about the lifecycle cost would be interesting. The length of life, the price and energy consumption is important. The products shall be easy to serve.

Question 12: What kind of environmental information would you be willing to pay for?

None

Question 13: Do you evaluate/analyze your products from a life cycle perspective?

No, since all the products are perishable.

Question 14: If one of your suppliers can provide a LCA; what information, from the LCA, would you value the most in your department?

It is hard to say, but probably energy consumption and service related costs. Money have a key role when choosing a supplier. It would be very valuable to get information straight away and not have to make calculations by ourselves.

Question 15: How do you provide your customers with environmental information about your products?

Pfizer provide their customers with environmental information through their environmental reports and information sheets.

There are many regulations around the marketing of pharmaceuticals, which makes it harder for Pfizer to actually promote their products as environmental friendly. Today Pfizer demands that all their production sites (around 100) are ISO certificated.

Question 16: How do you see yourself work with environmental questions in ten years?

The external demands on environmental related issues will increase. The demand will be higher and the control of the suppliers will probably be made harder.

The focus will especially be on areas that are critical and where the risks are high. If there is a scandal in a certain area, the focus and risk analysis on this particular area will be bigger.

There is an increasing focus on the patient's perspective, all the time, and will probably increase more in the future.

Part 2

	Priority (1-5)		**Priority (1-5)**		**Priority (1-5)**
	Today		In five years		In ten years
Price	2		3		5
Performance	1		1		1
Environmental friendliness during usage	4		4		3
Recyclable	5		5		4
Length of life	3		2		2

Question 2: What external factors pressure you (or will pressure you) to deal with environmental issues from the following parties?
– Legally – Customers – Competitors – Media

The customer demand will increase in the future, and pressure us to work with environmental issues. When the low-income countries get better positions on the market, then we have to have better sales argument, for example within CSR.

There are of course a lot of legal restrictions within the pharmaceutical industry, for example about how to handle waste.

Question 3: In the purchasing process: If you would receive a 2-3 pages long document concerning the environmental performance (about energy consumption, emissions and so on) of the product;
- Would such a document be valuable for you? If yes; how?
- How would you handle it?
- Who would read it?
- Would you store the document? ("Not throw it away..")

Yes it would, but it is hard to know how to evaluate such document. The information will probably be valuable but it is very hard to know how to compare such information with any other information. For example ISO and EMAS have been evaluated by a third part, which makes them more trustable and easier to use. However the document would be a proof that the company cares and is thinking one step further. There is also an increased focus on ethical issues.

If Pfizer would ask for such document described in the question, the of course they would read it. They would for example use important facts from it in their environmental reports or as a part of their product information.

In the pharmaceutical industry it is sometimes hard to care too much about different facts in the purchasing process, because often when buying new production equipment it has to be exactly the same as the old one. The new machine have to fulfill the same demands and work exactly in the same way as the old one, otherwise something can go wrong, and when it does it might be a matter of life.

When buying standard equipment it is easier to choose between different suppliers and products, and then environmental information is more valuable. Pfizer do not have a lot of different suppliers, at least in Strängnäs, which makes it harder to appreciate environmental aspects.

Question 4: How do you evaluate these environmental tools; choose three of the following environmental tools that you find most valuable/important.
- Carbon footprints - Water footprints - Product Category Rules (PCR)
- Life Cycle Assessment (LCA) - Black and Grey list - ISO standards
-Environmental Product Declaration (EPD) - Climate Declarations

Evaluate the three tools you have chosen; give them priority from 1 to 3.
(1= highest priority, 3= lowest priority)

1. ISO Standards	Priority 1
2. Black and Grey list	Priority 2
3. EPD	Priority 3

Question 5: What requirements about EPDs do you have on your suppliers? What are the motivations behind the requirements?

Pfizer do not have any requirements on EPDs today.

Question 6: Is there any type of environmental information that you would like to get from your suppliers that you do not receive today?

No, not really. We often get what we ask for, which is ISO certifications and the "säkerhetsdatablad".

Question 7: How do you evaluate your suppliers, considering environmental information? Such as; environmental certifications, environmental performance (for example emissions, toxic materials, energy consumption) and environmental declarations?

If there are two suppliers that are exactly the same, everything is equal; then environmental information can be crucial when choosing the supplier.

Question 8: A supplier can provide an environmental declaration. Evaluate at the following three declarations, which one would you evaluate the most useful, neutral and least useful for you to have. Put the number of the suggestion 1, 2, 3 in the box.

1. An overview of the environmental performance of the product, 2-3 pages. (No third party certification. No details or deeper analysis.)

2. More detailed information about the environmental performance of the product during its life cycle, 20-50 pages. (No third party certification. A deeper analysis. Specific environmental data.)

3. Summarized information about the environmental performance of the product during its life cycle. (Third party certification. Summarize of a deeper analysis. The most valuable specific environmental data.)

Valuate the highest; most useful 3
Neutral evaluation 1
Least evaluated; least useful 2

Question 9: A supplier can provide an environmental declaration. Look at the three following declarations, which one would you evaluate, in relation to the price, the most, neutral, and least for you to have.

None of them

Question 10 If the document is not certified by a third party, how reliable do you find the information? Valuate on a scale from 1 to 3.

1= not reliable, 2= reliable, 3=very reliable.
Put an X in the box that corresponds to your answer:
1 2 3
X

Question 11: Do you have any experience from Environmental Product Declarations (EPD)?

No

Question 12: What guidelines does your company have about EPDs? - When producing? - When purchasing?

None

Question 13: Are EPDs something that is interesting you?
Do you ever ask your suppliers for EPDs for the products you purchase?
- If yes, explain how…
- If no; do you believe that EPDs can be of your interest in the near future? In how many years?

There is no need for EPDs today. Pfizer is not ready for that type of enviormental declarations yet. Today ISO certification is good enough. Within the pharmaceutical industry the information in the declarations can be hard to use, since they cannot use the information for the end products, for example by typing environmental information on the pharmaceutical packages.

Question 14: Do customers ever ask you to provide them with an EPD?

No

Question 15: How do you see yourself work with environmental declarations in ten years?

Maybe, it is not impossible, but it would probably be in another way. It is hard to apply such declaration on the pharmaceutical industry.

Question 16: In the future; do you believe there will be a general demand for EPDs?

Yes generally it will be. For example if you look at the green house effect during the last 5 years; the trend is that people are more interested in environmental related issues and the need of information concerning those issues has increased.

