



School of Business
Economics and Law
GÖTEBORG UNIVERSITY

Handelshögskolans Civilekonomprogram
Bachelor Thesis, ICU2006:27

Kyoto's project-based mechanisms CDM and JI
*– How are they taken into consideration in the GHG management
strategy of the Swedish Trading Sector?*

Bachelor Thesis
Gabriela Schaad, 671015
Senad Hamzić, 841226

Tutor:
Anders Sandoff

**Department of Business
Administration/ Industrial and
Financial Management**
Spring 2006

Abstract

Backed by the Kyoto Protocol, corporate greenhouse gas management is of growing importance for the mitigation of global warming. The commitments of the EU and the Swedish environmental policy put pressure on companies under the emission trading scheme to reduce their carbon dioxide emissions or find other ways for compliance. Contrary to earlier regulations, market-based instruments such as emission trading, Clean Development Mechanism (CDM) and Joint Implementation (JI) offer a flexible approach and encourage global thinking. This study focuses on the corporate greenhouse gas management strategies adopted in Sweden and investigates in particular if the use of the flexible mechanisms CDM and JI are considered to be a viable option for compliance purposes. The empirical research explores attitudes towards CDM/JI and gives an overview on current and potential investments.

Our results show that internal emission reduction measures are the most common strategy to handle a shortfall in allowances, followed by the purchase of allowances on the carbon market. Large companies display a wider variety of strategies and are more open to alternatives such as CDM/JI. They are also more positive to CDM/JI while smaller companies have a more critical attitude. Our study of additional benefits for corporate investors, besides purely financial ones, shows that CDM/JI are used to spread risks and are seen to have a potential in the creation of strategic alliances and goodwill. However, so far, the Swedish trading sector's involvement in these project-based mechanisms is very limited.

List of abbreviations

Kyoto Units	
AAU	Assigned Amount Unit (valid from 2008)
EUA	EU Allowances (valid from 2005)
CER	Credits for emission reduction (valid from 2005)
ERU	Emission Reduction Unit (valid from 2008)
Others	
CDM	Clean Development Mechanism
CO ₂	Carbon dioxide
EBRD	European Bank for Reconstruction and Development
EU ETS	European Union Emission Trading Scheme
GHG	Greenhouse gases
JI	Joint Implementation
NEFCO	Nordic Environment Finance Corporation
SICLIP	Swedish International Climate Investment Programme
TGF	Testing Ground Facility
UNFCCC	United Nations Framework Convention on Climate Change

Table of contents

1. INTRODUCTION.....	1
1.1 BACKGROUND.....	1
1.2 ACHIEVEMENTS TO DATE.....	1
1.2.1 Clean Development Mechanism (CDM)	2
1.2.2 Joint Implementation (JI).....	2
1.3 COMMITMENTS OF THE EUROPEAN UNION.....	3
1.3.1 The European Union Emissions Trading Scheme.....	3
1.4 THE SITUATION IN SWEDEN.....	4
2. PROBLEM DESCRIPTION AND PURPOSE	6
2.1 PROBLEM DISCUSSION	6
2.2 RESEARCH QUESTIONS.....	8
2.3 PURPOSE	9
3. METHODOLOGY.....	10
3.1 DISCUSSION OF THE METHODOLOGY	10
3.2 PLANNING STAGE	10
3.2.1 Information gathering and outline of the study.....	10
3.2.2 Methodological perspective	11
3.2.3 Quantitative or qualitative research	12
3.2.4 Literature studies	12
3.2.5 Gathering of empirical data.....	13
3.2.6 Choice of method.....	13
3.2.7 Selection of interviewees	14
3.2.8 Drafting of a questionnaire.....	16
3.3 INTERVIEWS	16
3.3.1 Preparation of the interviews.....	16
3.3.2 Conducting the interviews.....	17
3.4 VALIDITY AND RELIABILITY	18
4. THEORY	20
4.1 INTRODUCTION.....	20
4.2 ISSUES UNDER DISCUSSION	20
4.3 ECONOMIC POLICIES.....	21
4.4 THE STAKEHOLDER APPROACH.....	21
4.5 SUSTAINABILITY STAGES.....	22
4.6 THE INSTITUTIONAL PERSPECTIVE	23
4.7 TWO STUDIES ON BUSINESS RESPONSES TO CLIMATE CHANGE.....	25
4.7.1 Antes: Management strategies for the compliance with GHG regulations.....	25
4.7.2 Pinkse & Kolk: Strategic options for addressing climate change	26

4.8 CHANGES IN ENVIRONMENTAL MANAGEMENT	29
5. ANALYSIS APPROACH AND MODEL.....	31
5.1 DIFFERENT APPROACHES FOR THE PRESENTATION OF RESULTS	31
5.1.1 Classification approach	31
5.1.2 Descriptive approach.....	33
6. EMPIRICAL RESULTS AND ANALYSIS	34
6.1 COMPANY STRATEGIES FOR GHG MITIGATION	34
6.1.1 Classification of the interviewed companies.....	34
6.1.1.1 The energy and oil sector.....	35
6.1.1.2 The paper and cardboard sector.....	37
6.1.1.3 The metal and steel sector.....	38
6.2 ATTITUDES TOWARDS CDM/JI.....	42
6.3 SPECIFIC INVESTMENTS IN CDM/JI AND THEIR PURPOSES	44
6.3.1 Göteborg Energi.....	44
6.3.2 Fortum Värme.....	45
6.3.3 E.On.....	45
6.3.4 LKAB.....	46
7. DISCUSSION	48
8. SUGGESTIONS FOR FURTHER RESEARCH.....	52
LIST OF REFERENCES	53
LITERATURE AND WEBSITES.....	53
INTERVIEWS	556
APPENDICES	57
APPENDIX 1 - Institutions and funds offering investments in CDM and JI projects.....	57
APPENDIX 2 - Breakdown of plants under the emission trading scheme	60
APPENDIX 3 - Compliance timetable.....	61
APPENDIX 4 - Review of the Carbon Market	61
APPENDIX 5 - The Swedish State's involvement in CDM/ JI projects.....	63
APPENDIX 6 - List of interviewed companies	64
APPENDIX 7 - Questionnaire.....	65

1. Introduction

There are serious concerns that our living conditions could deteriorate due to global warming. It is up to us to make sure that future generations do not have to live with the consequences of our short-sighted energy consumption. First steps to mitigate greenhouse gas emissions are taken and hopefully this thinking will spread further.

1.1 Background

Global warming is one of the most prominent and urgent issues that our generation has to tackle. Worldwide efforts and strong commitments are called for to prevent the climate changes that would have severe consequences for humanity and the planet we live on. Carbon dioxide (CO₂), which accounts for the largest part of global warming, has been generated extensively by human activity such as burning fossil fuels and deforestation over the past century. Industry, transport and domestic heating are pointed out as the main culprits (UNFCCC, 2002). More efficient burning of oil and coal, switching to renewable energy sources and the development of new technologies for industry and transport can bring major improvements (UNFCCC, 2006). Emissions must be reduced efficiently and without delay if we want to avoid a worldwide climatic disaster.

1.2 Achievements to date

The United Nations Framework Convention on Climate Change, a first attempt to deal with global warming, was ratified by 189 countries (UNFCCC, 2006). While in force since 1994, its main objective is to stabilize the content of greenhouse gases (GHG) in the atmosphere on a level that prevents man-made climate change. A legally binding document, the Kyoto Protocol, was ratified in 1997. It obliges major industrial nations to cut emissions of CO₂ and five other greenhouse gases¹ while developing countries are granted exemptions. When it entered into force in February 2005, 162 countries, with the US and Australia as two notable exceptions, had signed the Protocol. However, only 40 industrial nations, the so-called Annex I-countries, committed themselves to reduce their emissions of GHGs jointly by at least 5% from 1990 levels for the first commitment period 2008 to 2012 (UNFCCC, 2006). Emission reductions can be achieved either by

¹ Methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs)

domestic measures or flexible mechanisms which seek to lower the total cost of achieving the emission targets and stimulate international cooperation. The three flexible mechanisms defined in the Kyoto Protocol are Emissions Trading, Clean Development Mechanism (CDM) and Joint Implementation (JI). The idea is to provide cost-effective alternatives to own emission reduction measures by creating opportunities to trade emission allowances (AAU)² or invest in projects that reduce emissions in other parts of the world (Ministry of Sustainable Development (MSD), 2006).

1.2.1 Clean Development Mechanism (CDM)

The Clean Development Mechanism enables Annex I Parties to make investments in projects reducing GHG emissions in non-Annex I Parties³. The party from the investing country receives certified emission reductions (CERs) which it can use to meet its emissions target under the Kyoto Protocol, whereas the host country benefits from technology transfer and sustainable development. When engaging in CDM projects, it is important to prove that the project is additional, i.e. that it would not have been implemented without CDM (UNFCCC, 2006). Projects can be undertaken by private entities as well as governments⁴.

1.2.2 Joint Implementation (JI)

Annex I Parties accomplishing GHG emission reductions through projects in other Annex I Parties receive Emission Reduction Units (ERUs) which they can use to meet their own emission targets (STEM, 2006). The projects must be approved by all parties involved and need to be additional⁵. There are two different types of JI projects, track one and track two. The latter uses similar procedures as CDM projects. Track one projects may be implemented if the host country meets the requirements for registration and reporting. It applies national rules to select JI projects and to estimate the emission reductions created by them. The host country issues ERUs to the project participants through conversion of its own emission allowances (AAU). ERUs can be used first from 2008 (UNFCCC, 2006).

² Emission allowances and emission reduction units are equal to one metric tonne of emissions of CO₂

³ mainly developing countries

⁴ Please refer to Appendix 5 for some practice examples of CDM and JI projects

⁵ For detailed information on JI project activities please refer to <http://ji.unfccc.int/>

There are two ways to participate in the project-based mechanisms CDM and JI. One way is to directly engage in emission reduction projects according to the rules set out by the supervisory body⁶. The second option is to participate in a fund that purchases project-based GHG emission reductions in developing countries or countries with economies in transition. Institutions such as the World Bank offer a number of funds open to private and governmental investors. Please refer to Appendix 1 for further details about the most important funds. There is also a small secondary market for these emission reduction units.

1.3 Commitments of the European Union

Recently, the European Union has become the driving force of the global climate negotiations (Christiansen & Wettestad, 2002). The EU has committed itself to reduce its emissions from 1990-levels by 8% until 2012. In 2003, the Emission Trading Directive (2003/87/EC) was adopted, establishing a scheme for CO₂ emission allowance trading within the European Union. Currently, the trading system encompasses the installations of six key industrial sectors: energy, metal and steel, cement, glassware, ceramics, paper and cardboard. In 2004, the EU adopted the “Linking Directive” which connects the European Trading system to the Kyoto Protocol and its flexible mechanisms. The trading parties can now take advantage of the flexible mechanisms to meet their emission targets, although each state should define to what extent the flexible mechanisms can be used (MSD, 2006). EU’s most powerful tool to prevent global warming is the introduction of the European Union Emission Trading Scheme (EU ETS). The emission allowances issued to the EU members are called EU Allowances (EUA). Each state filed an allocation plan showing how the EUAs should be distributed among its industry. In 2005, the allowances for the test period were distributed for free (MSD, 2006).

1.3.1 The European Union Emissions Trading Scheme

The EU ETS was implemented in January 2005 and runs on a test basis until 2008, when the EU’s reduction commitment under the Kyoto Protocol comes into force (Swedish

⁶ Practicle guidance on CDM project activity can be found on <http://cdm.unfccc.int/Projects/pac/index.html>

Energy Agency (STEM), 2006). The EU ETS involves all member states and uses a “cap-and-trade” approach. The EU agrees upon a ceiling of total CO₂ emissions for a compliance period. It is then transformed into an aggregate amount of EUAs and divided between the countries. Under the test period, the trading scheme involves the sale and purchase of EUAs and CERs between parties that have a binding target. If a party has higher emissions than allowances granted to it, it can purchase additional ones from a party with a surplus. Parties with high costs for emission reductions will thus purchase allowances from parties with lower costs. With the help of market trade all over the EU, emissions are reduced in a cost-effective manner (Swedish Environmental Protection Agency (SEPA), 2006).

1.4 The situation in Sweden

According to the burden sharing agreement, setting out individual goals for each EU member, Sweden’s emissions must not exceed an increase of 4% compared to 1990 levels (MSD, 2006). This favourable target is due to the fact that Sweden already has come a long way in the implementation of environmentally friendly technology, particularly in the energy sector (Resvik, 2006). However, the Swedish climate strategy, adopted by the Riksdag in 2002, set out that the average CO₂ emissions for the years 2008-2012 should be at least 4% below the emissions of 1990. It further stated that this target should be reached without the flexible mechanisms (Ministry of the Environment, 2001).

To incorporate the EU rules, Sweden adopted the Emissions Trading Act (2004:1199) and the Emissions Trading Ordinance (2004:1205). All companies included in the trading scheme must first obtain a permit to emit CO₂. They can then apply for emission allowances to be allocated to them (STEM, 2006). The government has established and filed a national allocation plan for the test period 2005-2007 based on the average emissions from each installation during the period 1998-2001 (SEPA, 2006). Please refer to Appendix 2 for a breakdown of plants per sector. The emission allowances applied for amount to approximately 19-23 million ton per year. Heavy industry, forest industry and other industry sectors were allocated the full quota for their present emissions, while the

energy sector only received about 80%. The Swedish Energy Agency is responsible for the implementation of the emissions trading scheme in cooperation with other Swedish authorities.

The latest environmental proposition of March 2006 (Prop. 2005/06:184) mainly deals with three issues. It adapts the Emissions Trading Act to the requirements of the trading period from 2008-2012, issues guidelines for the national allocation plan for the same period and deals with the implementation of the EU linking directive. The revised proposition emphasizes the importance of an integrated policy for climate and energy. EU ETS and Kyoto's flexible mechanisms are seen as key factors for sustainable development. It is viewed that developing countries have the strongest need for effective energy supply and modern technology to prevent fossil-fuel dependency. International cooperation is considered to be highly important, if developed nations are to take responsibility for emission reductions in other parts of the world (MSD, 2006).

When the national allocation plan for 2008–2012 is to be filed with the EU by mid-year 2006, Sweden also has to indicate to what extent it allows the use of the flexible mechanisms CDM and JI. According to the environmental proposition, 20% of the total emission allowances can originate from these flexible mechanisms. Furthermore, it was decided that the EUAs from the test period can not be transferred to the first Kyoto period (SEPA, 2006).

