

The impact of the EU Emission Trading Scheme on the diffusion of climate protection innovations – the case of German local utilities

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Abstract

This paper analyses the effect of the novel market-based instrument of emission trading on investment strategies of local utilities in the climate friendly technologies of combined heat and power (CHP) and renewable energy resources (RES). We take the example of the German electricity sector, where the economic conditions have been subject to dramatic changes in recent years. The market liberalisation process along with the introduction of feed-in-tariffs for RES and CHP plants in combination with the European Emission Trading Scheme (EU ETS) represent challenges and opportunities for all actors in the energy sector. This paper addresses German local utilities in particular, as they are strongly affected by the market liberalisation leading to consolidation processes which require careful strategic repositioning.

Introduction

In January 2005, the EU wide emission trading scheme (EU ETS) for large stationary emitters of CO₂ or CO₂-equivalents (CO_{2e}) started in all 25 Member States. The general objective of this novel economic instrument is to help the EU cost-efficiently achieve its Kyoto commitment of reducing its greenhouse gas emissions (GHG) by -8 % by 2008-2012 (compared to 1990) and future - possibly more stringent - GHG reduction goals. With a view to the scale of long-term emission reduction requirements, emission reduction measures will have to

play a major role. Local utilities have a good knowledge of customer relations and control “the last mile” of the electricity grid. Therefore, they are expected to be important players for climate protection and energy efficiency measures, especially for the use of RES and CHP. Our paper analyses which innovation incentives result from the EU ETS for these two technology fields.

The analysis draws on the first empirical results of a postal survey conducted in spring 2006 among all German local utilities that fall under the EU ETS (n = 122). The questionnaire contained some general questions about the EU ETS, followed by more specific questions about alternatives for complying with the EU ETS as well as factors influencing the choice of those alternatives. It was addressed to the persons responsible for emission trading. The survey was carried out in spring 2006 by the Fraunhofer ISI in cooperation with the German Research Institute for Public Administration Speyer in a project funded by the VW foundation. It achieved a response rate of almost 40 % (n = 48). In addition to the data collected we used registry data from the German Emissions Trading Authority (DEHSt)¹. As the number of responses available is rather limited, we only applied descriptive statistical methods for our data analysis, bearing in mind the limitations of bivariate analysis.

The remainder of the paper is structured in the following way: we first analyse which compliance options local utilities consider in response to the EU ETS. Second, we take a closer look at the technology fields of CHP and RES, identifying factors that influence the investment strategies of German local

1. European Commission (2006): Community Transaction log, <http://ec.europa.eu/environment/ets/> (06.06.2006).

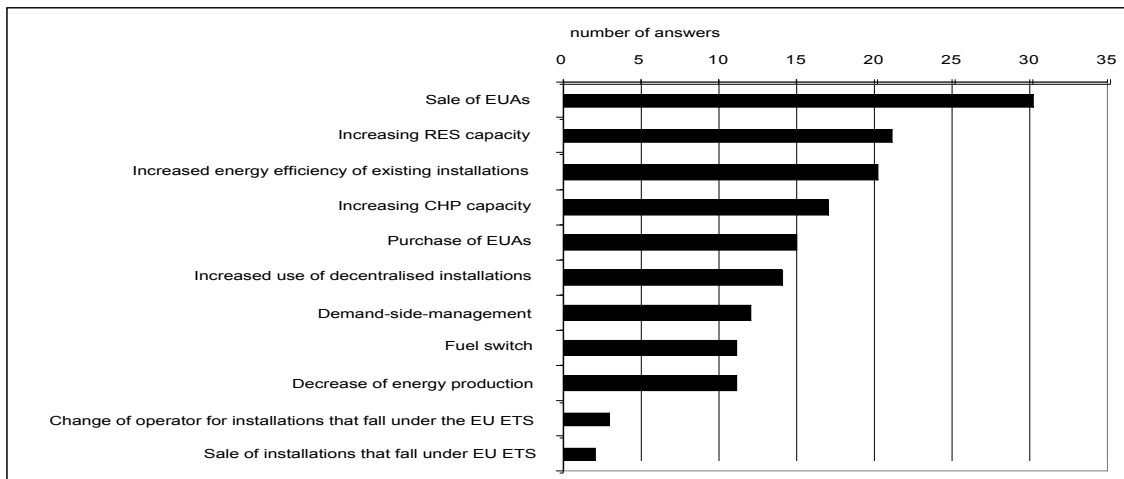


Figure 1: Ranking of compliance options in response to the EU ETS.

utilities. Finally, we sum up our findings and put them in a general perspective.