Question 17: If Alfa Laval can provide any kind of environmental information, such as those mentioned above (or any other that you may be interested of), which one would you like to receive from them?

Do know really know. It is hard to evaluate the information and when comparing you have to compare totally equal information/products to see the gain in it.

Question 18: If Alfa Laval can provide EPDs; Would you be interested?

From environmental point of view; yes it would be interesting but only because of curiosity. It would be interesting to see how such EPD would look like and how the environmental issues would be evaluated.
From purchasing point of view: No.

Question 19: What kind of environmental information/data would you prefer to have in such EPD?

Do not know.

Question 20: Do you think it is necessary with a third part certification for the EPD to be reliable?

Third part certification is important for the document to be reliable.

Question 21: Are you willing to pay for such EPD?

No

Question 22: Would you be satisfied just to know that Alfa Laval would be able to provide you with an EPD? (Checklist…)

When purchasing it would just be a checkpoint, at least today since Pfizer do not ask for it or would use the information for investigations. We are not ready for such document at the moment. The market and the companies have to see the gain in environmental information to evaluate it.

Appendix I – Interview Novozymes

Attending:
Lars-Gunnar Ritzén, Supply chain coordinator, Environmental coordinator
Anders Rosberg, Head of Process & Technology

The production site in Lund is working with biotechnical production.

Part 1

Question 1: How does your company work with environmental issues today?

Right now we are in the start of development and introduction of an environmental management system at the site in Lund. The parent company, Novozymes in Denmark, already have such system and the goal is that all bio-business within Novozymes shall implement such management system and then get certificated according to the ISO standards. There is a great focus on the environmental area in our company today.

As a producer of enzymes we already have an environmental approach in our business, since enzymes are more environmental friendly than chemicals. Novozymes help their customers to get a better environmental profile, and to be more environmental friendly.

For example Novozymes is delivering enzymes to both Unilever and P&G, to use in their washing powder. Washing clothes with such power can be made both in lower temperatures and with only biological raw materials.

Novozymes has gotten some awards for the environmental work done within the company. They can be found on our webpage: http://www.novozymes.com/en/MainStructure/Sustainability/Recognitions.htm

Question 2: Have you defined an environmental policy within your company?

The environmental policy within Novozymes is very important and shall be integrated into all parts of the company.

Question 3: Do you require suppliers to have any sort of environmental certifications and/or standardizations?

In the purchasing process Novozymes rank their bigger suppliers (delivering products over a certain amount of money) in different aspect. The suppliers have to fill in a questionnaire concerning their company. In this questionnaire there are five questions concerning the environment-
If the supplier:
1. Is documenting their impact on the environment.
2. Is following the environmental rules and regulations within the industry.
3. Have any type of eco-labeling.
4. Make Life Cycle Analysis (LCA) on their products.
5. Is sure that they do not contaminate the groundwater and the ecosystem.

When evaluating suppliers it is hard to know how far back in the value chain one can trust on the suppliers and their suppliers and so on.

When asking about the environmental management system at the supplier company, you can often assume that if they do have such system then they are also working in a sustainable way.

Question 4: Do you have a department/group of people working with environmental questions?
- How is the environmental work divided between different persons and/or different departments?

Novozymes has a department containing eight persons, they are stationed at the head office in Denmark. Every Novozymes site is represented by a environmental coordinator, who is reporting to the parent company every quarter of a year.

Question 5: What are the main reasons for your company to work with environmental related questions?

The main reason to work with environmental issues is to be vigorous and competitive. Since Novozymes has an environmental profile, it is very important for them to care about a sustainable development.

Novozymes educate their customers within environmental aspects in concerning the products they are buying from Novozymes. The environment is one of the strongest sales arguments for Novozymes. The products, such as the enzymes, help their customers to produce more environmental friendly products. During the sales process Novozymes calculate the decreased cost from using enzymes in the customers processes. Even if enzymes are expensive, using them often results in cost savings.

Question 6: What kind of environmental information do you value:
- When producing? - When purchasing? - Within marketing? - When selling?

Novozymes evaluate an interaction between environment and the economy. How they can save money and at the same time be environmental friendly, for example by decreasing their energy consumption.

Question 7: What kind of environmental challenges do you need to improve?
For what reasons; (why is it important?) Internal reasons? External reasons?

Decrease the energy consumption.

Question 8: How do you store environmental information from;
- internal parties - external parties

Environmental information is documented at the website. Technical documents are saved in a technical library/data base.

Concerning the storage of environmental information from suppliers such as Alfa Laval the most optimal way would be if Alfa Laval had a system, for example on their webpage, where the information could be found. Novozymes wants to have the information, when they need it, but do not want to store it themselves.

Question 9 : Do you feel any external factors that pressure you to deal with environmental issues? If yes; what kind of factors and how do you deal with them?

Laws and regulations. There is also an internal driving force, the company management has set up internal goals.

Question 10: In what way would environmental related information from your suppliers be to any value for you?

Energy consumption (related to cost savings). The environmental effects during the production process. Service and maintenance (the frequency of having to change spare parts etcetera). The recycle of the product.

Question 11: What kind of environmental related information from your suppliers would you like to have?

The homepage is very important, the information shall be both broad and of quality. A suggestion would be to have a homepage with log in and password, in that way the company can avoid abuse of the information but the customers still have the opportunity to find the information themselves. It is often an advantage to be able to search the information on your own.

Question 12: What kind of environmental information would you be willing to pay for?

None. We would be willing to pay for it but only as a part of the whole price, that means the product will be a little more expensive.

If there is a win-win situation, for example if Alfa Laval's products can decrease the energy consumption and thereby reduce costs, then of course it is easier to be willing to pay for it.

Question 13: Do you evaluate/analyze your products from a life cycle perspective?

Novozymes do it, but the production site in Lund does not.

Question 14: If one of your suppliers can provide a LCA; what information, from the LCA, would you value the most in your department?

Unfortunately the question is hard to answer, since we have not made it so far at yet.

Question 15: How do you provide your customers with environmental information about your products?

Environmental information is one of Novozymes main sales argument – "we educate our customers in the subject"

Question 16: How do you see yourself work with environmental questions in ten years?

Even more than today.

Part 2

	Priority (1-5)		**Priority (1-5)**		**Priority (1-5)**
	Today		In five years		In ten years
Price	2		2		3
Performance	1		1		1
Environmental friendliness during usage	4		4		2
Recyclable	5		5		4
Length of life	3		3		3

Question 2: What external factors pressure you (or will pressure you) to deal with environmental issues from the following parties?
– Legally – Customers – Competitors – Media
Laws and regulations. To keep the "green" image of the company.