2. Problem description and purpose

It is interesting to see where the challenges lie and what the business responses to global warming are. Do companies solely adapt to the changed regulations or can they even turn these to their favour?

2.1 Problem discussion

The commitments of the EU to cut down GHG emission and the introduction of the EU ETS have had a strong impact on Swedish trade and industry. Due to the introduction of emission allowances the energy prices have risen considerably, which forced companies to slim their energy consumption or find cheaper alternatives to remain competitive. Companies under the trading scheme needed to get informed and internalize the new regulations imposed on them. This involved adapting their installations to the changed requirements and setting up routines to deal with monitoring and reporting procedures. The deadlines have to be closely observed and advance planning is required to meet with the compliance requirements. Please refer to Appendix 3 for an overview. Although firms are familiar with other means of control such as the CO₂ tax on emissions, this new regime needs a different approach as the price of emission allowances is market-based⁷. Companies now have various options to fulfil their obligations under the new scheme which they have to analyze and evaluate. This may require both structural changes and a different way of thinking in order to assess the potential risks and catch new opportunities.

Even though the main GHG reductions should be achieved within a country's borders, the "linking directive" opens the way for the use of the more cost-effective flexible mechanisms. While a large part of Swedish industry owns sufficient EUAs for the period ending 2007⁸, the next allocation plan is likely to be more restrictive, particularly for the energy sector (MSD, 2006). This could involve substantial extra costs for the energy sector and expanding industries. The price for EUAs on the European carbon exchanges turned out to be significantly higher than expected and the market has been very volatile

⁷ Emissions allowances are financial instruments (MSD, 2006)

⁸ with unchanged production capacity

and unpredictable. Alongside with carbon prices, electricity prices rose from the introduction of the allowances scheme until the end of the first quarter 2006, when both dropped sharply, thus proving a close correlation between the two markets (Nord Pool, 2006). Appendix 4 gives further information on recent developments on the carbon market. The future price of emission allowances is a function of many factors. The environmental policies of the largest European countries and the resulting shortfall of allowances expected play a large role. This is where the project-based mechanisms come into the picture. Their use brings about both direct and indirect cost advantages. Historically, the prices for the project-based units lie below the EUAs' due to uncertainty about their delivery and registration (Lecocq & Capoor, 2005). With the pay-off from CDM and JI, the total amount of tradable allowances increases, which has a soothing effect on the market price (SEPA, 2006) and, as recent developments at the energy market showed, lowers energy costs. Moreover, CERs delivered before the end of 2007⁹ can be spared to the first Kyoto period, thus creating a bridge between the test period and the first Kyoto period, while traditional EUAs become invalid at the end of 2007.

The question is: has the Swedish trading sector paid attention to these advantages? Do the companies take this alternative way to acquire emission allowances into consideration? How do they adapt their environmental strategy to the new options available? Have CDM and JI any impact and can they create some additional value?

According to our observations, up to now the Swedish industry has had a very limited involvement in the project-based mechanisms. To our knowledge, only the Swedish State has directly invested in CDM/JI-projects whereas a very small number of industrial companies made investments through CDM/JI funds. Please refer to Appendix 5 for details on the involvement in CDM and JI projects by the Swedish State. In comparison with various other European countries that intensely engage in such projects, Sweden's involvement is very low (Lückge & Peterson, 2004). This despite the fact that Sweden's environmental policy states that it is desirable for industry to intensify its involvement in CDM/JI and incentives should be created to do so (SEPA, 2006). Politicians failing to set

⁹ also called "vintage CERs"

clear rules timely as well as short planning horizons might be possible reasons for the lacking commitment. The flexible mechanisms may not yet function perfectly, which involves risks for the investors. Direct investments might only be attractive to companies with the appropriate technology. In addition, large investments are needed if a company wants to start a project on its own. However, investing in funds is less risky and the first “dividend” from a CDM funds has recently been paid, so that investors now can be reassured that the mechanisms actually works.

In our view, GHG mitigation should not solely be based on ambitious national reduction targets, but also an intensified international cooperation, so that emission reductions indeed can be accomplished where it makes most sense. We are very positive towards CDM/JI projects and believe that participation could strengthen the Swedish industry’s position in various ways. On top of cost advantages, early movers could acquire valuable know-how, give positive signals to their environment and open the path for competitive advantages.

2.2 Research questions

Our main question is:

- Kyoto’s project-based mechanisms CDM and JI – how are they taken into consideration in the GHG management strategy of the Swedish Trading Sector?

The Swedish Trading Sector includes all companies that were allocated emission allowances under the National Allocation Plan. With GHG management we refer to all measures that companies, subject to the trading scheme, take to comply with the requirements imposed by the Emissions Trading Act. In order to create a better understanding of the companies’ assessment of CDM/JI, several underlying questions are interesting to address.

- Which GHG management strategies are used within the Swedish Trading Sector?
- How are CDM/JI perceived by the Swedish Trading Sector?
- Can CDM/JI be used to fulfil other purposes than purely financial ones?

With the help of the first underlying question we intend to map different GHG management strategies and roughly classify the companies. The second question gives us an indication whether companies are interested in CDM/JI and what their attitude towards CDM/JI is. Lastly, with the third question we want to investigate if there could be a different reasoning behind an investment in CDM/JI than a purely financial one.

2.3 Purpose

With this study we intend to lay the base for further studies on Swedish GHG management issues which are becoming increasingly important for companies. The purpose of this investigation is to find out what management strategies companies within the Swedish Trading Sector use to comply with their obligations under the emissions trading scheme. In particular, we want to know if investments in CDM/JI projects form part of their strategy and if so, for what reasons. We also investigate in what attitudes companies within the Swedish Trading Sector have towards CDM/JI and how well firms are acquainted with these mechanisms, which gives an indication on their acceptance and potential in Sweden. The current involvement of the Swedish Trading Sector is investigated with a focus on how and for what purposes Kyoto's project-based mechanisms are used. By identifying additional benefits we hope to give input to both companies and governmental institutions as to how these mechanisms could be made use of more favourably and intensively.

3. Methodology

Once we know the purpose of the research, how do we make sure that the results will be scientifically valid and useful? Creating new knowledge has to follow certain rules. Accounting for the methods applied in an open and thorough way ensures that the reader can verify the trustworthiness of the results.

3.1 Discussion of the methodology

A methodology should follow some basic principles. Eriksson and Wiedersheim-Paul (2001) sees it as a central requirement for scientific knowledge that the research should be repeatable. It therefore needs to be presented in such a way that it can be tested by another person who, using the same methods should get the same results. Sometimes this requirement is hard to fulfil as irreversible changes in the environment do not allow for the study to be repeated in exactly the same manner. This is probably true for our research. For example, new legislation that is about to be implemented, will set new parameters for companies' actions. The issue of global warming becomes increasingly important and thus might move up on companies' agendas. Despite these restrictions, we seek to give a clear and complete picture of how we conducted our research, so that the methods can be questioned and the results verified.

3.2 Planning stage

The initial stage includes defining the purpose of the study, collecting background and empirical information as well as solving methodological questions.

3.2.1 Information gathering and outline of the study

The mitigation of climate change and the schemes introduced by the Kyoto Protocol had caught our attention and we started to look for interesting aspects that we could investigate in. We deepened our knowledge and explored potential research questions by searching the daily press and newspaper archives for articles about emission trading, global warming, the Kyoto Protocol and related topics. By studying secondary information from Swedish and international institutions we learned more about the regulatory framework that sets the boundaries for companies' actions and problems that arise thereof. Due to the complexity and scope of climate change mitigation, it was

necessary to find a field that we could focus on. The idea to look at aspects related to the flexible mechanisms CDM and JI emerged. We were impressed by the ingenious concept to integrate developing nations and economies in transition in the climate change mitigation, while at the same time providing a cost-effective alternative for developed nations to fulfil their commitments. A first interview with Birgitta Resvik from the Confederation of Swedish Enterprise highlighted issues discussed within Swedish trade and industry. Subsequent discussions with our tutor on the interest and relevance of possible research questions enabled us to find a clearer outline and define the purpose of our research.

3.2.2 Methodological perspective

At the onset of a scientific study, it is important to find the right angle from which the tasks should be tackled. The choice of a perspective gives guidance in defining a research strategy and finding suitable methods. Our intention is to shed light on the specific situation that companies face and create better understanding for their actions. It is our belief that looking at reality from an actors' perspective is the most beneficial approach for our study and will enable us to catch the most interesting aspects. The actors' perspective aims at interpreting reality and creating a common language to explain certain phenomena. The subjective logic of the actors is the starting point of the research.

Andersen (1995) distinguishes between three methodological approaches in business research, the analytical perspective, the systems perspective and the actors' perspective. In the analytical perspective the focus lies on studying the relationship between causes and their effects. Ideally, hypotheses are tested and confirm or disproved. The principles of validity, reliability and objectivity are central. According to the systems approach no immediate causalities exist between cause and effect. Instead, system theorists try to relate an event with one or many causes and develop models or classifications to understand the relationship between causes and possible events. The aim of scientific inquiry from an actors' perspective is to get a better understanding of reality instead of explaining it by establishing laws of cause and effect. Interaction between the researchers and the actors leads to an interpretation of the situation and creates understanding. Our overriding methodological approach rests on an actors' perspective, although system

perspective aspects are integrated in the results section to complement the range of tools for the compilation and analysis of the empirical data.

3.2.3 Quantitative or qualitative research

The purpose of our study is to investigate in what measures companies take to live up to the new CO₂-compliance scheme as well as what their attitude towards CDM/JI is and for what purpose they intend to make use of the mechanisms. These questions touch predominantly qualitative aspects. The intention is to create understanding and interpret the information by taking the specific situation of a company into account. Our research is therefore more qualitatively oriented, although we also considered quantitative aspects and data. There are two main views on how research can be conducted, and it depends on the purpose of the study, which one is appropriate.

Quantitative research intends to explain or analyze the area of research using quantifiable variables and data. The qualitative approach takes a more holistic view on reality and tries to create better understanding by focusing on soft values and personal experience. The approach to research methods is open and flexible, allowing adaptation to the topic and the purpose of the study. To this end, qualitative and quantitative research methods can complement each other. This even implies that the collection of data could be done by way of qualitative methods, while the data analysis is quantitative (Befring, 1994).

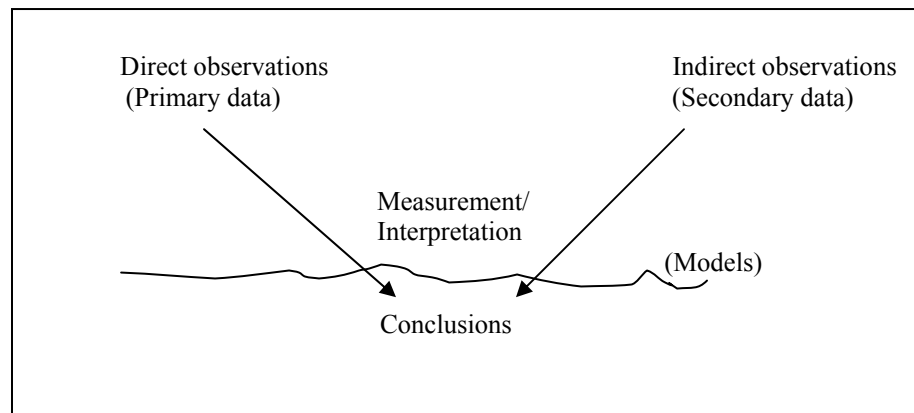
3.2.4 Literature studies

To broaden our knowledge in the field we searched databases such as JSTOR and Business Source Premier for suitable articles. Libris has also provided valuable information on previous Swedish studies done in this area. Even Internet has been used as a source for literature, background information and reports, mainly through the search engine Google. Key words such as Kyoto, CDM/JI, flexible mechanisms, emissions trading, GHG mitigation, environmental strategies etc. were used for searching in databases and the Internet. Additional material could sometimes be found by searching the reference list of interesting articles. The search for relevant and up-to-date material has been rather time-consuming due to the large number of hits and the varying quality of the sources. Literature studies were conducted under the entire work process.

3.2.5 Gathering of empirical data

According to Eriksson & Wiedersheim-Paul (2001), research can be conducted by either direct or indirect observations. Whilst indirect observations use secondary data produced by somebody else, direct observations are the result of one's own research. The below figure shows how these can be interlinked.

Figure 3.2.5 From observations to conclusions



Source: Adapted from Eriksson & Wiedersheim-Paul (2001)

To find answers to our questions, we collected both primary and secondary data about the area under investigation. The primary data was gathered by way of personal interviews that mainly focused on qualitative aspects. Telephone interviews were done if the distance did not allow for personal interviews or if this was preferable to the interviewee. The secondary data consists of previous research in the field, investigations from private or governmental organisations, legislations and propositions, newspaper articles from databases and finally information from companies' homepages and other Internet sites. An important source of secondary information was an ongoing survey by the Industrial and Financial Management Group at the School of Business Economics and Law with Göteborg University, commissioned by the Swedish Environmental Protection Agency.

3.2.6 Choice of method

We believed personal interviews to be the most appropriate method to collect the qualitative data we mostly looked for. Personal interviews have the advantage to allow

for a more relaxed atmosphere than telephone interviews. If a basis for mutual trust is created, more sensitive issues can be addressed. The interviewers obtain more complete information as complicated questions can be asked and areas of interest followed-up. The interviewee's body language can reveal additional information (Eriksson & Wiedersheim-Paul, 2001). On the other hand, personal interviews are more costly and time-consuming, given that the relevant companies are located anywhere in Sweden. Further, finding a convenient time for a personal interview might be more difficult.

When interviews are chosen for information-gathering, it has to be kept in mind that planning and working-up material is time-consuming. For this reason, interviewees should be carefully selected, so that the information collected will be relevant. As it can be difficult to reach the interviewee for additional information, special care should be applied when drafting the questionnaire and preparing the interview (Ejvegård, 2003).

3.2.7 Selection of interviewees

As mentioned, the right choice of interviewees is of vital importance for the relevance of our study. We have to both make a representative selection of companies and identify the person that works in the field we are investigating in and thus holds the relevant information. Furthermore, to ensure that the results of our study are valid, we want to interview a sufficient number of companies and make sure that our selection shows a representative branch distribution.

