



Sectoral and macroeconomic impacts of the large combustion plants in Poland: A general equilibrium analysis[☆]

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Abstract

This paper analyses the final incidence of direct costs of implementation of the EU Directive on SO₂ and NO_x emission limits for large combustion plants in Poland. First, we simulate a model from a power-sector perspective, where compliance with the Directive appears to be associated only with direct costs. Second, a more realistic, market-wide perspective is modeled, where abatement costs borne by the power sector become the revenues of the sectors supplying abatement technologies and services. Simulations indicate that if environmental benefits of implementation are unaccounted for, the Directive would seem to cause a deadweight loss in the economy. The overall impact, however, is likely to be less negative than what the interest groups claim. © 2006 Elsevier B.V. All rights reserved.

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1. The problem and the scope of analysis

The new directive of the European Parliament and the Council on air emission limits for certain pollutants from large combustion plants (Large Combustion Plants Directive—LCPD 2001/80/EC) was adopted on 27th November 2001 ([European Commission, 2001](#)). The

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Directive requires that the existing large combustion sources are adjusted to more strict requirements regarding emissions of SO₂, NO_x and particles by 2008. In addition, as of 2016 the plants with capacity of over 500 MWt will need to meet very strict NO_x emission standards. Polish energy sector is different from other EU Member States and Candidate Countries in many respects. The structure of fuels used for electricity and heat generation relies heavily on domestic coal and lignite, constituting 97% of the fuel mix. With this structure of primary fuel inputs, environmental protection costs constitute a high share of electricity generation costs. Electricity demand is forecasted to increase during the next 10–20 years, with the share of coal in the structure of fuels gradually decreasing (Ministerstwo Gospodarki, 2000, 2002).

In the second half of the 1990s the energy producers undertook significant investment efforts in the air protection area, in order to conform with the requirements of the previous version of the LCP directive and the Polish law. Many power plants started flue gas desulphurisation, securitising the investments through long-term contracts with the power grid operator. Financial situation of the energy sector has significantly deteriorated in the recent years and its borrowing capabilities have diminished. At the same time, a privatization process has begun. The perspective of having to pay more for adjusting to the new, stricter environmental protection requirements raises concerns about an increase in electricity costs and prices and a negative impact on international competitiveness of the Polish power industry. Due to the heavy reliance on coal and the unfavorable stage in business cycle, the Polish power sector expects significant direct adjustment costs. Interest groups representing the sector have argued that the increase in electricity prices will drive up the production costs of all other sectors, leading to the decrease in output and massive layoffs (unemployment rate in Poland reached almost 20% in 2003). They requested (with success) for long-term derogations and subsidies, claiming that otherwise the Directive would affect international competitiveness of energy intensive industries, decrease the disposable income of households throughout the country, which may lead to dramatic social consequences in poor and underdeveloped regions.

On the other hand, some governmental departments, the European Commission and environmental NGOs have stressed positive structural effects of environmental investments in the power sector, such as employment and growth in the sectors providing pollution abatement technologies and services. Indeed, abatement expenditures of the power sector constitute revenues of other sectors. Investments in pollution abatement equipment imply purchases of this equipment from the machine industry and purchases of related construction services from other sectors. Operation and maintenance of this equipment will imply purchases of chemicals and other materials and services that will increase the demand and the employment in other sectors. These indirect market effects are often overlooked by the particular industry, which has to bear the direct abatement cost.

If markets were fully efficient any administrative intervention into production decisions would inevitably cause deadweight loss and a decrease in welfare. The indirect market feedback effects, as described above, would only make things less painful. Electricity markets, however, suffer from intrinsic inefficiency caused by pervasive presence of external costs caused by the pollution associated with combustion of fossil fuels. Reduction of emissions delivers benefits to those sectors, which suffer damages caused by emissions of particulates and acid rain. These benefits are not captured by market prices, and therefore are not conveyed through the demand and supply adjustment mechanism, unless the markets for pollution rights are created or unless the pollution is taxed. External benefits of emissions

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