Compliance options with the EU ETS

With the coming into force of the EU ETS, utilities in Germany whose individual installations or bubble of installations on the same site exceed the threshold of 20 MW_{th} have to surrender EU emission allowances (EUA) equal to the amount of CO_{2e} emitted each year. The EUAs are allocated for free, tradable among participants and transferable into future trading periods starting from phase 2 (phase 1: 2005–2008, phase 2: 2008–2012). In accordance with international emission reduction obligations the overall amount of EUAs allocated will be gradually lowered each trading period².

In the light of the EU ETS, local utilities have to reconsider their energy production strategies as EUAs introduce a new cost factor into their calculations – both for existing installations and for new investments. We classified the possible responses to these circumstances into three categories which are not mutually exclusive. First, local utilities can make use of the market mechanism by selling (or purchasing) allowances in excess (or needed) on the carbon market. Second, they may try to lower the amount of their emissions using technological or organisational measures such as fuel switching, or demand-side-management. Third, local utilities can try to avoid the obligations resulting from the EU ETS, for example by decreasing their energy production or by selling installations that fall under the EU ETS. In our survey, we asked local operators to indicate in a list of ten possible compliance options those considered as possible choices for their response to the EU ETS, multiple responses were possible. Figure 1 shows the resulting ranking of these alternatives.

The top 5 courses of action can be classified in two groups: First, local utilities are considering the active usage of the carbon market (sale and purchase of allowances). Second, operators are favouring increased activity in the fields of RES and CHP as well as energy efficiency improvements of existing in-

stallations. In the following, we take a look exclusively at the technology fields of CHP and RES, analysing the factors that determine the tendencies of local utilities to invest in these climate friendly technologies.

Technology fields of CHP and RES

For reasons of environmental protection and security of energy supply, among others, the promotion of energy produced by RES is a priority of the European Union³. In Germany, this commitment is implemented via the Renewable Energy Sources Act 2004 (Erneuerbare-Energien-Gesetz) which obliges grid operators to pay a fixed tariff for “green” electricity fed into their grid (which is above the market price). Concerning the EU ETS, RES installations are excluded from all obligations linked to the scheme which can be considered as an indirect incentive to invest in RES.

CHP installations provide an environmental benefit because they exploit the waste heat resulting from electricity production, therefore reaching a much higher efficiency factor. Following the liberalisation of the energy market, electricity prices decreased significantly in Germany, resulting in a ratio of electricity and gas prices unfavourable for CHP. On this account the CHP Act (Kraft-Wärme-Kopplungsgesetz) was introduced in 2002. Similar to the RES Act, it imposes certain guaranteed payments with differing terms for old, new and modernised CHP plants. Concerning the EU ETS, a bonus allocation of EUAs for existing CHP plants and a double allocation based on both the amount of energy and the amount of heat produced (the so-called “double benchmark”) for new CHP plants was applied in Germany for the first trading period, leading to a surplus allocation in most cases.

Several firm-specific factors play an important role regarding the choice of RES and CHP for local utilities’ compliance strategies. In the following, we focus on two of them, namely on the exposure to the EU ETS and on the degree of information about the scheme.

2. For details about the EU ETS see e.g. Rogge, K.; Schleich, J.; Betz, R. (2006): An Early Assessment of National Allocation Plans for Phase 2 of EU Emission Trading. Karlsruhe: Fraunhofer ISI.

3. The latest step is a binding target of a 20 % share of RES in the overall energy consumption of the EU by 2020 set in March 2007.