We used different approaches to identify companies of interest. In a first information-gathering process, we looked at a large number of companies from each branch. The selection was based on a list showing all industrial installations that were allocated allowances when the system was introduced. The number was then narrowed using different criteria companies had to fulfil. The overriding criterion was obviously that the companies had to be of interest for our study. Interviewing them should contribute to our research. We listed several questions that, if answered affirmatively, would qualify for a company to be a worthy candidate.

- Is it likely to have a present or future shortfall of EUAs due to insufficient allocation or the expansion of its production?
- Is the company Swedish? If not, is it sufficiently large to make own decision-taking probable?
- Has the company shown interest in participating in CDM/JI projects in the past or is it likely to consider such investments to be an alternative in the future?

We looked for answers by studying newspaper articles, company homepages and earlier research in this field. To answer the first question we interviewed several key persons personally or by telephone. For some cases, finding satisfactory answers to all questions was difficult. We, therefore, concluded that companies with large emissions necessarily had much at stake and were assumed to add interesting aspects to our study.

Once a list of companies to be interviewed was compiled, the relevant persons within the company had to be identified. We aimed to find the responsible for environmental management by studying the homepage or talking to the telephone operator. Having got hold of the relevant person, we asked some key questions to find out if he or she was the right person to interview. Subsequently, we arranged for a personal or telephone interview with the person that seemed most likely to hold the information we were interested in. Although the response from the companies was generally very good, not all persons contacted could make themselves available. From the initial list of approximately 15 interview candidates, we conducted 13 interviews, nine personally and the remaining four by telephone. For a list of companies please refer to Appendix 6.

It is our endeavour to take the views of different stakeholders into account. As a complement to the empirical research on companies, we therefore gathered contact information of other institutions that we believed hold interesting information and thus could add value to our investigation. The persons we interviewed represented branch organizations, consultancy firms and governmental agencies.

3.2.8 Drafting of a questionnaire

A balanced and consistent questionnaire is important for the validity of the research. The questions asked need to be relevant for the study in order for the answers to be useful when compiling the results. In addition, careful drafting of the questions is essential to obtain complete and unbiased answers. Paterno (2000) gives a guideline on how questions should be addressed. According to her, neutral, open-ended questions give the best response. On the other hand, questions that can be answered with yes or no should be avoided. One also ought to resist the temptation to build own judgments into the questions or try to add value or meaning to them.

Our questionnaire is divided into categories of questions that follow a logical course and build up towards our main area of interest. To begin with, we ask general questions about the interviewee's work. Subsequently, we inquire about his experiences with emissions trading and the company's strategy. Thereafter, we address the questions relating to CDM and JI that are most relevant for our study. To round up the interview, a few concluding questions are asked. Please refer to Appendix 6 for the complete questionnaire.

3.3 Interviews

The interview phase involves more steps than the interview itself. Planning and preparation are an important part as well as the subsequent registration of the information gathered.

3.3.1 Preparation of the interviews

In order to obtain good results from an interview, the interviewer needs to have a basic knowledge about the company and the branch it is active in. This enables him or her to ask not only standardized questions but also investigate in company-specific areas. By being well-prepared, the interviewer also displays his involvement with the study, which adds to his trustworthiness. Thus, the interviewee might be more prepared to cooperate. We prepared ourselves for the interviews by collecting information about each company in a fact sheet. The information gathered covered basic data as well as facts about environmental policy, production processes, expansion plans etc. To enable even the

interviewee to get prepared for the interview, we sent a condensed version of our questionnaire to him or her in advance.

3.3.2 Conducting the interviews

Hertzl (2002) quotes Nancy Weil, a news editor, who said about interviews: “Make it a conversation – but never forget it’s an interview”. The idea of a qualitative interview is to give the interviewee leeway to steer the course of the interview and take up issues that are important to him (Holme & Solvang, 1997). This is the best approach, if one wants to understand the company-specific circumstances and the reasons for its actions. However, given that the interviewer searches answers to his research questions, he has to exercise a certain influence over the course of the interview. In practice, this meant to us in the role of the interviewers that we redirected the course of the discussion if the focus shifted away from our area of interest. This can sometimes be delicate and requires sensitivity from the interviewer. Openness and flexibility are, however, crucial to the qualitative interview and thus the interviewer has to find the right balance. Our objective was to obtain the relevant information under the short time available, while at the same time creating a pleasant interview situation.

Depending on the specific knowledge of the interviewee, we were also in the position to go deeper into some aspects, which allowed us to broaden our knowledge. Further, we tried to adapt to the interviewee and raised issues that were relevant considering his or her position and work-situation.

When conducting personal interviews, one has to keep in mind that there is a potential risk of undesirable interactions between interviewer and interviewee, which can lead to biased results (Eriksson & Wiedersheim-Paul, 2001). According to Dahmström (2000) this can be due to tone or choice of words or even by the style of clothes. We tried to avoid interviewer effects by tailoring our appearance and behaviour to the interview situation.

The interviews were mainly conducted at the interviewees’ workplace. This created good conditions for the interview to take place in a relaxed atmosphere, which in turn favours

the reliability and validity of the information obtained. By asking the interviewee to let us know if any issue was sensitive, we made sure that no confidential information was revealed. Detailed notes of all interviews were taken and, where possible, we used a tape recorder which enabled us to listen to the interview again in case of doubt.

3.4 Validity and reliability

Validity and reliability are important criteria to assess the quality of a report. If a study does not live up to a certain level on these criteria, the research does not add any scientific value (Ejvegård, 2003). Testing validity implies questioning whether the study measures the data that it intends to measure and whether the results have been influenced by other factors. Validity can be tested theoretically, i.e. the results are put to a test following a certain theory. Testing the empirical validity looks at the measuring method and whether it gives valid results. One measure to strengthen validity is triangulation, using different sources and methods to have the information obtained confirmed (Befring, 1994). Reliability measures usability and trustworthiness of a study. The question is whether the researchers could minimize measuring mistakes and to what extent the results are stable and precise. Subjective judgments and misinterpretations should influence results as little as possible. One way to avoid measuring mistakes is using standardized procedures for data registration (Befring, 1994).

When conducting a qualitative study a different meaning should be given to validity and reliability according to Kirk & Miller (1986) who claim that the research rests on different assumptions on reality. The qualitative researcher should be more pragmatic and give greater concern to objectivity. To ensure the scientific value of our qualitative research, we took a critical attitude towards our own preconceptions and applied sound methods for observation and measurement. During the interview, we tried to be attentive listeners, remain focused and be unbiased in our statements. The data from the interviews used in the results and analysis section was also sent out to the interviewees for comments. With this measure, the integrity of the interviewees is protected and the information verified. Corrections were made as requested.

We also used triangulation, comparing the information from the interviews with data from a secondary source. The data was sometimes inconsistent which forced us to make a choice between two answers. To solve this problem we tried to assess the validity of the data collection method and concluded that data obtained from the interviews was more trustworthy as we had better control over its collection.

4. Theory

New theories are often required to capture emerging research fields. However, the findings of previous research should not be overlooked. Thus, the ability to adopt and apply existing knowledge and theories is crucial.

4.1 Introduction

The theory section should grasp the many different aspects associated to the topic and lead to comparable conclusions about the situation. Our purpose is to give an overview on the most relevant theories in order to create better understanding of the mechanisms of firm behaviour towards climate change. To our knowledge, there is no readily available theory that we could adopt. We, therefore, used a problem-oriented approach meaning that the theory was selected once the majority of the data was collected. This allowed us to apply views from several research fields that would support our findings. Theories about environmental management, an area that has been studied intensively, have a central position in this section. Contributions from this field include sustainability stages, potential organisational changes due to climate change policies and empirical studies. Stakeholder theory and institutional theory represent earlier research on the drivers of change in business behaviour. Studies on the impact of economic policies are given a very general thought.

4.2 Issues under discussion

Willard (1995) argues that climate change has become a strong market force. It presents direct threats to corporations but can also offer new business opportunities. His view is that there are benefits to seeing environmental issues as opportunities and recommends companies to choose a pro-active environmental strategy rather than simply complying with the minimum requirements.

According to Pinkse (2006), firms' strategic decisions on how to meet the challenges from climate change does not only depend on their internal organisation or new business opportunities but to a large extent on developments in climate policy and the pressure they face from institutions, organisations or the public. Antes (2006) argues that firms' involvement in GHG mitigation is to a large extent imposed by other economic actors.

The legal institutions and legislations are of crucial importance for companies to internalize the minimum standards for their GHG management. Furthermore, they create expectations from stakeholders such as customers, employees, suppliers or the public.

In Pinkse's view, climate change issues have received only little attention in management research. He points out that many studies focus on an industry level and base on the assumption of rational behaviour. He argues that strategic decisions of firms, that sometimes are irrational, do not get sufficient attention.

4.3 Economic policies

A number of studies, mostly on a national level, have analyzed the consequences of applying different policy instruments to combat global warming. Mostly, the effectiveness of flexible, market-based instruments were compared with traditional "command-and-control" approaches, that regulate what type of technology should be used to reduce emissions. Market-based instruments were found to be more cost-effective than traditional approaches in achieving the same level of environmental effectiveness, thanks to an efficient price mechanism (Hahn & Stavins, 1992). Economists emphasize that, with the introduction of an emissions trading system, firms have a greater incentive to reduce emissions with the technology that is most beneficial for them (Pinkse, 2006). On the other hand, companies face great uncertainty as to the competitive effect of the regulatory measures of the Kyoto Protocol (Rugman & Verbeke, 1998). Especially within Europe, there are large differences between the national GHG reduction plans. Emissions Trading, CDM and JI allow companies to achieve emission reductions through interaction with other parties and joint efforts. Compared to the "command-and-control" approaches from the past, the flexibility of the new schemes offers considerable managerial discretion.

4.4 The stakeholder approach

Antes (2006) applied a stakeholder theory approach to analyze the implications of a company's actions to reduce its GHG emissions. Stakeholders are groups or individuals with an interest in the firm, such as customers, employees, suppliers or the public. Pinkse (2006) explains that a firm engages into a broad range of relations with actors that have a

legitimate interest in its business. The focus lies on what benefits a company could obtain or demands it could face from its stakeholders related to its GHG involvement. Antes (2006) points out that, as there is a conflict between the demands of different stakeholders, the company can not simply adapt to its stakeholders' demands. The management, therefore, has the task to balance these demands which results in a strategic behaviour that can either be in favour or at the expense of GHG reduction measures. However, companies have the discretion to actively influence their environment which could open up more favourable ways to deal with GHG management. Antes (2006) emphasizes that competitors play a special role in promoting the development of GHG management strategies within their organizational field. Willard (2005) identifies green consumers as an important stakeholder group as they represent a powerful market for green products and services. On the other hand, they have a strong environmental commitment and pay close attention to companies' environmental performance. There is therefore a risk of reputational damage which could affect revenues, if the company does not live up to their expectations.

4.5 Sustainability stages

Willard (2005) offers a different approach on how to look at companies' attitudes towards climate change. The firms' different responses are gathered in a five-stage sustainability continuum that spans from unawareness to passionate involvement in the issue. The idea is that companies start off at a certain stage, evolve over time and move higher on the sustainability scale.

Table 4.5 The Five Sustainability Stages

Stage 1: Pre-compliance	Stage 2: Compliance	Stage 3: Beyond compliance	Stage 4: Integrated Strategy	Stage 5: Purpose & passion
-----------------------------------	-------------------------------	--------------------------------------	--	--------------------------------------

Source: Willard (2005). Figure 1.3: The Five sustainability Stages

- Stage 1: The company recognizes no obligation beyond making profits. It uses exploitative practices to cheat the system, ignores sustainability and actively opposes environmental regulations.
- Stage 2: The company lives up to its liabilities by obeying the law and environmental regulations. It takes a reactive position but manages compliance issues well.
- Stage 3: The business moves away from its defensive stance. It realizes that it can cut expenses by pro-actively implementing cleaner processes and sounder environmental practices. It sees the benefit of sustainable practices towards reputation building and maximizing shareholder value. Sustainability initiatives play, however, a marginalized role and are not yet internalized. Measures encompass the “low-hanging fruit” in the manufacturing process: easily adopted alterations in the energy and materials management.
- Stage 4: The company re-brands itself and integrates sustainability in its business strategy. It now sees sustainability investments as opportunities and not as risks and costs. Sustainability initiatives give the company a competitive advantage through cleaner products and environmental effectiveness. They thus offer real business value.
- Stage 5: The company is committed to certain ethical principles. Its purpose is to improve, beside its own well-being, that of society and the environment. It is entirely devoted to its passionate and value-based principles.

4.6 The institutional perspective

Institutional theory argues that external forces determine companies’ decision-taking (Clemens & Douglas, 2005). It looks at questions such as for instance why companies resemble each other or how organisational practices spread through sectors (Scott, 1995). The study of institutional drivers includes investigating in processes such as isomorphism¹⁰ and its driving forces. However, institutional pressure can also lead to different strategies on an industry or firm-level according to Hoffman (1999). According to Antes (2006), the driving forces of a company’s GHG management are the institutions. As companies depend on the input of resources from its organizational field, they are more willing to comply with its expectations and adapt the company’s activities to them.

¹⁰ The fact that companies tend to be alike and adopt similar business practices.

An alternative would be to simply pretend that these expectations are complied with. Even exerting influence to shape the criteria of approval in the organizational field could be an option, provided the company has the authority to do so.

According to Pinkse (2006), two main themes have been studied under the institutional perspective in order to find the driving forces of environmental management. Firstly, the impact of different institutional drivers on the organizational structure has been analyzed. Secondly, it was studied how firms respond to institutional pressure. He listed his findings in a table:

Table 4.6 Institutional perspectives

<u>Institutional drivers</u>	<u>Responses to institutional pressure</u>
Regulative, normative and cognitive pressure	Incentives and barriers
Stakeholders	Creation and transformation of institutions
Government regulation	Multinationals' exploitation of institutional differences

Source: Adapted from Pinkse (2006), table 2.2

Cognitive pressure led to the belief that taking care of the environment was one of firms' responsibilities. Hoffman's (1999) study of the US chemical industry showed that similarities in the environmental strategies were caused initially by regulative pressure and were later on reinforced by normative and cognitive pressure. For example, normative pressures led to the early adoption of voluntary environmental standards.

