



## Does EU ETS lead to emission reductions through trade? The case of the Swedish emissions trading sector participants

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### ABSTRACT

The first trading period of the European Emissions Trading Scheme (EU ETS) has recently come to an end. The experiences of the actors in the trading sector will be of great importance in evaluating the aim and direction of this “Grand Policy Experiment”. This paper gives an account of the attitudes and actions of the companies included in the Swedish emissions trading sector after about 15 months of experience with the system. The data are based on a study commissioned by the Swedish Environmental Protection Agency, and is a comprehensive survey that encompasses all companies operating installations included in the Swedish Emission Trading Registry. However, the results point in a somewhat disquieting direction. Although the Swedish companies have shown significant interest in reducing emissions, this survey indicates that this is done without close attention to the pricing mechanism of the market-based instruments. If this praxis is widespread within the European trading sector, it can have a serious negative effect on the efficiency of the system.

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### 1. Introduction

The general idea of the European Emissions Trading Scheme (EU ETS) is based on the assumption that there are benefits from trade whenever the relative cost of CO<sub>2</sub> abatement differs among companies, regions or nations. The larger the differences in marginal cost, the greater the potential opportunities for gain from trade and the lower the total welfare cost relative to command and control for the participating nations in reaching the abatement goals set by the European Union. The economic efficiency of the system is of major importance for its success. This concern has given rise to a great number of articles and reports dealing both with the potential problems and their consequences (see for example Stern, 2006; Åhman et al., 2005; Grubb and Neuhoff, 2006; Kruger and Pizer, 2004).

A major advantage of the EU ETS over other policy instruments is that it offers companies the possibility of tailoring a cost-effective strategy to their own needs. The inherent freedom and flexibility of an emissions trading program puts pressure on companies to develop an effective strategy protecting both its competitiveness and its shareholder value. The development of such strategy requires considering a variety of factors such as the future development of fuel markets, potential regulatory changes, technological options, financing and taxation issues (Kruger,

2005). Additionally, some carbon mitigation strategies might involve large capital expenditures and long lead times for their implementation. Thus the development of a tailor-made corporate strategy involves evaluating a broad range of possible options against the background of a complex and ambiguous environment. One of the important issues in the development of the emissions trading scheme is how to design the system with respect to stimulating managers and owners to make informed decisions and take appropriate actions in order to reduce CO<sub>2</sub> emissions at an adequate rate and volume. In short, two types of informed decisions are needed for an efficient system. First, companies must make informed decisions about the balance between investments in CO<sub>2</sub> abatement and the trading of allowances. Second, companies must make informed decisions about their allowance trading strategies. Typical for the discussion of this issue is that firsthand experience from the companies involved or the implications of corporations' behaviour and attitudes for the scheme are rarely taken into account (Pinkse, 2006).

In this paper we examine potential problems faced by companies included in the EU ETS with making the informed decisions that are necessary for an efficient emissions trading scheme. The evidence is based on experiences drawn from the Swedish participants. Although Sweden accounts for little more than 1% of the total amount of allowances allocated, the experience of the participants can be considered highly relevant as Sweden has strong environmental awareness both at a national and at company level (Eckersley, 2004). This is also evident in the

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fact that Sweden introduced a CO<sub>2</sub> tax as one of the first countries in the world in 1991 and now has one of the highest tax rates (The SusNordic Gateway, 2009). As of January 2006 the CO<sub>2</sub> tax amounted to €103/ton CO<sub>2</sub> (Eurogas, 2007). There are, however, different principles as to how the CO<sub>2</sub> tax is applied. Electricity production is exempt from CO<sub>2</sub> tax whereas industry and combined heat and power production have a reduced rate of 21% of the full tax (EMI, 2007). The price signal from the EU ETS is thus stronger for the tax exempt electricity producers whereas it is approximately of the same scale as the CO<sub>2</sub> tax for industry and combined heat and power plant operators (compared to the market price for emissions allowances of approximately €20 at the time of the survey). At the same time, electricity producers can more easily transfer the extra costs to consumers than other industries. The impact of the EU ETS on the surveyed firms' compliance-related decision-making is difficult to assess against the background of the complex combination of taxes and industry-specific rules applicable.

To sum up, most companies included in the Swedish emissions trading sector have been exposed to a tax on CO<sub>2</sub> emissions for over a decade when the EU ETS was introduced and it can thus be assumed that they are familiar with decision-making on CO<sub>2</sub> abatement.