Question 3: In the purchasing process: If you would receive a 2-3 pages long document concerning the environmental performance (about energy consumption, emissions and so on) of the product;
- Would such a document be valuable for you? If yes; how?
Yes, it would be part of the decision of what to buy.
- How would you handle it?
As part of the material to base the purchasing decision on.
- Who would read it?
Envioronmental coordinator, the technical manager and the person who within Novozymes challenge all large investments.
- Would you store the document? ("Not throw it away..")
Yes, as part of the other documentations.

Question 4: How do you evaluate these environmental tools; choose three of the following environmental tools that you find most valuable/important.
- Carbon footprints - Water footprints - Product Category Rules (PCR)
- Life Cycle Assessment (LCA) - Black and Grey list - ISO standards
-Environmental Product Declaration (EPD) - Climate Declarations

Evaluate the three tools you have chosen; give them priority from 1 to 3.
(1= highest priority, 3= lowest priority)

1. ISO Standards	Priority 1
2. Carbon Footprint	Priority 2
3. LCA	Priority 3

Question 5: What requirements about EPDs do you have on your suppliers? What are the motivations behind the requirements?
No requirements about EPDs.

Question 6: Is there any type of environmental information that you would like to get from your suppliers that you do not receive today?
Do not know.

Question 7: How do you evaluate your suppliers, considering environmental information? Such as; environmental certifications, environmental performance (for example emissions, toxic materials, energy consumption) and environmental declarations?
Suppliers are evaluated and ranked according to a lot of factors. Out of the total XXX factors, 5 are concerning the environment.

Question 8: A supplier can provide an environmental declaration. Evaluate at the following three declarations, which one would you evaluate the most useful, neutral and least useful for you to have. ***Put the number of the suggestion 1, 2, 3 in the box.***

1. An overview of the environmental performance of the product, 2-3 pages. (No third party certification. No details or deeper analysis.)
2. More detailed information about the environmental performance of the product during its life cycle, 20-50 pages. (No third party certification. A deeper analysis. Specific environmental data.)
3. Summarized information about the environmental performance of the product during its life cycle. (Third party certification. Summarize of a deeper analysis. The most valuable specific environmental data.)

Valuate the highest; most useful	3
Neutral evaluation	1
Least evaluated; least useful	2

Question 9: A supplier can provide an environmental declaration. Look at the three following declarations, which one would you evaluate, in relation to the price, the most, neutral, and least for you to have.

We would not pay for the information, even if it has a third part certification.

Value the most: 1

Neutral evaluation: 3 (but we do not want to pay for it)

Least evaluated:2 (it is too much, we would never be able to read and evaluate all the information)

Question 10 If the document is not certified by a third party, how reliable do you find the information? Valuate on a scale from 1 to 3.

1= not reliable, 2= reliable, 3=very reliable.
Put an X in the box that corresponds to your answer:
1 2 3
X

It depends on the company that makes them. If Alfa Laval would make an EPD they would not need a third part certification for it to be reliable. An EPD from a big company with a good reputation, that you feel trust for do not need to have the third part certification.

Question 11: Do you have any experience from Environmental Product Declarations (EPD)?

No, not in practice.

Question 12: What guidelines does your company have about EPDs? - When producing? - When purchasing?
Novozymes in Lund do not have any guidelines for EPDs but the company in Denmark does.

Question 13: Are EPDs something that is interesting you?
Do you ever ask your suppliers for EPDs for the products you purchase?
No
- If no; do you believe that EPDs can be of your interest in the near future? In how many years?
Yes, in a couple of years.

Question 14: Do customers ever ask you to provide them with an EPD?

No, not in Lund. In bigger parts of Novozymes, probably.

Question 15: How do you see yourself work with environmental declarations in ten years?
Yes

Question 16: In the future; do you believe there will be a general demand for EPDs?
Yes

Question 17: If Alfa Laval can provide any kind of environmental information, such as those mentioned above (or any other that you may be interested of), which one would you like to receive from them?
A declaration of the energy use and Carbon footprint.

Question 18: If Alfa Laval can provide EPDs; Would you be interested?
Yes.

Question 19: What kind of environmental information/data would you prefer to have in such EPD?

The information shall not be too heavy. The EPD shall contain all relevant information but in a concise way. Novozymes want to know that the suppliers are considering the environment in their processes.

Question 20: Do you think it is necessary with a third part certification for the EPD to be reliable?
No, but the supplier have to be trustable.

Question 21: Are you willing to pay for such EPD?
Not separately, it shall be a part of the whole price for the product.

Question 22: Would you be satisfied just to know that Alfa Laval would be able to provide you with an EPD? (Checklist…)
It would be a good start but if the EPD was provided it would be better

Appendix J – Interview Wallenius

Part 1

Question 1: How does your company work with environmental issues today?

- Certified according to ISO 9001 and ISO 14001 since 1996 and 1998 respectively
- Long and short term goals
- Upstream solutions, don't solve an environmental problem by creating a new one
- Small steps in the right direction – don't wait for the perfect solution, start the work
- Be a forerunner, show what is possible – act not talk
- Take a broader responsibility than just follow laws and regulations

Question 2: Have you defined an environmental policy within your company?
Yes, but it does not contain any specific policy towards suppliers, but we do have some policies stated in our Quality Manual.

Question 3: Do you require suppliers to have any sort of environmental certifications and/or standardizations?
If yes; describe. (for example EU flower, ISO certificate, EMAS…)
All companies placed in the "Suppliers Register" have been approved. This register covers all suppliers that are approved and is updated when needed. The possession of an ISO certificate, both quality and/or environmental, is a plus for a supplier. Suppliers that for some reason no longer are approved are deactivated from the "Suppliers Register".

Question 4: Do you have a department/group of people working with environmental questions?
-If Yes; How is the environmental work divided between different persons and/or different departments?
Yes. There are different areas of responsibility within the environmental department and all other departments including sea-going are involved in implementation. All of our employees are responsible for applying environmental concern in their actions and environmental education is mandatory for all our employees.

Question 5: What are the main reasons for your company to work with environmental related questions?
Strategic decision made by the owner.

Question 6: What kind of environmental information do you value:
- When producing?
- When purchasing?
- Within marketing?
- When selling?

Question 7: What kind of environmental challenges do you need to improve?
For what reasons; (why is it important?)
Internal reasons?
External reasons?