The impact of stakeholders was already discussed in the earlier section. The role of government regulation has led to various discussions. Porter and Van der Linde (1995) argued that environmental investments led to innovations that lower costs and increase value in the long run. Thus the cost of compliance will be more than offset by the return on the investment. Accordingly, pollution prevention stimulates innovation as it increases the efficiency of the production process.

Institutional pressure can create incentives and barriers for firms to act in an environmentally friendly way. For example, Jiang and Bansal (2003) argued that the implementation of a certain standard depends on visibility. A firm whose activities attract attention from the public needs external recognition to preserve legitimacy and thus will implement the required standards. Firms can also exert influence on their institutional environment. Through political activities, such as lobbying, firms try to shape their institutional environment to their favour. This can create a competitive advantage over other actors in the industry. Moreover, multinationals have the possibility to exploit institutional differences between countries. However, there has been little empirical evidence that multinationals tend to relocate their activities due to environmental regulation (Jaffe et al., 1995).

4.7 Two studies on business responses to climate change

4.7.1 Antes: Management strategies for the compliance with GHG regulations

Antes (2006) takes the example of a European company running an installation subject to the EU Emissions Trading Directive and looks at the likely management strategies for the procurement of emission allowances. He identifies two types of companies, those starting off with a surplus of emission allowances and those with a shortfall. Companies with a surplus have the option to either sell excess allowances or save them for future use (“banking”). Companies with a shortfall have two basic strategies to choose from: Either they reduce their need for allowances internally by diminishing their emissions or they acquire additional allowances on the market. The choice between these options will depend on the marginal costs of reducing their emissions relative to the price of emission allowances. Antes distinguishes between four different strategies.

- 1. The reduction or avoidance of GHG emissions at the installation in order to reduce the number of allowances required.*

This approach is the most generally practised when complying with traditional environmental legislation. It includes more efficient processes and the substitution of fossil fuels by natural gas or renewable energy sources.

2. *Creating emission credits internally through CDM or JI projects abroad.*

Antes points out that the use of these mechanisms should only complement domestic reduction measures and that it depends on the limit that each member state sets in its Allocation Plan to what extent installation operators may use CDM and JI credits.

3. *Purchasing emission allowances and credits*

A company whose emissions exceed the number of allowances allocated can cover the shortfall by acquiring additional allowances on the market.

4. *Trading and creating allowances company-internally*

Companies structured into a number of divisions can set up an own company-wide trading network for emission allowances if, for example, reduction can be accomplished favourably within another entity of the group. This situation is most likely to occur within multinational corporations. According to Antes (2006), an internal trading system would indicate that market coordination has been institutionalized.

4.7.2 Pinkse & Kolk: Strategic options for addressing climate change; A cluster analysis

Kolk and Levy (2004) argue that the business responses to climate change depend on the perceived risks and opportunities and the type of regulation relevant for the industry and nation in which the company operates. The design of such a strategy is company-specific.

Based on data from the Carbon Disclosure Project that compiled data on GHG emission policies of the largest 500 multinationals¹¹, Pinkse & Kolk (2005) drafted a typology and compared strategic options for addressing climate change. The flexible regulations allow managers to choose between focusing on improvements in their business activities through innovation and various compensational measures. The crucial difference is that innovation improves a company's technology and competence while compensation gives little such effect. This dimension is shown in the horizontal axis of the typology. The two options can also be seen as a choice between "make" or "buy" emission reductions (Margolis & Walsh, 2003). However, companies can engage in both: Achieve some emission reductions internally and buy the shortfall. They can even "make" and "sell" emission reductions if these can be achieved at a lower cost than the current price for

¹¹ With a home country distribution of nearly 50% from Europe, 30% from the U.S. and 14% from Japan.

emission allowances. Further, the new regulatory scheme encourages companies to reach out further and establish partnerships and strategic alliances (Pinkse & Kolk, 2005).

On the vertical axis of the typology, the degree to which companies interact with others is framed. Interaction can be solely internal, encompass the supply chain (vertical) or go beyond that by interacting horizontally with competitors or other actors. Six ideal types of strategies for climate change mitigation were identified.

Figure 4.7.2 Strategic options for climate change

		MAIN AIM	
		Innovation	Compensation
O R G A N I S A T I O N	Internal (company)	Process improvement (1)	Internal transfer of emission reductions (2)
	Vertical (supply chain)	Product development (3)	Supply-chain measures (4)
	Horizontal (beyond the supply chain)	New product/market combinations (5)	Acquisition of emission credits (6)

Adapted from Pinske (2006), Figure 5.1 Strategic options for climate change

Box (1): Improvements in the production process include higher energy efficiency by developing new technology, optimization of the production process, replacing fossil fuels by clean energy sources, etc.

Box (2): Internal transfer of emission reductions or emission generating activities within the company or group. Trading emissions internally and transferring emission allowances between business units is a possible compensatory measure. Another measure that is most appropriate for companies with cross-border

activities could be the relocation of high-emission activities to countries without such strict rules.

Box (3): Innovation directed at products. Product innovation offers new strategic opportunities. Energy-efficient products reduce emissions with the customers.

Box (4): Supply-chain measures seek to avoid cutting emissions within the company. Inputs generating high emissions are replaced. Ideally, activities generating high emissions should be carried out externally by members of the supply chain. Certain high-emission activities can be subcontracted. Some companies even help their customers to reduce emissions.

Box (5): Exploring new product and market combinations to mitigate emissions. This could be done by way of strategic alliances between related business such as oil and automotive companies in order to develop new capabilities or technologies.

Box (6): Emissions trading and participation in offset projects such as CDM and JI. Partnering with companies or governments in locations where emission reductions are achieved more easily can help to balance own excess emissions.

Subsequently, a cluster analysis of the strategies was carried out to find different organisational configurations. The technique classifies companies based on their scores on each of the six ideal types of strategies, which results in company groups with a similar strategic mix. This resulted in the following six cluster centres of companies with similar profiles:

Cautious Planners: 31%

They have low scores on all strategy options. Their involvement in any of the six areas is low. They mention measures for reducing GHG emissions only as a future possibility and are still preparing for action.

Emergent Planners: 36%

They started developing a climate strategy but are in an early stage of implementing changes such as reduced energy consumption or GHG emissions. Target setting is the most plausible measure taken.

Internal Explorers: 14%

They focus on internal measures such as changes in the production process to achieve energy efficiency and GHG reductions. Targets have been set and some improvements achieved.

Vertical Explorers: 10%

Have a strong focus on their supply chain in order to develop more energy-efficient products and mitigate GHG emissions. These companies have little own emissions and are thinking more about the impact of their products.

Horizontal Explorers: 5%

Their focus lies on the exploration of opportunities beyond their usual scope of business. They seek cooperation with partners and develop new markets. Several strategic options that fit their competences are combined which makes them more competitive.

Emissions Traders: 4%

This group has a strong focus on trading on the emissions market and participating in offset projects. These companies see opportunities in combining trading and the achievement of own emission reduction targets.

4.8 Changes in environmental management

Antes (2006) points out that the new strategy types and the resulting greater flexibility open up for a new dimension in environmental management. He argues that all related administrative functions have to be re-valued to accommodate the combination of strategies chosen. He sees the main changes in the following areas:

Investment and financing: As there no longer is a necessity to reduce emissions at the installation and the company can generate and trade allowances or emission credits itself, investment and financing calculations have to take two factors into account: Firstly, the investment alternatives are more numerous and range from technical changes of the installations to trading emission allowances and alternative investments such as CDM /JI projects. Secondly, cost analysis has to have a portfolio approach considering all possible combinations of strategies. Investing in GHG reduction measures can increase the internal rate of return if the sale of allowances (less transaction costs) yields a higher

return than the costs of the reduction measure. Sandhövel (2003) anticipates that the role of financing will grow as emission certificates are of the same nature as shares. This makes it likely that future environmental management will cover previously unrelated areas.

Information: Physical information on material and energy flows as well as monetary information is required when GHG management extends to emissions trading. Various corporate functions can be in need for such information; for example procurement/sales, investment/financing and market research. The handling of monetary information, both for market coordination and accounting, will be a new aspect for environmental management.

Coordination: In the past, environmental management has either had a hierarchical internal coordination or was coordinated along energy and material flows. Emission trading requires external market coordination, which has an impact on all activities involved in GHG issues by influencing a company's decision taking process.

Antes concludes that the importance of certain administrative functions, particularly financing, will gain importance in environmental management. Due to the impact of emissions trading on structural development, a call for concentrated functions, such as centralized "Trading Teams", is likely. However, GHG management involves very heterogeneous tasks and requires different capabilities, which makes the creation of a central GHG management function under the environmental manager impractical and unlikely. One possible solution could be the development of lateral groups.

5. Analysis approach and model

Our approaches for the interpretation of the collected data are classification and description. The strategic options are depicted in a typology dividing between internal or external and innovative or compensatory measures.

5.1 Different approaches for the presentation of results

When conducting research from an actors' perspective, the results are mainly presented in a descriptive way, given that the collected data normally is of a qualitative nature. However, for better clarity, it is sometimes necessary to present even qualitative data in a way that is more frequently used for quantitative data. Our research contains both qualitative and quantitative aspects, which allows us to resort to a variety of tools for analysis. To show the results on measures taken by companies to comply with the new CO₂ regime, the data will be presented in a classification, while other results will be accounted for in a narrative or descriptive way. We take the freedom to adapt existing models or diagrams to our own needs so that the collected data can be presented tidily and in an easily understandable way.

5.1.1 Classification approach

With the help of classifications, business responses to issues such as GHG mitigation can be explored and characterized (Pinkse, 2006). Classifications can also form the basis for developing a measurement instrument for the analysis of empirical data. One type of classification approach is typologies. A typology approach towards environmental management organizes business responses under an interrelated set of ideal types. Based on the theory in the previous section, we will use the following ideal types to categorize companies' strategies to comply with GHG mitigation requirements.

Table 5.1 Company strategies to comply with GHG mitigation requirements

		GHG compliance by way of	
		Innovation	Compensation
L E V E L	Internal	(1) Process improvement	(2) Internal compensation
	External	(3) Investment in CDM/JI project	(4) Purchase of emission allowances or credits

Adapted from Pinske (2006), Figure 5.1 Strategic options for climate change

(1) Process improvement: Internal innovation

This strategy encompasses the reduction or avoidance of CO₂ emissions at the installation in order to reduce the number of allowances required. It includes more efficient processes and the substitution of fossil fuels by natural gas or renewable energy sources (Antes, 2006).

(2) Internal compensation:

This strategy is based on the internal transfer, trading or creating of emission allowance. Companies structured into a number of divisions can set up an own company-wide trading network for emission allowances if, for example, reduction can be accomplished favourably within another entity of the group (Antes, 2006).

(3) Investment in CDM/JI project: External innovation

The third strategy aims at generating emission credits internally through investments in CDM or JI projects. Investments can be done directly or through a carbon fund. It can be argued that CDM/JI are not innovative as such as they apply available technology. However, we consider such an investment to be an innovative solution requiring larger involvement compared to simple compensation measures.

(4) Purchase of emission allowances or credits: External compensation

Emission allowances (EUAs) and emission credits (CERs) can be purchased at the carbon exchanges such as ECX or Nord Pool. There is a spot market as well as a forward market for emission allowances.

A company can concentrate on one single strategy or follow a combination of several strategies. The results are presented by sector as this gives a better overview and a more coherent picture of the situation in each sector. The three sectors we focused on are energy and oil, paper and cardboard and metal and steel. These results are followed by an analysis on a branch level. The analysis is then extended to company size and results are mirrored against the survey from IFE.

5.1.2 Descriptive approach

Once companies' strategies are identified, we deepen our analysis of companies that made use of strategy (3) and look at the reasons behind the companies' potential investments in CDM/JI. The analyses of the attitude of firms towards CDM/JI and the purposes they assign to such an investment are mainly of a descriptive nature. The section on attitudes towards CDM/JI reflects mostly statements from the interviewees and is therefore related in a more personal manner. Our results are then compared with the survey from IFE which focuses more on the knowledge about and interest in CDM/JI. In the subsequent section we look at specific investments in CDM/JI and their purposes. These results are presented by firm and in a narrative form, rendering a summarized version of the relevant material from the interviews. Subsequently, the strategic purposes are identified and the interviewed companies positioned with the help of a diagram. This will result in a map over the strategic "landscape" of CDM/JI investments.

6. Empirical results and analysis

Companies focus predominantly on internal measures and compensate the remainder but strategies vary depending on size and industry. CDM/JI catch the attention of mainly large firms and are no option for smaller ones. Risk spreading and strategic considerations are the driving forces behind investments.

6.1 Company strategies for GHG mitigation

The following section is opened with a line of arguments as to which companies should form part of the analysis. Subsequently, the possible strategies are taken up again, followed by the results and analysis for each sector. We then draw conclusions on an aggregated level and compare the results with the data from the survey conducted by IFE.

6.1.1 Classification of the interviewed companies

When classifying the companies, one way to look at it is to separate the companies with sufficient allowances from those with a shortfall as Antes (2006) suggested. Of the 13 companies we interviewed, seven estimate their allocated emission allowances to be sufficient for the test period. Thereof three companies from the energy and oil sector, three from the paper and cardboard sector and one from metal and steel. Three of these believe that the allowances to be allocated to them for the period 2008-2012 will be insufficient. During the interviews we saw no clear distinction in the way GHG issues were tackled depending on if the companies had sufficient allowances or not. Even companies whose needs are covered continuously improve their production processes or take other actions to reduce GHG emissions. Therefore, it seems reasonable to include all interviewed companies in our analysis of strategies for the compliance with GHG mitigation requirements. As previously mentioned, the four available strategies are internal and external innovation or compensation, whereas:

- (1) Internal innovation aims at reducing or avoiding CO₂-emissions at the installation.
- (2) Internal compensation is based on internal transfer, trading or creating of emission allowances.
- (3) External innovation aims at generating emission credits through investments in CDM/JI projects or carbon funds.
- (4) External compensation is done by purchasing emission allowances or credits.