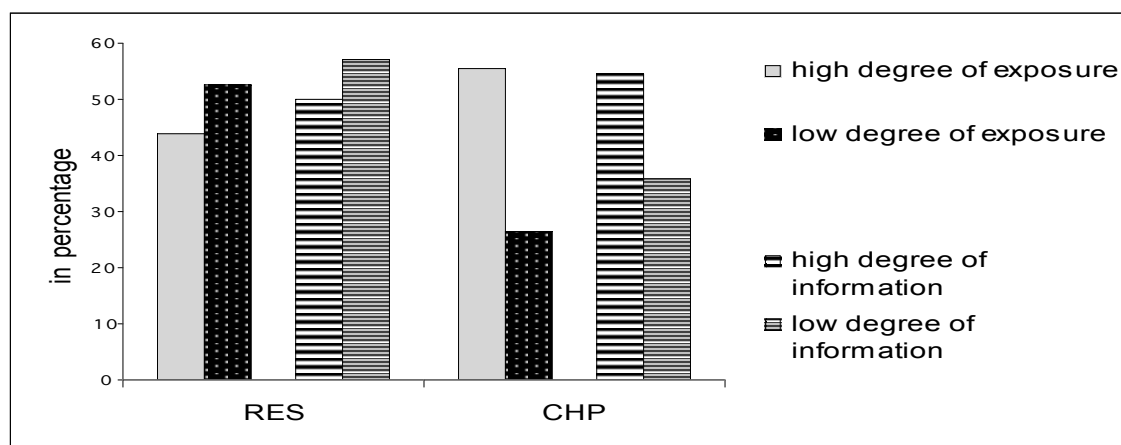


Figure 2: Factors of influence on the use of CHP and RES

EXPOSURE TO THE EU ETS

The index “exposure of local utilities to the EU ETS” is measured by several variables summed up and equally weighted. It is first influenced by the capacity of the utility’s own electricity generation. The higher its capacity, the stronger it is assumed to be affected by the obligations resulting from the EU ETS. The same argument applies to the amount of EUAs allocated as well as to the amount of actual emissions (as of 2005). Finally, we combine the latter two criteria to form a fourth variable capturing the under- / over-allocation of allowances. Since it can sell the surplus at a financial gain, a utility with an allocation exceeding its actual emissions may perceive the restraint of the EU ETS as less severe than a utility with an under-allocation.

Our hypothesis regarding the exposure of local utilities to the EU ETS is that local utilities more severely affected by the EU ETS will consider CHP and RES to be more important for their compliance strategy than utilities that are less severely affected. The empirical findings of our survey indicated that this is only partially true (see Figure 2).

55.6 % of the local utilities with a higher degree of exposure to the EU ETS considered CHP a response to the trading scheme, while only 26.3 % of those less affected by the EU ETS did so. Therefore, our data seem to suggest that the degree of exposure to the EU ETS does influence the likelihood that a local utility will consider CHP in response to the trading scheme. In contrast, the degree of exposure to the EU ETS does not seem to have an important impact on the consideration of RES. 43.8 % of the local utilities in our sample that are strongly affected by the EU ETS chose RES as a possible course of action vs. 52.6 % of the less affected ones. Apparently, local utilities seem to consider increased involvement in RES an option for action regardless of their degree of exposure to the EU ETS.

These somewhat surprising results may be due to the different legal arrangements regarding CHP and RES. On the one hand, the bonus allocation of EUAs and the double benchmark for new CHP plants represent a direct economic incentive for the operators of such installations as these regulations result in a higher amount of EUAs at their disposal. On the other hand, RES installations are excluded from the EU ETS. As a consequence, these plants are neither receiving emission allowances nor do they have to fulfil the administrative obligations of the EU ETS, such as monitoring and reporting. With regard to RES, the EU ETS can therefore merely be seen as having an

indirect impact on the compliance strategy of local utilities. This line of reasoning is supported by results about influencing factors related to the EU ETS regulatory framework. 64 % of the local utilities considered the German bonus allocation of EUAs for CHP plants as very important or important. By contrast, the exclusion of RES plants from the EU ETS is rated as very important or important by only 23 % of respondents.

THE DEGREE OF INFORMATION ABOUT THE EU ETS

In order to measure a local utility’s degree of information about the EU ETS we have again summed up several variables with equal weighting. The index depends on the year when the local utility first found out that it would be subject to the EU ETS. Utilities that obtained this information earlier (i.e. in 2001 or in 2002) are considered to be better informed than utilities which discovered it later (i.e. after 2002). The second compound is the utility’s estimation of future allowance prices up to 2008 and 2012, respectively. Both time horizons yielded similar results - a median of 30 € per EUA - which is much higher than the current market prices for phase 1 allowances and even for phase 2 allowances. These prices are 1.2 € and 15.4 €, respectively, as of March 16, 2007⁴ resulting after the EU Commission’s significant budget cuts in their first decision on notified national allocation plans of 10 EU Member States⁵. We therefore consider utilities that estimated the future price below 25 € to be better informed than those setting it above 25 €. Finally, we compared the allocation vs. emissions situation in 2005 estimated by respondents with verified data from the registry. Utilities that gave a correct estimation of the situation – either surplus allocation, allocation according to need, or under-allocation – are considered to be better informed than those that misjudged their situation.