Question 8: How do you store environmental information from;
- internal parties
- external parties

We are working to get at information base on the computer, with environmental information from both internal and external parties.

Question 9: Do you feel any external factors that pressure you to deal with environmental issues?
If yes; what kind of factors and how do you deal with them?
Yes, but only since recently due to the fact that legislation has finally started to put some pressure on the shipping industry.
There have been increasing interests in environmental performance from our customers which is a development we truly welcome.

Question 10: In what way would environmental related information from your suppliers be to any value for you?
It would probably more be a way to guide us to make the correct decisions

Question 12: What kind of environmental related information from your suppliers would you like to have? The environmental impact (energy consumption, choice of materials, emissions, water consumption etc) of the product

- ***During production***
- ***During lifetime***
- ***End of life handling***
- ***Improvement possibilities***

Have not really thought so much about it.

Question 13: What kind of environmental information would you be willing to pay for?

So far, none. Based on common understanding about creating a sustainable future.

Question 14: Do you evaluate/analyze your products from a life cycle perspective?

Not today – probably will in a close future

Question 15: If one of your suppliers can provide a LCA; what information, from the LCA, would you value the most in your department?

It depends on the product and the purpose of the product, but important key numbers on can compare between different products.

Question 16: How do you provide your customers with environmental information about your products?

- Our environmental report is published on our webpage
- All data of emissions sent out to our customers
- All other environmental measures, for ex ballast water treatment, reported to customers
- Participation in Clean Shipping Index

Question 17: How do you see yourself work with environmental questions in ten years?
Very proactively

Part 2

Question 1: What do you evaluate, in general, when purchasing a product today? And what will be the scores in 5 and 10 years time?
Please put your priority in front of the following examples. 1= highest priority, 5= lowest priority. Put the number in the box:

	Priority (1-5)		**Priority (1-5)**		**Priority (1-5)**	
	Today		In five years		In ten years	
Price	2		3		5	
Performance	1		1		1	
Environmental "friendliness" during usage	3		2		2	
Recyclable	5		5		4	
Length of life	4		4		3	

Question 2: What external factors pressure you (or will pressure you) to deal with environmental issues from the following parties?
- Legally
- Customers
- Competitors
- Media

Question 3: In the purchasing process:
If you would receive a 2-3 pages long document concerning the environmental performance (about energy consumption, emissions and so on) of the product;
- Would such a document be valuable for you? If yes; how? How would you handle it. Who would read it? Would you store the document? ("Not throw it away..")

Yes, it would be used as a tool to help us evaluate different suppliers of similar products. And would be read by someone in the environmental department, then others who are involved. We would store the information as long as we would find it valuable.

Question 4: How do you evaluate these environmental tools; choose three of the following environmental tools that you find most valuable/important. Evaluate the three tools you have chosen; give them priority from 1 to 3. (1= highest priority, 3= lowest priority)
- Carbon footprints
- Water footprints
- Product Category Rules (PCR)
- Life Cycle Assessment (LCA)
- Black and Grey list
- ISO standards
-Environmental Product Declaration (EPD)
- Climate Declarations

1.EPD……...Priority 1

2.Water footprint……..Priority 2

3.Black and grey lists……Priority 3

Question 5: What requirements about EPDs do you have on your suppliers? What are the motivations behind the requirements?

None so far.

Question 6: Is there any type of environmental information that you would like to get from your suppliers that you do not receive today?

Yes, but that would lead to a disadvantage compared to other suppliers.

Question 7: How do you evaluate your suppliers, considering environmental information? Such as; environmental certifications, environmental performance (for example emissions, toxic materials, energy consumption) and environmental declarations?

Environmental Management Systems, named environmental responsible person, supplier evaluations including description of environmental work, environmental certificates etc.

Question 8: A supplier can provide an environmental declaration. Evaluate at the following three declarations, which one would you evaluate the most useful, neutral and least useful for you to have. Put the number of the suggestion 1, 2, 3 in the box:

1. An overview of the environmental performance of the product, 2-3 pages. (No third party certification. No details or deeper analysis.)

2. More detailed information about the environmental performance of the product during its life cycle, 20-50 pages. (No third party certification. A deeper analysis. Specific environmental data.)

3. Summarized information about the environmental performance of the product during its life cycle. (Third party certification. Summarize of a deeper analysis. The most valuable specific environmental data.)

Put the number (1-3) in the box:
Valuate the highest; most useful 3
Neutral evaluation 2
Least evaluated; least useful 1

Question 9: A supplier can provide an environmental declaration. Look at the three following declarations, which one would you evaluate, in relation to the price, the most, neutral, and least for you to have. Put the number of the suggestion 1, 2, 3 in the box:

1. For free. An overview of the environmental performance of the product, 2-3 pages. (No third party certification. No details or deeper analysis.)

2. For free. More detailed information about the environmental performance of the product during its life cycle, 20-50 pages. (No third party certification. A deeper analysis. Specific environmental data.)

3. Have a price. Summarized information about the environmental performance of the product during its life cycle. (Third party certification. Summarize of a deeper analysis. The most valuable specific environmental data.)

Put the number (1-3) in the box:
Valuate the highest; most 3
Neutral evaluation 2
Least evaluated 1 – depending on the price of course, and the product

Question 10: If the document is not certified by a third party, how reliable do you find the information? From a scale from 1 to 3.

1= not reliable, 2= reliale, 3=very reliable.

Put an X in the box that corresponds to your answer:

1	2	3
☐	☐	☐

Hard to answer, since it depends on the relationship and the history of the supplier, whether or not the supplier is considered trustworthy.

Question 11: Do you have any experience from Environmental Product Declarations (EPD)?

Very limited, have heard about it but not really more than that…

Question 12: What guidelines does your company have about EPDs?
- When producing?
- When purchasing?

Question 13: Are EPDs something that is interesting you?
Do you ever ask your suppliers for EPDs for the products you purchase?
- If yes, explain how…
- If no; do you believe that EPDs can be of your interest in the near future? In how many years?

As soon as we have several suppliers (no point with just getting it from one supplier) delivering the information would we start asking for it.

Question 14: Do customers ever ask you to provide them with an EPD?

No, not yet

Question 15: How do you see yourself work with environmental declarations in ten years?
Do not know

Question 61: In the future; do you believe there will be a general demand for EPDs?

Do not know

Question 17: If Alfa Laval can provide any kind of environmental information, such as those mentioned above (or any other that you may be interested of), which one would you like to receive from them?