6.1.1.1 The energy and oil sector

- (1) All energy companies used internal innovation to cut CO₂-emissions. The most common measure was to replace fossil fuels by bio-fuels which are excluded from the emissions allowance scheme. Mölndal Energy replaced part of their fossil fuels with wood chips (Carlström, 2006) while Fortum Värme used bio-oil for the same purpose. Fortum has reduced the burning of fossil fuels at their district heating plant as much as possible (Dotzauer, 2006). The fuel mix at Göteborg Energi is optimized with the help of a computer programme. Based on the estimated need, the cheapest combination of fuels is determined, taking fuel prices, taxes, allowance prices and other factors into consideration. This makes a profitability ranking of their various installations possible and allows for sophisticated planning over a three-year horizon (Nilsson, 2006). E.ON Sweden already has a favourable mix of mostly renewable energy sources. Measures are therefore mainly taken abroad, for example by replacing coal with gas at their Danish power stations (Örtenvik, 2006). Vattenfall has currently only 5-10% fossil fuels and tries to keep this share as low as possible (Strand, 2006). Dotzauer (2006) points out that most of the fuel-switching was already made when the carbon tax was introduced in 1991 and thus most companies do not have so much room for improvements left now. Preem sees the prime focus in reducing own emissions, which makes more sense than paying somebody else for reducing his emissions (Brinck, 2006).

- (2) Internal transfer of emission allowances between the installations is used within Vattenfall and Göteborg Energi (Strand, Nilsson, 2006) E.On uses internal compensation on a group level since in particular German installations run on coal have a shortfall of allowances. Within Fortum, one of the largest Nordic energy companies, all units are responsible for their own trading strategy and carbon risk policies (Carbon Disclosure Project, 2005). The management strategy is thus decentralized and Fortum does not transfer allowances internally. This would be done at market price anyway as all business units are independent entities, says Dotzauer (2006).

- (3) Investments in CDM projects have been used by Göteborg Energi and Vattenfall, both through a fond (Nilsson, Strand, 2006). Fortum Värme is in an initial stage to discuss and assess a possible CDM investment whereas E.On is in the process of making such an investment centrally within the group. Preem argues that, although being a large actor, it are too small to conduct own CDM/JI projects.
- (4) All energy companies with a shortfall purchase emissions allowances at an exchange. In order to be protected against unreasonably high prices at the end of the period, Mölndal Energi purchases allowances monthly based on its emissions (Carlström, 2006). Vattenfall covers its shortfall on a continuous basis to spread the risks (Strand, 2006).

In summary, all interviewed energy companies use a combination of strategies. Emission reductions at the installations are the prime focus to avoid higher costs due to a shortfall in emission allowances. Fossil fuels are complemented with bio-fuels if the cost to do so does not exceed the expected costs for additional allowances. Internal transfer of allowances is widely used to even out the different emission profiles of the installations. Purchasing emission allowances on the exchanges is a natural step for the companies as they have access to experienced energy traders. The risk exposure with a shortfall in emission allowances is closely followed by all companies. Most energy companies are also open-minded to alternative ways to obtain allowances, such as CDM. In the case of Göteborg Energi, also lobbying was used in order to improve the allocation for the new Rya heat and power plant, but without much success.

Energy companies were pointed out as the winners of the emissions trading scheme due to the fact that prices at the energy market are set at the margin for the last produced unit. While some energy companies clearly benefit from the higher energy prices, those mainly providing district heating do not profit from the scheme since the prices for district heating are agreed upon in advance. In addition, energy companies will meet stronger requirements in the future as politicians recently have decided to cut their allocation of allowances. This will put even more pressure on energy companies to phase out fossil fuels which is likely to increase competition and lead to a continued

concentration in the sector, as smaller companies are less flexible in their use of fuels. The consequences of a stronger market concentration have yet to be assessed.

6.1.1.2 The paper and cardboard sector

- (1) Within Stora Enso Group, the strategy for mitigating climate change is maximizing bio-fuel use, increasing the use of combined heat and power and improving energy efficiency (Carbon Disclosure Project, 2005). The installation at Hylte uses as little fossil fuels as possible. It is also going to burn external waste. Although this requires large investments, it will reduce their share of emissions subject to the allowance scheme. Even own waste products are re-cycled and used for steam or internal electricity production (Johansson, 2006). According to the Carbon Disclosure Project, SCA has worked with environmental issues for a long time, having the reduction of CO₂-emissions as one of its main objectives. SCA widely uses bio-fuels. However, further projects are running to replace fossil fuel with bio-fuel or natural gas. According to Eriksson (2006), also own waste products are used as fuels. Assi Domän is working with an energy efficiency project, focusing on improving their internal processes (Lundin, 2006). Knauf Danogips generates steam by either burning oil or using electricity, depending on what is cheaper. Elsbj (2006) sees very little opportunities for process improvements as their production facility is limited in space and available resources.
- (2) Internal transfer of allowances is used within Stora Enso and SCA. SCA wants to be in balance each year and to this end allowances are transferred internally between the installations.
- (3) None of the companies use CDM/JI investments as a part of their strategy. Eriksson (2006) gave it a thought but has dropped the idea as SCA has no need of additional allowances before 2008. However, CERs were purchased to close the gap between the test period and the first commitment period. Assi Domän argues that it would be more beneficial to do CDM/JI projects on a national level as small firms do not have the possibility to take part in such activities.

- (4) All companies with a shortfall purchase emission allowances at an exchange. Johansson (2006) argues that this is the safest way to cover a shortfall as the prices are known.

The strategies used in the paper and cardboard sector are quite variable. Internal measures are taken wherever possible to save energy and cut emissions and missing allowances are purchased at the exchanges. Having a renewable energy source as the basis of their activities is clearly an advantage as it offers a variety of internal measures. Within this sector, only few of the interviewed companies suffer economically from the direct consequences of the compliance scheme. However, all companies were severely hit by the rising electricity prices caused by the introduction of emission allowances. Several actors also argue that the emissions allowances scheme makes it more difficult for them to expand their production. The presence of internal environmental policies and sustainability initiatives shows, however, that these companies are used to handling environmental issues and for the most part easily adapt to the new requirements. They have a pro-active attitude, although measures are predominantly directed at internal processes and do not encompass CDM/JI.

6.1.1.3 The metal and steel sector

- (1) LKAB is constantly looking after possibilities to reduce its GHG emissions and increase energy efficiency. The measures taken include new investments at the installations, process-related improvements and the replacement of coal by gas is under investigation. This is, however, difficult as the use of coal is tightly linked to the production process (Lundkvist, 2006).
- (2) LKAB has a shortfall of allowances on all its installations, while SSAB has a surplus. This option is therefore not applicable.
- (3) LKAB has investigated into the possibility of implementing own CDM-projects but nothing has been decided yet. According to Lundkvist (2006), cooperation with Sveaskog has been initiated to exploit the possibility to use wood plantations as carbon sinks and generate emission reductions.

(4) LKAB is a buyer of emission allowances. A carbon dioxide group has been formed within the company. One member of the group is responsible for the purchase of emission allowances and raw materials. Purchases are done on a continuous basis, keeping pace with the actual emissions.

Within the metal and steel sector we had access to information from two companies. Having different starting points, they differed significantly in their strategy. LKAB has been allocated allowances for approximately 90% of its emissions and uses a variety of strategies to mitigate the shortfall, while SSAB has obtained full allocation. According to Lundkvist (2006), LKAB was not very successful at influencing decision makers. Jernkontoret, the branch organisation of the Swedish steel industry, achieved much better results. SSAB explains that it tried to influence decision makers to take a branch specific view on how allowances should be allocated. This lobbying activity led to that benchmarking is applied as an allocation basis for the steel sector instead of historical emissions. It can, therefore, be claimed that lobbying in order to influence the rules of the game and create favourable conditions for the own company or sector is a complementary strategy to those we defined. This requires companies to get involved in the decision taking process and negotiations at an early stage. Cooperation and strong commitment at the initial stage might be a more successful strategy than recovering a shortfall once the allocation has been decided. However, there is no guarantee that lobbying leads to the desired effects.

On an aggregated level, looking at the strategies according to company size, the data does not give a complete overview as none of the interviewed companies was small (below SEK 100 million), only two of them were middle-sized (between SEK 100 and 1000 million) while the remainder had a turnover above SEK 1000 million. What can be said from the collected data is that the middle-sized companies were more restricted in their mix of strategies. Internal improvement measures were possible only to a limited extent so that these companies more strongly relied on purchasing allowances. Larger companies showed a more varied picture, although size and an engagement in CDM/JI investments was not strongly correlated either.

We conclude that internal innovation is the dominating strategy, applied by almost all companies independent of their allowances allocation. Many of the companies we spoke to argued that this strategy was the safest and most controllable. This first strategy was usually complemented by purchasing emission allowances, the second-most used strategy. However, various companies see purchasing emission allowances on the market as more risky and were more reluctant to it as the prices had been very volatile. Risk management strategies could be widely observed. Internal transfer has been practised by most companies with several installations. CDM/JI investments rank last and were mostly considered by large companies. To our knowledge, none of the interviewed companies consider reducing their production in order to lower emissions to be an option. Reducing the production to be able to sell off emission allowances was no option either. Trading in emission allowances for speculative purposes could not be observed. Some actors consider the direct consequences of the emissions trading scheme to have a marginal impact on their production. Much more important was the price for their raw material and energy (Johansson, Lundkvist, 2006). The introduction of emission allowances thus does not have any major impact on the production decisions. It does, however, have an impact on investment decisions (Örtenvik, Nilsson, 2006).

When comparing the results from the interviews with the ongoing survey at IFE, our results were mostly confirmed (IFE, 2006). As we have seen, most of the interviewed firms prefer improving their own processes in order to achieve emission reductions. According to the survey, the percentage of companies that predominantly alter their processes to achieve reductions is 46%. Looking at companies with a turnover below SEK 100 million, 68% of the companies choose this alternative. Comparing this result with the medium-sized companies, i.e. with revenues from SEK 100-1000 million, there is clearly a difference in preferences. Although the majority of them, 45%, still prefer improving their processes, several use other alternatives. This trend is even more obvious when looking at large companies with a turnover above SEK 1000 million. Only 36% in this category use process improvements to achieve their goals. There is an obvious correlation between company size and the possibility and willingness to use different

options for emission reductions. For smaller companies it seems to be easier, more accessible and more affordable to improve own processes. The larger a company is, the more sophisticated its strategy for GHG mitigation gets. This fact became evident when conducting our site visits. Large companies have more resources and are able to create internal networks or lateral groups to handle the tasks emerging from the newly-introduced emissions trading scheme as Antes (2006) suggested. The new challenges are met by adopting the organizational structure, whereas emission trading usually is performed as a side task by the internal trading department. Similar observations as those suggested in the theory section could be made. This confirms that large companies have better internal resources to negotiate the risks and reap potential benefits. Committed employees taking initiative and driving new ideas appeared to be particularly valuable to companies in exploring new opportunities.

It is also interesting to look at the results of the survey from the perspective of companies with sufficient allowances for their needs and those with a shortfall. 63% of companies in the first category use process improvement, whilst only 29% in the latter use this option. This result is rather unexpected and could be due to the fact that technical standards, and thus the extent to which emission reductions can be achieved differs significantly between the installations. Some companies, therefore, can easily achieve CO₂ reductions and thereby shift from being a purchaser of allowances to being a seller, which could be a further incentive to take these measures.

Internal compensation is increasingly used with growing size. According to the survey, 15% of the middle-sized and 34% of the large companies use this option. Obviously, large companies structured into many divisions can better create an internal trading network. The survey also informs us that 20% of the companies with a surplus in allowances use this strategy, along with 17% of those with a shortage.

Investment in CDM/JI are no strategic option for small companies as the survey confirms. This is probably because the investments are costly, time-consuming as well as uncertain; factors that can not be easily negotiated by smaller companies. The picture is

quite similar with both middle-sized and large companies. The use of this strategy is only marginal. The reasons for this will be investigated further later on.

According to the survey, the purchase of emission allowances or credits is the most broadly used strategy of companies with a shortage. 33% of small companies use this strategy. The corresponding proportion for middle-sized and large companies is 37% and 20% respectively. Another indicator that this strategy is most common is, not surprisingly, its use by companies with a lack of allowances. 52% of these companies buy the required emissions at the European carbon market. Even 13% of the companies with sufficient allowances are interested in this strategy.

As Pinkse and Kolk's (2005) study indicates, many companies consider emission trading and offset projects as an easy way out as they do not require own efforts for emission reductions; they are therefore opposed to these mechanisms. It is also concluded that most companies that trade in emissions have a rather proactive climate strategy on the whole and do not solely try to buy off their obligations.

6.2 Attitudes towards CDM/JI

With regard to the interviewees' attitudes, there has been a broad range of statements about CDM/JI. Nilsson (2006) argues that CDM/JI had initially been very controversial due to the fact that development aid often leads to adverse consequences. Moreover, it was viewed as negative to reduce emissions elsewhere instead of taking measures at home. He believes that this probably has changed now as there are very strict rules for the implementation of the projects and developing countries are very positive towards these initiatives. In his view, a WIN-WIN situation is created. In addition, CDM/JI play a key role in spreading the thinking of GHG mitigation globally.

Örtenvik (2006) argues that CDM/JI contribute to lower the prices and are a good way to reduce one's own costs for emission allowances. According to Eriksson (2006), the creation of new CDM/JI can not live up to the demand; there is a bottleneck to get the projects approved. He also sees substantial risks with CDM/JI depending on when a party wants to join a project. There is no need for this as CERs can also be purchased on the

secondary market. Johansson (2006) considers CDM/JI to be a match mainly for financial investors and not for industrial companies. He sees producing printing paper as their mission and not engaging in speculative financial transactions. However, Johansson would welcome the possibility for forestry-related CDM/JI projects. Lundkvist (2006) on the other hand, does not see CDM as a financial instrument for LKAB; the intention with such investment would be to cover their shortfall. At Preem, CDM/JI is seen as having a strategic dimension as well as the potential to create goodwill. Unfortunately, we could not speak to any person at Vattenfall that could give us their opinion on CDM/JI.

Our investigation shows that the interviewees from larger firms in general have good to very good knowledge about CDM/JI and mostly have a positive view. Representatives from smaller firms are familiar with the basics, but do not see any need to get informed in more detail. Carlström (2006) stated that small firms do not have any resources for such extroverted business ideas and there is no time for this either. Even other actors voiced that their resources were focused on their core business and they, therefore, had no time to consider CDM/JI (Elsby, IFE, 2006). Resvik (2006) explains that most companies are organised so tightly that they do not waste any resources on issues that are not vital to them. At the most, these companies would delegate an employee to observe the situation. In her view, only a limited number of Swedish companies, probably about 10-20, had the capability to make own CDM/JI projects. Other opinions were that this system solely favours larger privately-owned companies that can make investments abroad (IFE, 2006). We conclude that smaller firms were more critical or negative towards CDM/JI. According to Arne Nilsson from Greenstream (2006) companies from various industries showed interest in CDM/JI and they were usually well informed about the mechanisms.

