European Energy Policy in Transition: Critical Aspects of Emissions Trading

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Abstract

The overarching theme of the thesis is European energy and climate policy, with a particular focus on the role of emissions trading. The thesis consists of eight papers.

Paper 1 outlines the origins and characteristics of the European Union's Emissions Trading System (EU ETS), launched in January 2005. It then analyses the most contentious issues in the economics literature and in the public debate surrounding the trading system. The initial years of the trading system have provided a large-scale testing ground for trading a new environmental commodity, carbon dioxide. The lessons learned are diverse and not all experiences are positive, but the accomplishment of creating a common carbon price across a large part of the EU economy should not be underestimated. Policy makers in Europe and elsewhere would be wise to make use of the information gained from the EU ETS, be they supporters of emissions trading or sceptics of such policies. The paper concludes with a look towards the future, highlighting some upcoming revisions of the EU ETS and issues that remain unresolved.

Paper 2 examines how firms' pricing strategies depend on the initial distribution of emissions allowances in the market, which is an important feature in the design of an emissions trading program. In a competitive market, the choice between an auction and free allocation of allowances should not, according to economic theory, have any influence on firms' production choices or on consumer prices. However, the debate swirling around current emissions trading systems shows that parts of industry, the general public, and the policy-making community expect the method of allocation to affect product prices. The paper reports on the use of experimental methods to investigate behaviour with respect to how prices will be determined under a cap and trade program with different allocation methods. Participants initially display a variety of pricing strategies. However, given a simple economic setting in which earnings depend on behaviour, we find that subjects learn to consider the value of allowances and overall behaviour moves toward that predicted by economic theory.

In **paper 3,** we study the rules governing allocations to both installations[1] that close and to new entrants. Member states in the European Union are responsible for National Allocation Plans that determine the initial distribution of emission allowances in the CO_2 Emission Trading System, including rules governing allocations to installations that close and to new entrants. The European Commission has provided guidelines to discourage the use of allocation methodologies that prompt incentives, which affect firms' compliance behaviour, for example, by rewarding one type of compliance investment over another. We find that the treatment of closures and new entrants by member states is inconsistent with the general guidelines provided by the EU. We propose stronger EU guidance regarding closures and new entrants, a more precise compensation criterion on which to justify free allocations, and a ten-year rule as a component of future EU policy that can guide a transition from current practice to an approach that places greater weight on efficiency.

In **paper 4,** we focus on the effect of the price of emission allowances on CO_2 emissions from Swedish electricity generation, using an econometric time series analysis for the period 2004–2008. Before the launch of the EU Emissions Trading System in 2005, the electricity sector was widely proclaimed to have more low-cost emission abatement opportunities than other sectors. If this were true, effects of the EU ETS on carbon dioxide emissions would likely be visible in the electricity sector. We control for effects of other input prices and hydropower reservoir levels. Our results do not indicate any link between the price of EUA and the CO_2 emissions of Swedish electricity production. A number of reasons that may explain this result are discussed, and we conclude that other determinants of fossil fuel use in Swedish electricity generation likely diminish the effects of the EU ETS.

In **paper 5**, we return to the issue of allocation, focusing on the impact of allocation to new entrants in the EU ETS, using the power sector as the reference. The study compares the allocations in phase I and phase II of the EU ETS to two hypothetical energy installations located in different EU member states. The discussion focuses on the Nordic countries and their integrated energy market. The quantitative analysis was complemented by interviews with policy makers and industry representatives. The results suggest that current allocation rules can significantly distort competition. The annual value of the allocation is comparable to the fixed investment costs of a new installation and is not insignificant, compared to expected revenues from sales of electricity from the installation. The study finds that the preferred option for the Nordic countries is not to allocate free allowances to new entrants in the energy sector. It should be combined with adjusted rules on allocation to existing installations and closures in order to avoid putting new installations at a disadvantage. A second, less-preferred choice suggests harmonized benchmarks across the Nordic countries.

In **paper 6,** we quantify the volume of free allowances that different National Allocation Plans proposed to distribute to existing and new installations, again with specific reference to the power sector. Most countries continued to allocate based on historic emissions, contrary to hopes for improved allocation methods, frequently using 2005 emission data; this may strengthen the belief by the private sector that emissions in the coming years will influence their subsequent allowance allocation. Allocations to new installations translate into large (and frequently fuel-differentiated) subsidies, which risk significant distortions to investment choices. Thus, in addition to supplying a long market in the aggregate, proposed allocation plans reveal continuing diverse problems, including perverse incentives. To ensure the effectiveness of the EU ETS in the future, the private sector will need to see credible evidence that free allowance allocation will be drastically reduced post-2012, or that these problems will be addressed in some other way.

Paper 7 investigates four alternative methodologies for free allocation based on historical activities that were under discussion before the allocation methodologies for phase I had been

[1] An 'installation' is the official EU term for a factory or a plant emitting carbon dioxide, i.e., the complying entity in the EU ETS.

established. We analyse emissions-based allocation, production-based allocation with actor-specific emission factors, production-based allocation with benchmarking, and production-based allocation using data on best available technology. The allocation methodologies are evaluated against the criteria for National Allocation Plans,[2] regarding their conformity with the criteria introduced by the Swedish Parliamentary Delegation on Flexible Mechanisms (the FlexMex 2 Commission), which did a substantial part of the preparatory work in Sweden ahead of the launch of the EU ETS. We find that no allocation methodology unambiguously meets all criteria. Emissions-based allocation is most straightforward, transparent, and the easiest to implement. Production-based allocation meets more of the criteria, but is more costly to implement and requires more data. Due to the lack of abatement cost curves, it is not possible to accurately model potential capital flows between the trading sectors, but we believe it is unlikely that any given allocation scheme will be perceived as fair by all concerned parties, no matter how sophisticated it is. A final conclusion is that data availability probably limits the options available to the authorities designing the allocation schemes. For example, data on best available technology was not available in time for phase I allocations of the EU ETS.

Paper 8 evaluates the climate impact from the use of peat for energy production in Sweden. By applying a dynamic energy model, we study the effect on climate change from the use of peat for energy generation, measured as the contribution to atmospheric radiative forcing when using 1 m^2 of mire for peat extraction over a 20-year period. We look at two different methods of aftertreatment of the mire: restoration of wetlands and afforestation. The climate impacts of a peatlands–wetlands scenario and a peatlands–forestation–bioenergy scenario are compared to the climate impacts of using coal, natural gas, and forest residues for energy generation. We perform sensitivity analyses to evaluate which parameters are important to take into consideration to minimize the climate impact from peat utilisation. In a 'multiple generation scenario', we investigate the climate impact if 1 megajoule of energy is produced from peat every year for 300 years and compare it to other energy sources. The results are sensitive to what after-treatment is used and what time horizon is applied. In a majority of the scenarios, however, the climate impact of peat is lower than if coal was used to generate the energy, but higher than the corresponding values for natural gas and forest residues.

Key words: *Energy policy, climate policy, carbon dioxide, climate change, emissions trading, EU ETS, efficiency, distributional effects, closures, new entrants, electricity, allocation, auctions, carbon leakage, competitiveness, peat, radiative forcing*

JEL Classification: *C22, C91, D21, D24, D44, D61, Q54*

ISBN : *978-91-85169-42-9*

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[2] Listed in annex III of the EU ETS Directive (European Union 2003).