Question 18: If Alfa Laval can provide EPDs; Would you be interested?

Yes

Question 19: What kind of environmental information/data would you prefer to have in such EPD?

Depends on the product, but some relevant key numbers.

Question 20: Do you think it is necessary with a third part certification for the EPD to be reliable?

Yes

Question 21: Are you willing to pay for such EPD?

Depends on the price and the product, if it would be worth paying extra for it. That is, it depend on how much the product has cost.

Question 22: Would you be satisfied just to know that Alfa Laval would be able to provide you with an EPD? (Checklist…)

No, we would like to read it ourselves.

Question 23: Alfa Laval can provide an environmental declaration. Look at the three following declarations (same as above), which one would you evaluate, in relation to the price, the most, neutral and least for you to have. Put the number of the suggestion 1, 2, 3 in the box:

1. For free. An overview of the environmental performance of the product, 2-3 pages. (No third party certification. No details or deeper analysis.)

2. For free. More detailed information about the environmental performance of the product during its life cycle, 20-50 pages. (No third party certification. A deeper analysis. Specific environmental data.)

3. Have a price. Summarized information about the environmental performance of the product during its life cycle. (Third party certification. Summarize of a deeper analysis. The most valuable specific environmental data.)

Put the number (1-3) in the box:
Valuate the highest; most 3
Neutral evaluation 2
Least evaluated 1 - depending on the price of course

Appendix K – Interview Moller – Mearsk/Broströms

Attending: Captain Christian Schell - Regional Marine Standards Manager at Broström,in Gothenburg (16th of April 2010)

Part 1:

Question 1: How does your company work with environmental issues today?

At Maersk Tankers and Broströms we recognize that a sustainable future is integral to the way we conduct our business. We place a high priority on the health, safety and security of their employees and assets and the well being of all those contributing to or affected by our operations. We are committed to the protection and conservation of the environment and we aim to integrate sustainable thinking and CSR into all our business processes and business relationships.

Question 2: Have you defined an environmental policy within your company?
- Does it contain specific policy towards suppliers?
- Where can we read more about it? (Can we get "a copy"...?)

- **YES** - The sustainability strategy that A.P. Moller – Maersk Group provided in 2009 supports our business strategy and provides a competitive advantage through cost savings and cost avoidance, more effective and environmentally-friendly operations, creation of innovative business opportunities and the ability to attract and retain engaged employees. Our vision is to be positioned as a recognized sustainable leader in the tanker industry.

  The sustainable development of our business unit include the development of environmentally sound solutions to the challenges relating to the environment and climate change and we have set targets for 11 areas in their action plan for 2010:

  1. Air emissions – Reduce:
     - CO_2 exhaust emissions per cargo unit x nautical mile by 5% by 31st December 2012 from 2007 levels. And by 15% by 31st December from 2007.
     - NOx per cargo unit x nautical mile by 5% by 31st December 2010 from 2007
     - Average annual sulphur content in fuel on maximum 2.5% for tanker vessels.
  2. Fuel Optimization Projects – Specific Maersk Tankers projects to be rolled out to integrated Maersk Tankers and Broströms tankers Fleet.
  3. Sustainable use of Resources – Plan use of energy, technology and transport to achieve maximum benefit for minimum expenditure of resources.
  4. Oil Pollution – Minimizing oil pollution risk and reduce oily water discharge from daily vessel operation.
  5. Ballast Water – Enhance ballast water management.

6. Waste management – Reduce environmental impact of waste disposal, whereas at least 10% of all garbage landing shall happen in ports.
7. Antifouling paint – Reduce the environmental impacts from antifouling paint by continuously monitor the effect on fuel consumption.
8. Chemical management – reduce environmental impacts from paints and chemicals by enhancing the awareness regarding minimization and substitution of chemicals.
9. Environmental management and awareness – Deepen the understanding regarding environmental issues in shipping and ISO 14001 among sea staff and office staff.
10. Vessel recycling – Prepare vessels for environmentally responsible recycling.
11. Customer requirements – Meet customer requirements with regards to environmental issues.[201]

- **No**
- **Sustainability report for 2010 and Sustainability Action Plan 2010**

Question 3: Do you require suppliers to have any sort of environmental certifications and/or standardizations?

If yes; describe. (for example EU flower, ISO certificate, EMAS…)

No, we do not really look in so deep in those questions, since we do not have any outspoken demands yet and therefore do we evaluate our suppliers from many different points of views.

[201] **Broström** and Maersk Tankers (2009), *Sustainability Action Plan 2010*. Broström and Maersk Tankers.

Question 4: Do you have a department/group of people working with environmental questions?

- How is the environmental work divided between different persons and/or different departments?

- **Yes**, I am (Christian Schell) the outer most responsible for environmental questions at Broström.

Question 5: What are the main reasons for your company to work with environmental related questions?

- We believe that sustainability is the new way of doing business and delivering services. It gives a competitive edge in maintaining a strong customer base and attracting new customers. Our fleet will be operated cost effectively with focus on reducing their environmental footprint and ensuring the health and safety of all our employees. As a part of our strategy process, we have consulted employees' engagement surveys, analyzed tenders and reviewed customer audits for trends and opinions on their stakeholders' preferences. We are motivating our employees by target setting, awareness and training.

Question 6: What kind of environmental information do you value:

When producing?

- Nothing specifically, we have to make sure that the performance of what we purchase are good enough after that we look into environmental questions, such as environmental labeling and how the company is working with environmental question, in general.

When purchasing?

- That they have some certificates and that they are aware of environmental issues.

Within marketing?

- We want to show that we do work actively with environmental issues and therefore have we for the first time produced a Sustainability report from 2009.

When selling?

- We want to make sure that we provide god service and thereby we find the environment to be extremely important, therefore we do a lot of work within the environment.

Question 7: What kind of environmental challenges do you need to improve?

For what reasons; (why is it important?)
Internal reasons?
External reasons?

- Future targets: Environmental Strategy for 2010
  To ensure continuous improvements of their environmental performance their objectives and targets are revised on an annual basis.

They realize that they have to work together to achieve their common goal, which is to reduce consumption of resources, emissions and pollution and aid in their aim for Eco-Efficiency.

Their long term strategy focuses on the following areas:

- Air emission Reeducation Targets
- Waste Management
- Sustainable use of resources
- Chemical Management
- ISO 14001 for combined fleet
- Increases Environmental Management and awareness

- Externally: Maersk Tankers try to take everything they do a step further than before in order to gain competitive advantage, this is done by identify potentials for more efficient use of resources, lower emissions and optimize cost and also a proactive mitigation of environmental risk.