When comparing these results with the survey, it reflects our observation that smaller companies not usually are that familiar with CDM/JI. 60% of them are not acquainted with these mechanisms, while 33% have heard about the projects, but do not have any deeper knowledge. None of the smaller companies have been involved in such project, nor do they plan to. The results for middle-sized companies are quite different. Some of them report to be well-acquainted with CDM/JI, while 65% have some knowledge about the projects and only 31% have none. None of the medium companies has experience

with such project. However, a few indicate that they are looking at the possibilities to take part. The large companies, on the other hand, show better knowledge and a greater involvement in CDM/JI. Half of the companies have basic knowledge about the projects, 28% are well acquainted and only 22% are not familiar with them. 9% of the large companies state that they have already been involved in such project. Several companies plan an investment in CDM/JI in the future whereas 25 % will do further research about such possibility in the future. On this section, the results from our interviews and the survey were conflicting. Several companies announcing their interest for a future investment or their investigation in this possibility proved to have no such intentions during the interview. This could be due to the fact that the source of information was different, i.e. the person replying to the survey and our interviewee were not the same. A plausible explanation is that the management has other intentions that are not known to the interviewee. We, however, value the information obtained directly higher as the sources for mistakes or misinterpretations are more numerous when doing a survey.

6.3 Specific investments in CDM/JI and their purposes

The following section first describes the specific situation of the companies engaged in a CDM/JI investment or considering such future investment. We then aim at identifying the strategic purposes and position the interviewed companies with the help of a diagram.

6.3.1 Göteborg Energi

With its investment of SEK 20 million in the Community Development Carbon Fund administered by the World Bank in 2004, Göteborg Energi was a forerunner in Sweden. They took to the idea of small-scale projects that contribute to the transfer of new techniques and sustainable development in developing countries. The main reason for this investment was, however, spreading the risk connected to their large shortfall in allowances. They wanted to balance their portfolio. At the same time the investment offered the opportunity to broaden their competencies and knowledge about CDM without having the responsibility for the individual projects. To do own projects was never an option as this would be incompatible with their business idea of being a regional energy provider. Thus, making use of others' competencies and getting a reasonable

return from the fond was the smartest solution (Nilsson & Holmquist, 2006). Although the first CERs have already been delivered, the fond will yield most of its CERs under 2008-2012. Nilsson sees also an advantage in the fact that CERs can be saved until the first Kyoto period. However, CDM is only a complement to the measures taken at home. At Göteborg Energi, goodwill is not seen as a reason for investments in such projects as the requirements for approval are far too demanding. Göteborg Energi has not actively communicated its engagement in CDM, much because of the complicated nature of the subject matter.

6.3.2 Fortum Värme

According to Dotzauer (2006) CDM has been discussed on a company level as well as on a group level. It is important to find an appropriate partner to cooperate with. Fortum has many useful contacts, competencies and a working network. Some employees are committed to the idea of conducting a project and act as a driving force. According to Dotzauer (2006), an investment in CDM is likely to be made even if such project yields less than other projects, due to the fact that it can create goodwill.

6.3.3 E.On

Örtenvik is involved in a climate strategy project on a group level and has therefore good knowledge of the issues discussed. Within the E.On group, CDM/JI projects are initiated as a centralized initiative whereas all business units can make suggestions for potential projects. He sees it as positive that E.On takes responsibility for being the world's largest energy supplier. It is E.On's ambition to build up knowledge around CDM/JI which is seen as a vital competence for the future. As of yet, E.On has no distinct strategy for investments in CDM/JI as this possibility came up only recently. As our interview showed, E.On wants to be active in markets that are of interest to them and that they are affiliated with. The dimensions Örtenvik sees for what purposes CDM/JI investments can have are profitability, Corporate Social Responsibility and goodwill. It can also be vital for building strategic relationships. He mentions a project between Ruhrgas and Russian Gazprom where processes are made more effective which allows for large-scale improvements at low risk. This early cooperation could be crucial for future business. Once the North Sea's gas reserves are depleted, Russia will be the world's dominant gas

supplier. To date, E.On applies the same investment profitability criteria for CDM/JI as for ordinary projects. However, it is under discussion to lower the criteria for investments connected to Corporate Social Responsibility.

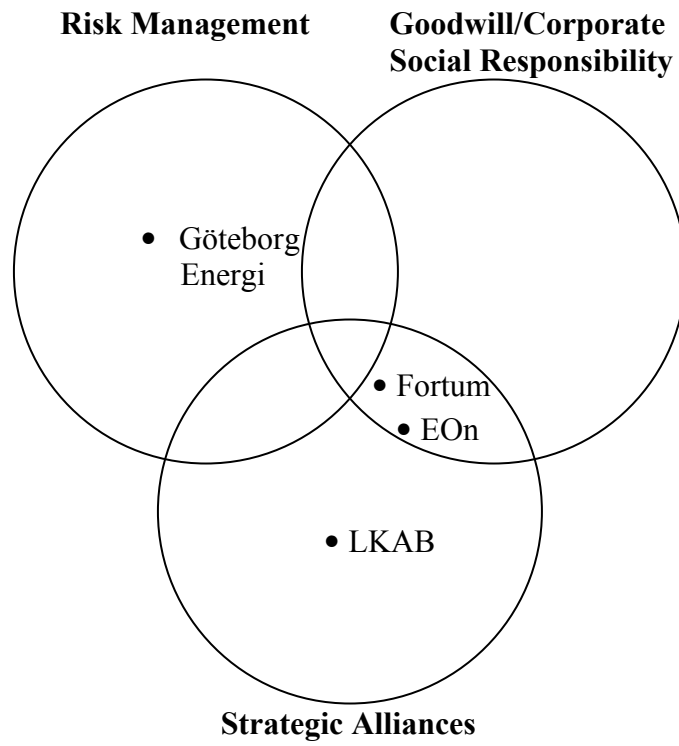
6.3.4 LKAB

Anders Lundkvist has been looking at the commercial possibilities with CDM-funds in order to cover a minus at the end of the test period and get a smooth transition to the first Kyoto period. Within LKAB, also the possibilities of conducting own projects are being looked at. Egypt was identified as a suitable country. By improving their clients' installations, the competitive advantages of the own products could be emphasized and the energy consumption reduced. This would be a good opportunity to strengthen the bonds with their clients. Nothing has been decided yet. Due to the strong demand for their products, LKAB would currently not be in the position to deliver the required quantity to Egypt. Even other projects could be of interest provided that they lie within their competencies and are related to their products or clients. The fact that LKAB's competitors in Brazil are engaged in CDM, although they are not subject to the emissions trading scheme, is one more reason not to lag behind and acquire the competencies that these projects have to offer. For LKAB it is a clear disadvantage to fall under the trading scheme whilst their competitors are exempted.

The above descriptions lead us to identify three main reasons for an investment in CDM/JI beside the obvious reason to obtain emission reductions at a favourable price. CDM/JI can be a tool to spread the company's risk exposure due to a shortfall in allowances. CDM/JI can create goodwill with customers and other stakeholders and contribute to improving Corporate Social Responsibility. Lastly, CDM/JI can be used to strengthen existing bonds with suppliers or customers and can offer a gateway for new business opportunities by creating strategic alliances.

We have depicted these three strategic purposes and the positions of the respective companies in a figure.

Figure 6.3.4 Strategic purposes of CDM/JI



7. Discussion

Thanks to the richness of available data, we believe to have captured a reliable and extensive picture of the landscape of corporate GHG management strategies in Sweden. We observed a strong focus on achieving emission reductions at the own facilities, both due to political pressure and the awareness of the value of a comprehensive environmental policy in satisfying the stakeholders. An interesting aspect that came up was that lobbying could create more beneficial conditions for GHG compliance, as the example of the steel sector showed. Cooperating to join forces is a further measure worth to be considered when designing a corporate GHG management strategy and should not be neglected when studying this field. Such activities are, however, only marginal. Most companies take the rules imposed on them as a political fact and try instead to manage the consequences in the best possible way. We believe that companies ought to try to influence political decision making more actively through a stronger engagement in their branch organisation. Improving the dialogue between government and branch organisations on how to solve the problems connected to global warming could lead to more realistic political goals and beneficial solutions for the trading sector.

When looking at our results, it should not be forgotten that the emission trading scheme has only run for little more than one year and companies still collect experience in this field. The signals from the carbon markets had been difficult to interpret as the market still is immature, which adds more uncertainty to determining which strategy is cheapest in the long run. Missing policies for post-Kyoto do not encourage companies to take long-term commitments. It is, therefore, not surprising that the project-based mechanisms CDM and JI so far have received very little attention from the Swedish trading sector. The common attitude has been to wait and see how the flexible mechanisms and the carbon market in general develop. The problems we see with CDM/JI are that the procedures for application, registration and certification are complicated, time-consuming and involve large transaction costs. Another difficulty is the complexity of the flexible mechanisms. Moreover, CDM/JI are not usually likely to yield any return before several years after the initial investment was made. We believe that CDM/JI could be made more attractive and accessible for companies by simplifying processes. As the Swedish state

has collected experience by making own projects, it should see it as a mission to assist the responsible UN institutions to improve processes and make these mechanisms more accessible.

Although the introduction of market-based instruments are widely seen as preferable to a “command-and-control” approach, the allocation principles had a distorting effect and thus added an additional risk moment for some corporations. From our interviews we got the strong impression that allocation principles had been arbitrary, which created an unfair ground on which to compete. Basing the allowances allocations on historical data does not take any company or branch specific circumstances into account. A more tailor-made allocation principle as for instance benchmarking per sector would be preferable. For companies exposed to international competition, no unnecessary hurdles should be created that deteriorate their competitive position. We experienced that the governmental institutions were very defensive about their standpoint and were not open to criticism. They reject the fact that numerous companies struggle with compliance rules. In our opinion, Swedish environmental policy should be more strongly focused on reductions that can be achieved *cost-effectively* within the borders. Punishing domestic “polluters” seems a short-sighted policy. Instead, incentives for international cooperation should be created that could benefit industries and environment alike and create new competitive advantages.

The rise in energy prices due to emission trading was conceived as the most serious problem by the interviewees. It could seriously jeopardize new investments in energy-intensive sectors in the long run. There are also serious concerns that the EU’s competitive position could be affected negatively by the consequences of the regulative constraints. This makes international cooperation on the mitigation of climate change even more vital. Opposed to the situation today, we would wish that politicians in the future make sure that companies in Sweden are more open to finding creative solutions beyond Swedish borders by for example making use of CDM/JI. The Swedish State should increase its efforts to make CDM/JI more attractive for the Trading Sector and

actively support interested companies. Introducing a steering tool that is hardly used can not give any positive effect.

When it comes to small companies, CDM and JI are no options for their GHG strategy as these companies neither have the resources nor the time to investigate in such investments. We consider this to be a competitive disadvantage and encourage companies to look at the possibility of investing in CERs instead, which allows for a smooth transition into the first Kyoto period. Looking at large companies, there is much harder pressure to find a suitable strategy for cost-effective compliance as the financial consequences are far stronger. With regard to their commitments in CDM/JI, we observed some promising initiatives, mainly by companies with a large risk exposure. The energy sector, having to negotiate the largest shortfalls, showed most interest in CDM/JI investments. All participants emphasized that potential investments in CDM/JI had to have a strong connection with their core business. Within companies that looked at CDM/JI, a more long-term perspective of GHG management has been applied. Sustainable development ranks high on their agenda. The opportunities offered by CDM/JI have been recognized and the use of the flexible mechanisms as a multi-tool could be under way. Their value in strengthening the bonds within the value-chain is an important plus as well as their role in binding up strategic resources through for instance early-stage cooperation with competitors. In the light of more recent initiatives, such as the Carbon Disclosure Project, which investigates in GHG mitigation from an investor's point of view, the increasing importance of Corporate Social Responsibility should not be neglected. Particularly for large companies receiving attention from a broader public, investments in CDM/JI have a large potential to make a contribution to their Corporate Social Responsibility work and the creation of goodwill. These investments could increase the credibility of environmental policies whose trustworthiness is difficult to verify. In our opinion, large companies can reap many benefits from such investments. Their commitment should, however, go beyond pure utility thinking. As public companies they also have the responsibility to allocate their resources in a sustainable way. They are in the focus of public attention and, as Jiang and Bansal (2003) suggest,

require external recognition to preserve legitimacy. For this reason, they should exploit the possibilities to invest sustainably and be a driving force behind CDM/JI investments.

We conclude that the Swedish trading sector has some way to go before the full potential of CDM/JI is reached. The global emission reduction thinking is not as wide-spread in Sweden as we would wish it to be. It is praiseworthy for Sweden to be one of the countries with the lowest emissions and high awareness about environmental issues. The high ambitions on a national level, however, do not encourage Swedish companies to take pro-active actions and reap the benefits from the flexible mechanisms. There is no point in improving state-of-the-art technology in a small country like Sweden, where only marginal emission reductions can be achieved, while the largest and strongly-expanding polluters such as China still rely on outdated, unclean technology. To promote spreading the advanced technology and taking a more protective attitude towards domestic industry would make more sense. Better conditions should be created to encourage companies to engage in emission reductions that benefit both themselves and the climate. Through this they could acquire valuable know-how, give positive signals to their environment and open the path for competitive advantages.

8. Suggestions for further research

- Our study showed that CDM/JI have not yet reached their full potential within the Swedish industry. Further research could be done to quantify the risks and benefits for corporations considering such investments.
- Our focus of attention lied on the business responses of the Swedish trading sector. It would be interesting to investigate in the potential of CDM and JI for finance sector and study the occurrence of carbon- related business opportunities.
- Another perspective from which the topic could be explored further is the political. What is a healthy level of political ambitions in the field of sustainable development? Are Sweden's environmental policy targets realistic and do they promote a sound development of its industry?
- A similar study could be conducted in a couple of years to investigate if there have been any changes in companies' GHG management strategies, how the Swedish Trading Sector's involvement in CDM/JI has developed in the meantime and if there is support for the additional benefits identified in this study.

List of references

Literature and websites

Andersen, P.H. (1995) Ontology and research strategy – paradigmatic consequences of social inquiry. In: Elfring, T., Jensen, H.S., Money, A., (Eds.). *European Research Paradigms in Business Studies*. Handelshøjskolens Forlag, Århus, Denmark.