### 1.1. Setting the scene for investment appraisal

In January 2005, the European Union launched the EU ETS, covering approximately 45% of its total CO<sub>2</sub> emissions. This environmental policy tool is the European Union's flagship for reaching its goal to cut CO<sub>2</sub> emissions by 8% from 1990-levels by the end of 2012. The first trading period, which came to a close in 2007, can in some ways be regarded as a practice period (EEA, 2005). One of the more significant lessons drawn from this period is the delicate task for the system authorities to issue just enough allowances to balance supply and demand over time. The challenge has been to avoid an aggregate surplus with an allowances price approaching zero, and an aggregated deficit with participants forced to pay the penalty fee.<sup>1</sup> Obviously, setting an appropriate emission cap in order to create scarcity is of crucial importance. The allowance price should be high enough to create incentives for firms to curb their emissions in order to lower costs. Thus, the ambitiousness of the target ultimately determines the efficiency of the scheme. However, corporate attitudes and perceptions of allowance management and trading are critical for the scheme's functioning.

The stability of the market is to a large extent based on how the participating companies are configured to cope with the uncertainties inherent to the emissions trading scheme. What kind of decision-heuristics and organizational adaptations do these companies employ in order to approximate the theoretical version of an efficient strategy, i.e. comparing the price of buying allowances against the marginal abatement cost over time?

Behaviour and attitudes among the participating companies not only have significance for the stability of the market but also for the efficiency of the emission trading scheme. Uncertainty always imposes a cost for the individual investor.<sup>2</sup> Theoretically these costs can be seen to arise due to the existence of long-run

and short-run uncertainties. Long-run uncertainty will both decrease the volumes of investments in the reduction of CO<sub>2</sub> emissions and postpone the realization of such investments. There are two possible explanations for this. First, higher hurdle rates reflecting higher risk make these investments less profitable. Second, the value of flexibility makes it more profitable to continue operations in existing plants rather than investing in new ones (Trigeorgis, 1996). Short-run uncertainty will drive allowance prices upwards in a cap and trade system with a stiff penalty arrangement in place. This results in increased compliance cost and to some degree even other costs, e.g. for electricity. Long-run and short-run uncertainties will reduce the allocative efficiency of the market if they are perceived as large. Participants find it more difficult to assess the opportunity cost of an investment compared to, e.g. buying allowances under the EU ETS. These costs incurred by the participants resulting from uncertainty will also increase the total cost for meeting the commitments at the EU level. It is of great importance for policy makers to monitor how companies apprehend the situation at hand and how they act to cope with it.

This paper describes and analyses important aspects of the Swedish emissions trading sector participants' *allowance management*. The next section outlines the research design and missing data analysis. In Section 3 the empirical data are presented organized in three parts, each one dealing with a different area of allowance management important for the evaluation of the aim and direction of the EU ETS. Section 3.1 describes how the participating companies have organized their allowance management and how it interconnects with already established environmental systems. Section 3.2 examines the role and functions of allowance trading. This is done by analysing how the Swedish companies trade and the kind of trading strategies they employ. Section 3.3 focuses on how their carbon mitigation strategies link to the European Emissions Trading Scheme. This is done by investigating preferred abatement methods and perceptions of future market conditions. The fourth and final section discusses and summarizes the results in terms of corporate and policy-related challenges.

## 2. Methodology

### 2.1. Research design and analysis of missing data

Data were collected by means of a web survey directed to all 221 Swedish companies subject to the European Emission Trading Scheme in 2006.<sup>3</sup> The questionnaire consisted of 51 questions predominantly with multiple response alternatives. Questions and response alternatives were elaborated after a series of personal interviews with allowance management representatives from both industry and energy sector companies.<sup>4</sup> The overall structure of the questionnaire was as follows: Initially, a number of background questions were asked. Subsequently, the three main themes, organization of allowance management, allowance trading and carbon mitigation strategies, were explored by way of seven sub-topics, each containing between four and 16 questions. The sub-topics investigating the first main theme are *emission reductions* and *activities related to the EU ETS*. Questions on *allowance trading* and *project-based mechanisms* covered

<sup>1</sup> If the company did not deliver sufficient allowances at the reconciliation date, a fee of €40 per tonne CO<sub>2</sub> not accounted for was charged. In the current trading period the penalty fee is €100. In addition, the company must surrender the shortfall the following year.

<sup>2</sup> N.B.: Certainty, in terms of stable cash flows generated from government policies and measures, does also come at a cost. Typically however, this will burden society as a whole since it takes on much of the risk (e.g. risk for gold plating, fewer innovations, etc.).

<sup>3</sup> The total number of corporations is 225; four subsidiaries to larger corporations participating in the study were, however, excluded. The complete report including the questionnaire in Swedish (with a summary in English) can be found at: [www.naturvardsverket.se/Documents/publikationer/620-5679-4.pdf](http://www.naturvardsverket.se/Documents/publikationer/620-5679-4.pdf)

<sup>4</sup> A total of four in-depth interviews with representatives from energy (3) and industry (1) sector companies.

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