Question 8: How do you store environmental information from:
- internal parties
- external parties

- We would store the information in a database that is connected with other marine companies and wholesaler such as; Caterpillars. In that way can there be collective benefits from it.

Question 9: Do you feel any external factors that pressure you to deal with environmental issues?
If yes; what kind of factors and how do you deal with them?

Legally: There are many legal aspects that we need to take inconsideration. There are demands and legal jurisdiction from flag states, harbors and European Maritime Safety Agency (EMSA)

Customers: Our main customers are the oil companies, but since there are different needs from year to year do also our customers differ from year to year. We have had or have big companies such as; Exxon and Preem.

Our customers evaluate us with the help from an annual screening process that they subject us with, that result in a status report. But we also make sure to screen our selves before this process, which is done at least twice a year.

Competitors: There is an extreme competitor situation in this kind of business, which is evaluated from two sides; best price and CSR policies.

Media: Media is a big factor in the equation – every time a ship runs aground the spot light from the media is on us, whereas they always display the picture of the "dead oily

bird". For that reason is it important to have an action plan. Whereas our vice president at Broströms is the only one that is allowed to make any sort of comments about it, and in that way avoid rumors.

The media also communicate whether or not the marine business are working active for a better environment. So we put much focus on education and quality insurance on our ships. We are currently also working with sulpherdioxide, catalyst and new sources to use as fuel. We are working with a project where we are developing new propeller blades, which are quite similar to those that are used in airplanes.

In what way would environmental related information from your suppliers be to any value for you?

Question 10: What kind of environmental related information from your suppliers would you like to have?

- It would be good with a shorter, easier "digested", document, with some specific key numbers on environmental impact, such as: carbon- and water footprint.

Question 11: What kind of environmental information would you be willing to pay for?

- We would not pay for it

Question 12: Do you evaluate/analyze your products from a life cycle perspective?

- No, not really – we do look on into key number from material, life length and emission, but we do not specific create an LCA.

Question 13: If one of your suppliers can provide a LCA; what information, from the LCA, would you value the most in your department?

- Key numbers, from example carbon- and water footprint

1. How do you provide your customers with environmental information about your products?

   - Sustainability Report 2009 and Sustainability Action Plan 2010

2. How do you see yourself work with environmental questions in ten years?

   - It will be a part of our daily routine.

Part 2

Question 1: What do you evaluate, in general, when purchasing a product today? And what will be the scores in 5 and 10 years time?

Please put your priority in front of the following examples. 1= highest priority, 5= lowest priority.

	Priority (1-5)		**Priority (1-5)**		**Priority (1-5)**
	Today		In five years		In ten years
Price	3		3		4
Performance	1		1		1
Environmental friendliness during usage	2		1		1
Recyclable	3		2		1
Length of life	3		3		3

Question 2: What external factors pressure you (or will pressure you) to deal with environmental issues from the following parties?

Legally: There are many legal aspects that we need to take inconsideration. There are demands and legal jurisdiction from flag states, harbors and European Maritime Safety agency (EMSA)

Customers: Our main customers are the oil companies, but since there are different needs from year to year do also our customers differ from year to year. We have had or have big companies such as; Exxon and Preem.

Our customers evaluate us with the help from an annual screening process that they subject us with, that result in a status report. But we also make sure to screen our selves before this process, which is done at least twice a year.

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The media also communicate whether or not the marine business are working active for a better environment. So we put much focus on education and quality insurance on our ships. We are currently also working with sulpherdioxide, catalyst and new sources to use as fuel. We are working with a project where we are developing new propeller blades, which are quite similar to those that are used in airplanes.

Question 3: In the purchasing process:

If you would receive a 2-3 pages long document concerning the environmental performance *(about energy consumption, emissions and so on)* of the product;

- Would such a document be valuable for you? If yes; how?
- How would you handle it?
- Who would read it?
- Would you store the document? ("Not throw it away..")

Yes, that kind of document would be very valuable to us, mainly since it provide us an insight in those products that we purchase and use and in that way we can make sure to act in a more environmental "friendly" way. We would store the information in a database that is connected with other marine companies and wholesaler such as; Caterpillars. In that way can there be collective benefits from it.

The document would be read by our environmental team that later would make necessary changes towards the better.

Question 4: How do you evaluate these environmental tools; choose three of the following environmental tools that you find most valuable/important. Evaluate the three tools you have chosen; give them priority from 1 to 3. (1= highest priority, 3= lowest priority)

- Carbon footprints
- Water footprints
- Product Category Rules (PCR)
- Life Cycle Assessment (LCA)
- Black and Grey list
- ISO standards
- Environmental Product Declaration (EPD)
- Climate Declarations

1. Carbon Footprint…….Priority 1
2. Climate Declarations……Priority 2
3. Water Footprints……...Priority 3

Question 5: What requirements about EPDs do you have on your suppliers? What are the motivations behind the requirements?

We do not really have any requirements today on our suppliers.

Question 6: Is there any type of environmental information that you would like to get from your suppliers that you do not receive today?

We are only at the beginning with our environmental work, but we will demand our suppliers to provide us with an EPD within 1-3 years in the future.

Question 7: How do you evaluate your suppliers, considering environmental information? Such as; environmental certifications, environmental performance (for example emissions, toxic materials, energy consumption) and environmental declarations?

We do not really look in so deep in those questions, since we do not have any outspoken demands yet therefore do we evaluate our suppliers from many different points of views.

Question 8: A supplier can provide an environmental declaration. Evaluate at the following three declarations:

1. An overview of the environmental performance of the product, 2-3 pages. (No third party certification. No details or deeper analysis.)

2. More detailed information about the environmental performance of the product during its life cycle, 20-50 pages. (No third party certification. A deeper analysis. Specific environmental data.)

3. Summarized information about the environmental performance of the product during its life cycle. (Third party certification. Summarize of a deeper analysis. The most valuable specific environmental data.)

Put the number (1-3) in the box:

Valuate the highest; most useful	3
Neutral evaluation	2
Least evaluated; least useful	1

Question 9: A supplier can provide an environmental declaration. Evaluate at the following three declarations (same as above), which one would you evaluate, in relation to the price, the most (1), neutral (2) and least (3) for you to have.

1. For free. An overview of the environmental performance of the product, 2-3 pages. (No third party certification. No details or deeper analysis.)