Antes, R. (2005) Corporate greenhouse gas management in the context of emissions trading regimes. [online]. [Accessed 25 May 2006]. Available from World Wide Web: <http://euram2005.wi.tum.de/index.php/Paper174.pdf?page=downloadPaper_afterconference&form_id=174>

Befring, E. (1994) *Forskningsmetodik och statistik*. Lund: Studentlitteratur

Carbon Disclosure Project 2005 [online]. [Accessed 20 May 2006]. Available from World Wide Web: <<http://www.cdproject.net/results.asp>>

CFU (The World Bank Carbon Finance Unit), Carbon Funds and Facilities [online], [Accessed 22st April 2006]. Available from World Wide Web: <<http://carbonfinance.org/Router.cfm?Page=Funds&ItemID=24670>>

Christiansen Atle C., Wettestad Jørgen, The EU as a frontrunner on greenhouse gas emissions trading: how did it happen and will the EU succeed?, 2002 [online]. [Accessed 3rd May 2006]. Available from World Wide Web: <<http://asef.on2web.com/subsite/env/documents/EUasfrontrunneronKyoto.pdf>>

Clemens, B., Douglas, T. J. (2005) Does coercion drive firms to adopt 'voluntary' green initiatives? Relationships among coercion, superior firm resources and voluntary green initiatives. [online]. [Accessed 3rd May 2006]. Available from World Wide Web: <http://web117.epnet.com.ezproxy.ub.gu.se/citation.asp>

Dahmström, K. (2000) *Från Datainsamling till rapport: att göra en statistisk undersökning*. Lund: Studentlitteratur

EBRD (European Bank for Reconstruction and Development), The Kyoto Protocol and Carbon Finance [online]. [Accessed 23rd April 2006]. Available from World Wide Web: <<http://www.ebrd.com/country/sector/energyef/carbon/index.htm>>

ECX (European Climate Exchange), News [online], [Accessed 4th May 2006]. Available from World Wide Web: <http://www.europeanclimateexchange.com/index_flash.php>

Eriksson, L.T., Wiedersheim-Paul, F. (2001) *Att utreda, forska och rapportera*. Karlshamn: Liber Ekonomi

Ejvegård, R. (2003) *Vetenskaplig metod*. Lund: Studentlitteratur

Hahn, R.W., Stavins, R.N. (1992) Economic incentives for environmental protection. *Corporate Environmental Strategy*, 9 (4)

- Hertzal, L. (2002) Interviewing. *Above the fold* [online]. Volume 2 (issue 8) [Accessed 9th May 2006]. Available from World Wide Web:
<http://www.poynter.org/resource/9332/AUG_FOLD20_02.pdf>
- Holme, I. M., Solvang, B. K.(1997) *Forskningsmetodik - Om kvalitativa och kvantitativa metoder*. Lund: Studentlitteratur
- Hoffman, A.J. (1999) Institutional evolution and change: environmentalism and the U.S. chemical industry. *Academy of Management Journal*, 42(4)
- Industrial and Financial Management Group (2006) ongoing survey commissioned by the Swedish Environmental Protection Agency
- Jaffe, A.B., Peterson, S.R., Portnoy, P.R., Stavins, R.N. (1995) Environmental regulation and the competitiveness of US manufacturing: what does the evidence tell us? *Journal of Economic Literature*, 33
- Jiang, R.J., Bansal, P. (2003) Seeing the need for ISO 14001. *Journal of Management Studies*, 40(4)
- Kirk, J., Miller, M.L. (1986) Reliability and Validity in Qualitative Research. [online]. [Accessed 19 May 2006]. Available from World Wide Web:
<<http://www.jstor.org.ezproxy.ub.gu.se/view/00377732/di010919/01p02552/0?currentResult=00377732%2bdi010919%2b01p02552%2b0%2c07&searchUrl=http%3A%2F%2Fwww.jstor.org%2Fsearch%2FBasicResults%3Fhp%3D25%26si%3D1%26Query%3Dkirk%2BAND%2BMiller%2B1986>>
- Kolk, A., Levy, D. (2004) Multinationals and global climate change: issues for the automotive and oil industries. In S.M. Lundan (Ed.), *Multinationals, Environment and Global Competition*, Vol. 9. Amsterdam: Elsevier
- Lecocq F., Capoor K. (2005) *State and Trends of the Carbon Market 2005*, [online]. [Accessed 29 April 2006]. Available from World Wide Web:
< <http://www.ieta.org/ieta/www/pages/getfile.php?docID=899> >
- Lückge H., Peterson S. (2004), The role of CDM and JI for fulfilling the European Kyoto Commitments, Kiel Institute for World Economics
- Margolis, J.D., Walsh, J.P. (2003) Misery loves companies: rethinking social initiatives by business. *Administrative science Quarterly*, 48.
- Ministry of the Environment, The Swedish Climate Strategy, Summary Gov. Bill 2001/02:55 [online]. [Accessed 4th May 2006]. Available from World Wide Web:
<www.regeringen.se/content/1/c4/11/55/fbd1d28b.pdf>
- Ministry of Sustainable Development (2006) *Regeringens proposition 2005/06:184, Utvecklad utsläppshandel för minskad klimatpåverkan*, Stockholm: Riksdagstryck
- NEFCO (Nordic Environment Finance Corporation), [online]. [Accessed 22st April 2006]. Available from World Wide Web:
<<http://www.nefco.org/page.asp?headerid=70&subid=71>>

- Nord Pool, [online]. [Accessed 30 May 2006]. Available from World Wide Web: <<http://www.nordpool.com/nordpool/spot/index.html>>
- Paterno, S. (2000) The Question Man. *American Journalism Review*. [online]. [Accessed 9 May 2006]. Available from World Wide Web: <<http://www.ajr.org/Article.asp?id=676>>
- Pinkse, J., Kolk, A. (2005) Business Responses to Climate Change: Identifying Emergent Strategies. *California Management Review*, 47(3)
- Pinkse, J. (2006) *Business Responses to Global Climate Change*. Veenendaal: Universal Press
- Point Carbon, “Carbon 2006”, Hasselknippe, H. and K. Røine eds. [online]. [Accessed 3rd May 2006]. Available from World Wide Web: <http://www.pointcarbon.com/wimages/Carbon_2006_final_print.pdf>
- Porter, M.E., Linde, C.v.d. (1995) Green and competitive – Ending the stalemate. *Harvard Business Review*, 73(5)
- Porter, M.E., Linde, C. v. d. (1995) Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*, 9(4)
- Rugman, A.M., Verbeke, A. (1998) Corporate strategies and environmental regulations: an organizing framework. *Strategic Management Journal*, 19
- Sandhövel, A. (2003) *Banks and emissions trading*. In: *Umweltwirtschaftsforum* vol 11, no. 3
- Scott, W.R. (1995) *Institutions and Organizations*. Thousand Oaks: Sage Publications
- STEM (Swedish Energy Agency), International Climate Investments [online]. [Accessed 21st April 2006]. Available from World Wide Web: <http://www.stem.se/WEB/STEMEx01Eng.nsf/F_PreGen01?ReadForm&MenuSelect=0650E42872736D32C1256E780028DE47&WT.Ti=International%20Climate%20Investments>
- STEM (Swedish Energy Agency), Skatter [online]. [Accessed 3rd May 2006]. Available from World Wide Web: <http://www.stem.se/WEB/STEMEx01Swe.nsf/F_PreGen01?ReadForm&MenuSelect=616C722F91B6B8C8C1256DD7002967B9&WT.Ti=Energi-%20och%20klimat-%20politik.Styrmedel.Skatter>
- Swedish Environmental Protection Agency, Climate Change, 2005 [online]. [Accessed 4th March 2006]. Available from World Wide Web: <<http://www.internat.naturvardsverket.se/>>
- UNFCCC (United Nations Framework Convention on Climate Change), Climate Change Information Kit (2002) [online]. [Accessed 21st April 2006]. Available from World Wide Web: <http://unfccc.int/resource/docs/publications/infokit_2002_en.pdf>

UNFCCC (United Nations Framework Convention on Climate Change), Essential background, Feeling the Heat [online]. [Accessed 21st April 2006]. Available from World Wide Web: <http://unfccc.int/essential_background/feeling_the_heat/items/2907.php>

UNFCCC (United Nations Framework Convention on Climate Change), Essential background, Convention [online]. [Accessed 21st April 2006]. Available from World Wide Web: <http://unfccc.int/essential_background/convention/items/2627.php>

UNFCCC (United Nations Framework Convention on Climate Change), Essential background, Kyoto Protocol [online]. [Accessed 21st April 2006]. Available from World Wide Web: <http://unfccc.int/essential_background/kyoto_protocol/items/2830.php>

UNFCCC (United Nations Framework Convention on Climate Change), A guide to the Climate Change Convention and its Kyoto Protocol, 2002 [online]. [Accessed 4th May 2006]. Available from World Wide Web: <<http://unfccc.int/resource/guideconvkp-p.pdf>>

Willard, B. (2005) NEXT Sustainability Wave: Building Boardroom [online]. [Accessed 19 May 2006]. Available from World Wide Web: <<http://site.ebrary.com/lib/gubselibrary/Doc?id=10085541&ppg=42>>

Interviews

Bergkvist, Leif - Korsnäs AB, 3rd May 2006 (by telephone)

Brinck, Leif - Preemraff Lysekil, 9th May 2006 (by telephone)

Carlström, Kenth - Mölndal Energi, 26th April 2006

Dotzauer, Erik - AB Fortum Värme, 2nd May 2006

Elsby, Leif - Knauf Danogips Inlands Kartongbruk GmbH, 28th April 2006

Eriksson, Per-Erik - Svenska Cellulosa Aktiebolaget SCA, 2nd May 2006

Holmquist, Lars - Göteborg Energi, 10th May 2006

Johansson, Bengt - Naturvårdsverket, 11th May 2006

Johansson, Conny - Stora Enso Hylte AB, 25th April 2006

Lundberg, Klas - SSAB Oxelösund, 17th May 2006 (by telephone)

Lundin, Bengt - Assi Domän Cartonboard AB, 28th April 2006 (by telephone)

Lundkvist, Anders -LKAB, 8th May 2006 ☐

Nilsson, Arne - Greenstream Network AB, 25th April 2006 (by telephone)

Nilsson, Mats - Göteborg Energi, 10th May 2006

Nylander, Johan - Energimyndigheten, 3rd April 2006 (telephone conversation)

Resvik, Birgitta - Svensk Näringsliv, 4th April 2006

Strand, Hanna - Vattenfall, 12th May 2006

Örtenvik, Mattias - E.ON, 27th April 2006

Appendices

Appendix 1 - Institutions and funds offering investments in CDM and JI projects

The World Bank

The World Bank's carbon finance unit (CFU) offers a range of nine funds that are open to governments and companies in OECD countries wanting to purchase greenhouse gas emission reductions from projects in the developing world or in countries with economies in transition. CFU acts as a broker purchasing emission reductions on behalf of the contributor within the framework of the Clean Development Mechanism (CDM) or Joint Implementation (JI) specified in the Kyoto Protocol. The funds work as partnerships managed by the World Bank as a Trustee. CFU follows the World Bank's mission to reduce poverty through its environment and energy strategies. Its initiatives have the aim to catalyze the global carbon market, reduce transaction costs, support sustainable development and reach benefits for the poorer communities of the world (CFU, 2006).

The World Bank entered into agreements with several European countries in order to create country specific funds, some exclusively open to the private and public sector or designated entities in the country. So far, Denmark, The Netherlands, Spain and Italy have created their own carbon finance funds. The main features of the remaining funds are described below (CFU, 2006).

Prototype Carbon Fund

As the first carbon fund, the mission of the Prototype Carbon Fund (PCF) is to pioneer the market for project-based greenhouse gas emission reductions within the framework of the Kyoto Protocol, while contributing to sustainable development. The PCF became operational in 2000 and offers a learning-by-doing opportunity to its stakeholders (17 companies and 6 governments from industrialized countries) which have contributed a total of US\$180 million to the fund. Currently, there are 28 projects under preparation (CFU, 2006). The Swedish State made an investment of US\$ 10 million in the fund (Ministry of Sustainable Development, 2005).

Community Development Carbon Fund

The CDCF became operational in 2003. It mainly supports carbon finance for small-scale projects in the poorer areas of the developing world, creating an opportunity to combine financial innovation and improving of the lives of the poor. The fund's first tranche which now is closed to further subscription amounts to \$128.6 million and was financed by nine governments and 15 organizations. Several projects have been registered by the UNFCCC Executive Board and the first certified emission reduction units have been issued. A number of new emission reductions purchase agreement have been signed up which shows that CDCF makes solid progress. Among the initial subscribers is also Göteborg Energi AB (CFU, 2006).

Bio Carbon Fund

The fund became operational in 2004 and has a capital of \$53.8 million. Its first tranche closed in 2005. It is active in developing countries and in countries with economies in transition and specializes in the sequestration and conservation of carbon in forests and agro ecosystems. These projects offer a unique opportunity for the rural communities of the poorest countries to form part of the carbon market and reap its development benefits. Its aim is to deliver cost-effective emission reductions while conserving biodiversity and alleviating poverty (CFU, 2006).

Umbrella Carbon Facility

Under the UCF, funds are pooled for the acquisition of emission reductions from large projects. The Facility would have several tranches, each buying substantial amounts of emission reductions from a project or programme without portfolio limits regarding country or sectoral exposure. The First Tranche is dedicated to buying Certified Emission Reductions (CERs) from Chinese HFC-23 projects (destruction of Trifluoromethane). The UCF would ensure a better flow of the capital accumulated in the OECD countries to meet emission reduction obligations towards projects in the developing countries (CFU, 2006).

NEFCO Nordic Environment Finance Corporation

In 2003, the countries of the Baltic Sea Region entered into a regional agreement in order to establish a testing ground for Joint Implementation to promote an early follow-up of the Kyoto Protocol. An investment facility for environment and energy project in the Baltic Sea Region, the Testing Ground Facility, was established by the five Nordic countries and Germany. This cooperation is an important means of transferring environmental and energy efficient technique to this region whereas in particular the Russian market is considered to have a large potential. This facility is managed by the Nordic institution for environmental financing NEFCO (Ministry of Sustainable Development, 2005).

