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THE SOCIAL COSTS OF POWER GENERATION AND CLIMATE POLICY: IMPACTS OF THE SWEDISH NATIONAL EMISSION TARGET

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Overview and Objective

In accordance with the Kyoto Protocol and the EU Burden Sharing Agreement, Sweden is permitted to increase its greenhouse gas emissions by 4 percent compared to their 1990-levels until the end of the first Kyoto commitment period in 2012. In an attempt to precede stricter future requirements, Sweden has rejected their opportunity to increase emissions and instead decided to decrease emissions with 4 percent until the end of the first commitment period. Moreover, other than Germany and Great Britain, Sweden is the only EU country that has decided to take this extra step and focus on a national emission target, addressing thus emissions made on Swedish soil. The difference between a national emission target and the option of fully utilizing the benefits of emissions trading within the EU ETS lies in how Sweden can meet the target, where reductions will be made, and, of great importance, how much it will cost and affect different sectors of the economy. In this paper we focus on the implications of Swedish climate policy for the social choice between new electric power plants.

The sectors that are included in the EU ETS include power- and heat generators as well as selected energy intensive industries. This divides the Swedish economy into a trading sector that participates in the ETS, and a non-trading sector that cannot utilize the flexibility of emissions trading. The non-trading sector, e.g. transports, is currently regulated through a carbon tax system. An important implication of the Swedish national emissions target and the presence of a trading and non-trading sector is that if a firm in the trading sector chooses to buy permits, a corresponding reduction has to be made in the non-trading sector.

Recent studies indicate that the above formulation of Swedish climate policy will have consequences for the costs of climate policy and the overall emission levels in Europe (e.g., Carlén, 2004; Hill and Kriström, 2005). The overall purpose of this paper is to analyze how the current Swedish climate policy – as well as alternative policy designs – affects the internalization of environmental external costs (including carbon-related costs) and ultimately the socially efficient choice between different power generation technologies.

Methodological Issues

In a first step, we assess the (private) lifetime costs for a number of technologies: gas-fired power; bio-fuelled power; and wind power, and add to these the costs that various policies imply. In this way we obtain an assessment of the costs facing a power plant owner planning to invest in new capacity. In a second step, we assess the negative (environmental) external costs associated with each of the technologies considered. In the case of the external costs of carbon dioxide emissions three different cases are identified and analyzed:

- First, we assume that Sweden has not signed any international climate agreement but that there is a domestic carbon tax. This implies that there are no flexible mechanisms available and that the combustion of fossil fuels would increase global CO_2 emissions.
- The second case rests on the assumption that there is an international agreement such as the Kyoto Protocol, emissions trading within EU ETS, but where Sweden has a national

emission target implying that any increase in emissions in the trading sector must be met by reductions in the non-trading sector. This is the current policy.
- In the third case, there is an international agreement such as the Kyoto Protocol, emissions trading within EU ETS, but here Sweden can make full use of the emissions trading and any adjustments in the non-trading sector are not necessary.

The analysis will thus show to what extent differences between the costs that an investor faces and the social cost of a certain technology exist, and permits an assessment of important differen-ces across the three different climate policy designs.

Results

The results indicate that in the first case, it is difficult to assess the full economic ranking of the different technologies based on their individual social costs, mainly due to uncertainties about the social cost of carbon (affecting the natural gas alternative). However, overall onshore wind power tends to have lower social costs than bio-fueled electric power. In the second case a new investment in natural gas-fired power implies no net increases in global emissions, but the Swedish national target imply that the non-trading sector will have to undertake relatively expensive carbon mitigating measures. This implies an extra cost to society, and it turns out that the social cost of gas-fired power is higher than for (onshore) wind power. This is in contrast to the results from the third case where natural gas comes through as the most desirable alternative from a social efficiency perspective. There are no net emissions of carbon dioxide and since no adjustments in the non-trading sector are necessary, the social cost of carbon will be zero.

Currently the Swedish policy stance towards increased gas use is rather negative. Our results suggest however that if the Swedish Government abandons its national target for carbon emissions, and makes full use of the flexibility provided by EU ETS, this will have a profound positive affect on the economics of natural gas use for power generation.

References

Carlén, B. (2004). “EU’s Emissions Trading System in the Presence of National Emission Target.” Working Paper 2004:16, Department of Economics, Stockholm University.

Hill, M. and B. Kriström (2005). *Klimatmål, utsläppshandel och svensk ekonomi (Climate Policy Goals, Emissions Trading and the Swedish Economy)*. SNS Förlag, Stockholm.