2. For free. More detailed information about the environmental performance of the product during its life cycle, 20-50 pages. (No third party certification. A deeper analysis. Specific environmental data.)

3. Have a price. Summarized information about the environmental performance of the product during its life cycle. (Third party certification. Summarize of a deeper analysis. The most valuable specific environmental data.)

Put the number (1-3) in the box:

Valuate the highest; most	3
Neutral evaluation	2
Least evaluated	1

Question 10: If the document is not certified by a third party, how reliable do you find the information?

From a scale from 1 to 3 (1=not reliable, 2=reliable, 3=very reliable)

We would find the information reliable (number 2) to use as a source for our environmental work.

Question 11: Do you have any experience from Environmental Product Declarations (EPD)?

Yes – mainly from the chemical point of view, whereas maybe less than 10% of our customers actually ask for one in specific.

Question 12: What guidelines does your company have about EPDs when:

- Producing?

Even though there are few of our customers that actually ask for an EPD in specific - our customers demand that we can produce, on a monthly basis, a document showing our environmental work, with data that would as well fit into an EPD.

- Purchasing?

Looking at the situation we do not have a enough people that could screen or produce the EPDs, so the main thing is that we must change our mindset even more, which only can be done from starting from the inner circle, the board of our company.

Question 13: Are EPDs something that is interesting you?

Do you ever ask your suppliers for EPDs for the products you purchase?

- If yes, explain how…
- If no; do you believe that EPDs can be of your interest in the near future? In how many years?

Yes! It communicates a company's sustainability work to the outside world, but also what kind of information that the suppliers can provide to us. EPDs makes it possible to keep ones credibility.

Question 14: Do customers ever ask you to provide them with an EPD?

Yes! The want information about our emission, water footprint, about the ships – but they want this with no extra expense.

Question 15: How do you see yourself work with environmental declarations in ten years?

It will be a part of our daily routine.

Question 16: In the future; do you believe there will be a general demand for EPDs?

If not a general demand from the customer, there will at least be demands seen from a legal aspect.

Question 17: If Alfa Laval can provide any kind of environmental information, such as those mentioned above (or any other that you may be interested of), which one would you like to receive from them?

The forth thing on our list that we would like to receive more information about from Alfa Laval is their work related to the CSR, if they have any.

Question 18: If Alfa Laval can provide EPDs; Would you be interested?

Yes we would be very interested!

Question 19: What kind of environmental information/data would you prefer to have in such EPD?

Environmental data such as useful numbers on different values of substance, the amount of NOx, SOx, water footprints, the key numbers from the LCA.

Question 20: Do you think it is necessary with a third part certification for the EPD to be reliable?

Third part certification is good, because it provides a more critical thinking – but it is NOT necessary.

Question 21: Are you willing to pay for such EPD?

In a way; Yes. But it really should be included in the price – that is; the customer will not notice that one have been paying extra for it.

Question 22: Would you be satisfied just to know that Alfa Laval would be able to provide you with an EPD? (Checklist…)

We would not be satisfied only knowing that Alfa Laval can provide one – we want them to provide it to use, when we purchase from them or any of our suppliers.

Question 23: Alfa Laval can provide an environmental declaration. Look at the three following declarations (same as above), which one would you evaluate, in relation to the price, the most (1), neutral (2) and least (3) for you to have.

1. For free. An overview of the environmental performance of the product, 2-3 pages. (No third party certification. No details or deeper analysis.)
2. For free. More detailed information about the environmental performance of the product during its life cycle, 20-50 pages. (No third party certification. A deeper analysis. Specific environmental data.)
3. Have a price. Summarized information about the environmental performance of the product during its life cycle. (Third party certification. Summarize of a deeper analysis. The most valuable specific environmental data.)

Put the number (1-3):

Valuate the highest/most	3
Neutral evaluation	2
Least evaluated	1

Appendix L – Chart of Companies we been in Contact with

	"To optimize the performance of our customers' processes. Time and time again"
Type of product/service	Heat exchangers, separators and fluid handling.
Head office	Lund , Sweden
Employees	27 manufacturing units and about 70 service centers over the world. The products are sold in approximately 100 different countries.
Locations	12 000 employees
Order intake 2009	21,54 million SKR
Homepage	www.alfalaval.com

	To help companies to develop their nusiness, products and services for a lower environmental impact, higher quality towards a more sustainable business
Type of product/service	Environmental consultants and support
Head office	Lund Sweden
Employees	2
Locations	Lund, Sweden
Turnover 2009	■
Homepage	www.ecowise.se

	Rangsells is the customer's natural first choice when dealing with waste and residues. Rangsells is working for a sustainable development.
Type of product/service	Services within environment and recycling.
Head office	Stockholm, Sweden
Employees	2300
Locations	Sweden, Norway, Denmark, Estonia, Latvia, Poland.
Turnover 2009	4 MSEK
Homepage	www.rangsells.se

	"Our focus lies on sustainable development and work to ensure holistic and creative solutions for our clients."
Type of product/service	Environmental consulting
Head office	Lund, Sweden
Employees	2
Locations	Lund, Sweden
Turnover 2009	■
Homepage	www.miljogiraff.se

	Healthy people, environment and organizations strengthens our customers' business, trust and profitability.
Type of product/service	Environmental Consulting
Head office	Stockholm, Sweden
Employees	25
Locations	Stockholm, Sweden
Turnover 2009	■
Homepage	www.goodpoint.se

Raul Carlson	
	"I accomplish things to change the world."
Type of product/service	Specialised on information for sustainability governance. Working for eco2win.
Head office	Jönköping, Sweden
Employees	■
Locations	Jönköping, Sweden
Turnover 2009	■
Homepage	www.raulcarlson.com

IVL Svenska Miljöinstitutet	
	The Swedish environmental research institute is an independent, non-profit organization, working with applied research for an environmentally economically and socially sustainable growth in business and society.
Type of product/service	Research institute
Head office	Stockholm, Sweden
Employees	180
Locations	Stockholm, Sweden
Turnover 2009	204 MSEK
Homepage	www.ivl.se

MiljöRapporten Nyheter och analyser för dig som arbetar med miljö och hållbarhet	
	”Miljörapporten” is a report concerning important environmental topics. The report keeps the readers updated within the present environmental situation.
Type of product/service	Reporting, news paper
Head office	Stockholm, Sweden
Employees	4
Locations	Stockholm, Sweden
Turnover 2009	■
Homepage	www.miljorapporten.se