Testing Ground Facility (TGF)

TGF is a Public Private Partnership between Governments, institutions and industrial companies from the private sector in the Baltic Sea Region acting as a regional carbon finance facility. The fund was established in December 2003 in order to provide financial assistance for investment projects through purchasing emission reduction credits. The second subscription was closed in March 2006, resulting in a fund capital of €32, 5 million (NEFCO, 2006). The TGF aims at investing in projects that deliver cost-effective emission reductions for the account of the investors. The Swedish State has contributed approximately SEK40 million (Ministry of Sustainable Development, 2005).

EBRD - European Bank for Reconstruction and Development

The European Bank for Reconstruction and Development was established in 1991 with the purpose to support the emerging private sector in the former communist countries. This region offers abundant possibilities to reduce emissions, energy waste and costs under the Kyoto Protocol's flexible mechanism. EBRD has entered the field of carbon finance acting as financier of emission reduction projects and purchasing emission reductions for the account of third parties.

Multilateral Carbon Credit Fund

This fund was expected to become operational in 2005 and aims at buying carbon credits under the European Union scheme, Joint Implementation and Clean Development Mechanism as well as developing emission reduction projects. It also opts at enabling its shareholders to trade carbon credits directly under the so-called Green Investment Schemes (EBRD, 2006). The Swedish State is currently preparing an investment in the EBRD fund (Ministry of Sustainable Development, 2005).

For information on further institution offering similar investment opportunities please refer to the Carbon Disclosure Project 2005, Appendix C, Carbon Funds, pp. 143-145

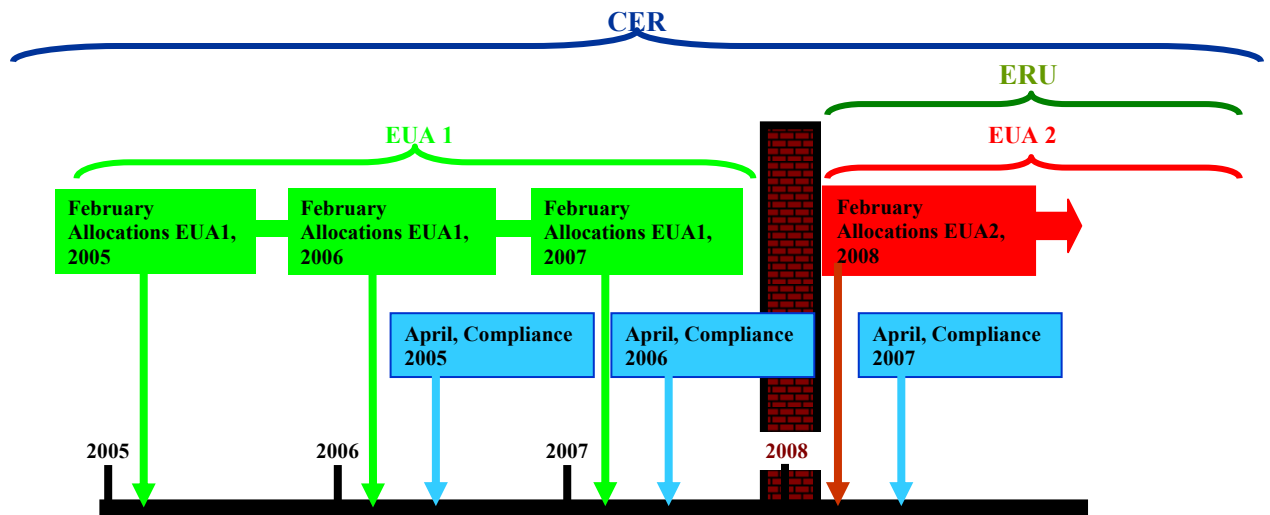
Appendix 2 - Breakdown of plants under the emission trading scheme

As per the end of 2005, a permission to emit CO₂ was granted to 712 plants which belonged to the following industries:

Industry	Number of plants
Combustion ovens from electricity and district heating	507
Combustion ovens other industries	104
Metal and steel	18
Cement and lime	11
Glassware and ceramics	9
Refineries	5
Paper and cardboard	58

Source: Environmental proposition 2006 (adapted)

Appendix 3 – Compliance timetable



Source: Per-Erik Eriksson, SCA, 2006

Appendix 4 - Review of the Carbon Market

The carbon market includes the trading of emission allowances (EUA) allocated under the European Emissions Trading Scheme (EU ETS) and the generation of emission reductions units (ERUs) based on the project based mechanisms. According to the authors of the report *State and Trends of the Carbon Market 2005* (Lecocq and Capoor, 2005) the regulatory framework of the carbon market has become more solid since its introduction in January 2005. Point Carbon (2006) finds that “the EU ETS is a qualified success after its first year of operation”. The company reports a significant rise in transactions under 2005 with a total value of approximately €9,400 million. About 63% of the volume was exchanged at ECX while Nord Pool accounted for 24% of the volume. There is also a significant bilateral market where companies directly exchange emission rights. Point Carbon (2006) considers the way the EU members release information to the market to be a shortcoming of the EU ETS system. In April 2006 the EUA prices dropped by 55% after several countries announced their national emission data. Due to this the EU now considers introducing rules on the release of national emissions (ECX, 2006).

Project -based transactions

Lecocq and Capoor report that the market for project based emission reduction units is growing steadily. According to a survey made by Point Carbon (2006) Clean Development Mechanism is the market segment with the largest volumes with the private sector as the largest buyer. The supply of emission reductions has, however, been strongly concentrated in only a few countries such as China, India and Brazil while there has been little activity in smaller and poorer countries, notably in Africa. The destruction of HFC₂₃, a very potent greenhouse gas, remains the dominant project type judging from the volumes of emission reductions supplied. Second rank projects capturing methane and N₂O followed by hydropower, biomass energy and landfill gas capture. It is important to note that more than half of the volume of emission reductions stems from abating non-CO₂ emissions. Fuel switching and traditional energy efficiency projects account for less than 5% (Lecocq and Capoor, 2005). Point Carbon (2006) estimates that for CDM, emission reduction purchase agreements were entered into for approximately €1.9 billion while the corresponding amount for JI was €96 million. In addition, a small market for secondary CDM trading has emerged. According to Point Carbon (2006) CDM is viewed as the preferred project mechanism with a large future potential.

Prices of emission allowances and emission reduction units

Lecocq and Capoor (2005) stated that emission reduction units derived from the project-based mechanisms showed a large spread of prices. However, prices are reported to be upward moving. The spread is due to the diversity of underlying projects and differences in terms of contract. CERs generated through CDM projects had a weighted average price of \$5.63 and ERUs from JI projects of \$4.23 (Jan. 2004 to Apr. 2005). The market for traditional EUAs differs significantly from the one for CDM/JI-based emission reductions, which explains the wide price gap between them. Project-based ERs involve substantial risk as long as they are not delivered and registered. Government issued EUAs, to the contrary, have very little risk. In addition, the markets are only partially connected and there remain some uncertainties as to the import of CERs into the European Trading System. It is also reported that the high current price level does not

reflect the long-term equilibrium price between supply and demand. Due to the thin volumes traded so far, prices have showed high volatility. While the carbon market is responding to the implementation of the Kyoto Protocol, it is still subject to major uncertainties such as missing price signals for emission reductions after 2012 and the impact of AAUs from the Russian market on the long-term price equilibrium (Lecocq and Capoor, 2005)

Appendix 5 - The Swedish State's involvement in CDM/ JI projects

The Swedish Energy Agency established the Swedish International Climate Investment Programme (SICLIP) in 2000. This programme includes CDM and JI investment projects. Its purpose is to promote international cooperation and collect experiences that can be shared with other Swedish parties willing to make such investments. The programme is currently engaged in three CDM projects in Brazil and one in India. To date, two JI projects have been started in Eastern Europe. In addition, a fund called Testing Ground Facility (TGF) is run under the JI mechanism to promote regional climate co-operation in the Baltic Sea Region (STEM, 2006). The details of the projects are as follows:

CDM Projects

Brazil: Bagasse cogeneration projects

Three projects are ongoing in Brazil that increase the energy supply by using Bagasse, a renewable energy source deriving from the sugarcane industry. It also involves the installation of improved steam turbines. These projects help to use the available natural resource in a more rationale way and create a competitive advantage for the agricultural sugarcane industry. At the same time it secures the electricity production in the region when the traditional energy generation through water power is scarce.

India: Biomass Power Project in Tamil Nadu

The project involves the construction of an 18 MW biomass power plant in Tamil Nadu in southern India. Under this project, surplus biomass residues from charcoal production are used to generate electricity instead of being disposed of without taking advantage of its energy potential. The project has been adapted to fit the local scarcity of water supply and runs with air cooling. On top of the electricity supplied, the project will create

employment opportunities in the region. This project combines mitigating climate change through the generation of energy through sustainable sources and the alleviation of poverty.

JI Projects

Romania: Timisoara Combined Heat and Power rehabilitation project

The Timisoara project aims to improve energy efficiency and upgrade the existing heat production plant which presently uses coal and natural gas. This involves the installation of two highly efficient steam turbines. It is expected that the new cogeneration capacity meets the electricity needs within the plant whereas excess electricity can be sold. The project is likely to increase the national electricity supply and contributes to sustainable development in Romania.

Estonia: Viru Nigula 24 Wind Park

The project involves constructing a wind park of eight turbines with a total electricity generation capacity of 24 MW: The planned construction will be one of the largest in the Baltic countries. Currently, more than 90% of the electricity generated in Estonia is based on the use of oil shale in power plants. Introducing wind energy in Estonia is an important step towards augmenting the amount of electricity generated from renewable energy sources, thereby reducing GHG emissions.

Appendix 6 – List of interviewed companies

Company	Branch	Contact person	Allowances 2006
<i>AB Fortum Värme</i>	Energy	Erik Dotzauer	816 926
<i>Assi Domän Cartonboard</i>	Paper & Cardboard	Bengt Lundin	61 760
<i>E.ON Värme Sverige AB</i>	Energy	Mattias Örtenvik	660 771
<i>Göteborgs Energi</i>	Energy	Lars Holmquist + Mats Nilsson	312 112
<i>Knauf Danogips GmbH Inlands kartongbruk</i>	Paper & Cardboard	Leif Elsby	21 506
<i>Korsnäs AB</i>	Paper & Cardboard	Leif Bergkvist	10 389
<i>LKAB</i>	Metal & Steel	Anders Lundkvist	438 780
<i>Möln dal Energi AB</i>	Energy	Kenth Carlström	55 715
<i>Preem Raffinaderi AB</i>	Oil	Leif Brinck	586 130
<i>SCA AB</i>	Paper & Cardboard	Per-Erik Eriksson	267 000
<i>SSAB Oxelösund AB</i>	Metal & Steel	Klas Lundberg	2 598 426
<i>Stora Enso Hylte AB</i>	Paper & Cardboard	Conny Johansson	114 926
<i>Vattenfall AB</i>	Energy	Hanna Strand	348 075

Appendix 7 – Questionnaire

Om företaget (miljöarbete mm) och den som intervjuas

- Vad arbetar du med i företaget?
- Kan du kort beskriva företagets miljöarbete
- I vilken omfattning har införandet av utsläppsrätter påverkat ert arbete?
- Känner du till om ni har blivit tilldelade tillräckligt med utsläppsrätter för den nuvarande produktionen. Behovet framöver?
- På vilket sätt täcker ni/ska täcka ert underskott?

Kännedom (problem, utmaningar, uppfattningar?) om CDM/JI

- Känner du till Kyotos flexibla mekanismer CDM/JI?
- På vilket sätt har ni fått kännedom om dessa?
- Är detta något som uppmärksammas i företaget?
- Finns det någon som är tillsatt för att titta specifikt på aspekter kring utsläppsrättshandeln?
- Vilka är dina egna uppfattningar om projekten?
- Möjligheter, problem, utmaningar
- Tycker ni att detta är ett effektivt styrmedel för utsläppsreduktion?

Företagets engagemang i CDM/JI

Redan engagerade

- Berätta om ert engagemang i CDM/JI
- Vilka är orsakerna till att ni engagerade er i CDM/JI?
- Vilka erfarenheter har ni utav ert arbete med projekten, (problem, utmaningar)?
- Anser ni att det har varit lönsamt för företaget?
- Vilka lärdomar har ni tagit med er?
- Har företaget planer på att engagera sig i framtiden?

Ej engagerade i nuläget

- Vilka för och nackdelar med CDM/JI ser ni för ert företag?
- Hur ställer sig företaget till detta alternativa sätt att införskaffa utsläppsrätter?
- Kan detta vara ett alternativ för er att täcka era underskott (nuvarande, eller framtida)?
- Anser ni att detta är en investeringsmöjlighet för företaget?
- Vilka faktorer ligger bakom era beslut att inte engagera er?
- Har företaget planer på att engagera sig i framtiden?

Strategi och beslutsfattande kring CDM/JI

- På vilket plan skulle CDM/JI kunna ha en strategisk betydelse? Miljöarbete? Lönsamhet? Good will? Symbolisk betydelse?
- Ingår CDM/JI i er miljöstrategi?
- På vilken nivå fattas besluten kring utsläppshandeln?
- Vad har ni för strategi kring denna handel?
- Detta är riskfyllda projekt, har ni stött på liknande projekt tidigare? (*Riskbenägenhet*)
- Vad har frågor kring utsläppshandeln för prioritet i nuläget?
- Tycker ni att det kan finnas svårigheter att finansiera projekten? (*Tillgängligt kapital*)
- Skulle ni praktiskt kunna genomföra projekten? Finns teknologin tillgänglig?
- Letar ni aktivt efter alternativa lösningar?
- Ställer ni samma lönsamhetskrav på CDM/JI- projekt som på andra investeringar?
- På vilken nivå skulle frågor kring CDM/JI behandlas?

Framtida utsikter

- Hur kommer företaget att påverkas i framtiden av systemet med utsläppsrätter?
- Vad skulle få ert företag att investera i CDM/JI i framtiden?
- Tror du att CDM/JI kan få genomslag inom svensk industri? Varför/varför inte?
- Hur tror du att priset på utsläppsrätter kommer att utvecklas i framtiden?

Förslag om förbättringar kring CDM/JI?

- Hur tycker ni att informationen kring dessa mekanismer har gått ut?
- Har informationen varit lättillgänglig och tydlig? Tydligt regelverk?
- Vad skulle kunna ha gjorts för att få er mer intresserade?
- Vad har staten för roll i informationsspridningen?