Our hypothesis regarding the degree of information is that local utilities that are better informed will consider CHP and RES to be more important for their compliance strategy. Here,

4. Climate Corporation (2007): Emissions Trading News.

5. European Commission (2006): Communication from the Commission to the Council and to the European Parliament on the assessment of national allocation plans for the allocation of greenhouse gas emission allowances in the second period of the EU Emissions Trading Scheme accompanying Commission Decisions of 29 November 2006 on the national allocation plans of Germany, Greece, Ireland, Latvia, Lithuania, Luxembourg, Malta, Slovakia, Sweden and the United Kingdom in accordance with Directive 2003/87/EC, Brussels.

we argue that those utilities which not only observe the price of allowances but are also well informed about detailed allocation rules of the EU ETS are more likely to recognize and act upon the direct and indirect advantages of CHP and RES as compliance options. Our empirical findings regarding this issue appear to be divided.

54.5 % of the better informed utilities showed a tendency to choose CHP as an option for action in response to the EU ETS. Only 35.7 % of the local utilities with a lower degree of information considered CHP an appropriate measure. Therefore, the degree of information does seem to influence a utility's tendency to favour CHP. Those utilities with a higher degree of information probably have a better understanding of the incentive system for both existing and new CHP installations and may thus find this compliance choice more attractive than not so well informed utilities.

By contrast, the degree of information does not seem to have a significant impact on the consideration of RES. 50 % of the well informed local utilities considered RES compared to 57.1 % of the less informed utilities. Apparently, local utilities are thinking about increasing their activity in RES regardless of their level of knowledge of the EU ETS. Bearing in mind our findings regarding the degree of exposure to the EU ETS, we might more generally conclude that local utilities consider activity in RES regardless of the trading scheme. This could be due to the incentives given by the feed-in-tariffs stipulated in the German Renewable Energy Resources Act. Furthermore it can be the result of RES being seen as a long-term solution to the challenge of climate change.

Conclusions and future perspectives

Summing up we conclude that increased use of RES and CHP is among the options considered as most important by local utilities in reaction to the EU ETS. We analysed more closely the working mechanisms by which the EU ETS exerts its influence on the utilities' inclination to invest in these climate friendly technologies. Here we focussed on the degree to which local utilities are exposed to the EU ETS on the one hand and on their degree of information about the regime on the other hand.

With respect to CHP the results showed that there is a positive influence of both variables on the consideration of CHP in response to the EU ETS. I.e. the higher the exposure to the scheme and the better the knowledge of local utilities about it, the greater is the probability that they will consider CHP to be a suitable response to the trading scheme. By contrast, we could not identify such a relation for RES. Apparently, neither the degree of exposure to the EU ETS nor the level of information about this new policy instrument play an important role for the importance assigned to RES as a possible response to the EU ETS. These findings can be explained by the different incentives for the use of RES and CHP set by the the EU ETS regime. The German implementation of the EU ETS appears to be successful in providing an economic incentive to CHP plants by granting a bonus allocation for existing ones and a double benchmark for new installations. It seems to have a direct impact on the compliance strategy of local utilities. By contrast, the exclusion of RES plants from the EU ETS may only indirectly influence local utilities' climate strategies. Here, the

RES Act remains to be the most important policy instrument supporting the diffusion of RES in Germany. The importance of subsidies for RES and CHP for local utilities is shown in a study of our project partners who find that "environmental regulation is successful in creating innovative niches ..., which are indeed used by local utilities"⁶.

Glossary

CHP	Combined Heat and Power
EU ETS	European Union Emission Trading System
EUA	EU Emission Allowances
RES	Renewable Energy Sources

Acknowledgements

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6. Barnekow, S.; Jansen, D. (2006): Local utilities coping with the transformation of the energy market and their role for the diffusion of climate friendly technologies, Speyer: Deutsches Forschungsinstitut für öffentliche Verwaltung (FÖV Discussion Papers 36).