MISTRA STIFTELSEN FÖR MILJÖSTRATEGISK FORSKNING	
Type of product/service	Mistra is a foundation and as such must comply with the Swedish Foundations Act.
Head office	Stockholm, Sweden
Employees	17
Locations	Stockholm, Sweden
Turnover 2009	■
Homepage	www.mistra.org

	"As one of the world's leading engineering companies, we help our customers to use electrical power efficiently, to increase industrial productivity and to lower environmental impact in a sustainable way. **Power and productivity for a better world**"
Type of product/service	Power and Automation Technologies
Head office	Oerlikon, Switzerland
Employees	117 000
Locations	The ABB Group of companies operates in around 100 countries
Turnover 2009	4126 MUSD
Homepage	www.abb.com

Type of product/service	
Head office	
Employees	
Locations	
Turnover 2009	
Homepage	www.volvo.com

	"We work for and with our customers to provide preferred processing and packaging solutions for food. We apply our commitment to innovation, our understanding of consumer needs and our relationships with suppliers to deliver these solutions, wherever and whenever food is consumed. We believe in responsible industry leadership, creating profitable growth in harmony with environmental sustainability and good corporate citizenship."
Type of product/service	Packages, processing equipment, filling

	machines, distribution equipment, service products
Head office	Lausanne, Switzerland
Employees	21 600
Locations	More than 170 different countries
Turnover 2009	16.7 MSEK
Homepage	www.tetrapak.com

	Vattenfall produce approximately 20 percent of all the electricity that is consumed in the Nordic region.
Type of product/service	Energy
Head office	Stockholm, Sweden
Employees	9507
Locations	4 countries; Sweden, Norway, Denmark and Finland
Turnover 2009	3.7 MSEK
Homepage	www.vattenfall.se

Type of product/service	The products and services range from compressed air and gas equipment, generators, construction and mining equipment, industrial tools and assembly systems, to related aftermarket and rental.
Head office	Stockholm, Sweden
Employees	30 000
Locations	Manufacturing in 20 countries
Turnover 2009	6 Billion EUR
Homepage	www.atlascopco.com

Type of product/service	Plate heat exchangers, High-speed separators, Decanters and Sanitary fluid handling
Head office	Bochum, Germany
Employees	20 000
Locations	50 countries

Turnover 2009	5 Billion EUR
Homepage	www.gea-phe.com

Type of product/service	Produce high-speed separators and Decanters.
Head office	Jesi, Italy
Employees	23 000 employees worldwide
Locations	■
Turnover 2009	170 MEUR
Homepage	www.pieralisi.nl

Type of product/service	Produce Decanters and Seperators.
Head office	■
Employees	■
Locations	France and Austria
Turnover 2009	366.3 MEUR
Homepage	www.andritz.com

Type of product/service	Produce Decanters.
Head office	Vilsbiburg, Germany
Employees	■
Locations	■
Turnover 2009	116 MEUR
Homepage	www.flottweg.de

Type of product/service	Produce Plate heat exchangers.
Head office	Landskrona, Sweden
Employees	■
Locations	■
Turnover 2009	4MSEK
Homepage	www.swep.net

Type of product/service	Produce Plate heat exchangers.
Head office	■
Employees	■
Locations	■
Turnover 2009	■
Homepage	www.hisaka-asia.com

Type of product/service	Produce Plate heat exchangers and Sanitary fluid handling.
Head office	USA
Employees	■
Locations	40 countries
Turnover 2009	46MEUR
Homepage	www.apv.com

Type of product/service	Produce High-speed separators.
Head office	Japan
Employees	■
Locations	■
Turnover 2009	5.4 Billion EUR
Homepage	www.kakoko.co.jp/english

Type of product/service	Produce Sanitary fluid handling.
Head office	USA
Employees	■
Locations	■
Turnover 2009	11.7 Billion USD
Homepage	www.itt.com

AstraZeneca	
Type of product/service	Pharmaceuticals
Head office	London, United Kingdom
Employees	65 000
Locations	Have sites in 26 countries
Turnover 2009	31.1 Billion USD
Homepage	www.astrazeneca.com

Pfizer	
Type of product/service	Pharmaceuticals
Head office	New York, USA
Employees	85 000
Locations	Approximately 70 sites all around the world.
Turnover 2009	48.4 Million USD in 2007
Homepage	www.pfizer.se

novo nordisk®	
Type of product/service	Pharmaceuticals
Head office	Bagsværd, Denmark
Employees	29 000
Locations	Production sites in six different countries and affiliates or offices in 76 countries.
Turnover 2009	51 078 MDDK
Homepage	www.novonordisk.se

biovitrum.	
Type of product/service	Pharmaceuticals
Head office	Stockholm, Sweden
Employees	500
Locations	■
Turnover 2009	2 Billion SEK

Homepage	www.biovitrum.com

GE Healthcare

Type of product/service	Pharmaceuticals
Head office	New York, USA
Employees	45 000
Locations	Employees in more than 100 countries
Turnover 2009	15 Billion USD
Homepage	www.gehealthcare.com

octapharma

Type of product/service	Pharmaceuticals
Head office	Lachen, Switzerland
Employees	4000
Locations	Developing sites in 6 countries
Turnover 2009	10.4 MSEK
Homepage	www.octapharma.com

WALLENIUS WILHELMSEN LOGISTICS

Type of product/service	Providing logistics solutions and ocean transportation with fuel-efficient and environmentally efficient vessels which are continually upgraded with the latest technology and environmentally-aware designs.
Head office	■
Employees	3300
Locations	Offices in 6 countries
Turnover 2009	2.3 Billion USD
Homepage	www.2wglobal.com

Type of product/service	A shipping company – that are involved in a wide range of activities in the energy, logistics, retail and manufacturing industries.
Head office	Copenhagen, Denmark
Employees	115 000
Locations	130 countries
Turnover 2009	48.5 Billion USD
Homepage	www.maersk.com

Type of product/service	A shipping company that offer a reliable service, giving customers flexible and safe transportation of their products.
Head office	Gothenburg, Sweden
Employees	14 000
Locations	Offices in Gothenburg and Singapore
Turnover 2009	10 MSEK
Homepage	www.brostrom.com

Type of product/service	A company in the global market for transportation and storage of bulk liquid chemicals, acids, edible oils and other special products.
Head office	Bergen, Norway
Employees	■
Locations	■
Turnover 2009	1474 MUSD in 2008
Homepage	www.odfjell.com