

The impacts of EU CO₂ emissions trading on electricity markets and electricity consumers in Finland

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Available online 2 June 2006

Abstract

In this paper, the likely impacts of the EU emission trading system on the Nordic electricity market and on the position of various market actors are assessed. In its first phase, the EU CO₂ emission trading system includes power plants with thermal capacity greater than 20 MW, metals industry, pulp and paper industry, mineral industry and oil refineries. This paper describes the assessment done for the Finnish Minister of Trade and Industry, analysing the likely impacts on power plant operators, on energy-intensive industries, on other industries and on other consumer groups. The impacts of emissions trading were studied with the VTT electricity market model and with the TIMES energy system model. The annual average electricity price was found to rise 0.74 EUR MW h⁻¹ for every 1 € tonne CO₂⁻¹ in the Nordic area. Large windfall profits were estimated to incur to electricity producers in the Nordic electricity market. In Finland, metals industry and private consumers were estimated to be most affected by the electricity market price increases. Expanded nuclear power generation could limit the increases in the prices of electricity to one-third compared to those in the base case.

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Keywords: Nordic electricity market; Investment; CO₂ emission; Windfall profit; Industry; Domestic sector

1. Introduction

All EU countries except for Malta and Cyprus are committed to greenhouse gas (GHG) emission reductions within the Kyoto protocol by 2008–2012 (UN/FCCC, 1998). The EU burden sharing commitment is the EU's mechanism of complying to the Kyoto protocol as community. The EU has now introduced a carbon dioxide (CO₂) trading system as a means for achieving the

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EU burden sharing targets, commenced in the beginning of 2005 ([Official Journal of the European Union, 2003](#)). With the emission trading system, a market-based cost is associated to carbon dioxide emissions, and emission allowances can be sold and purchased within the EU area. In the first phase of the system, 2005–2007, power plants with thermal capacity greater than 20 MW, as well as metals industry, pulp and paper industry, mineral industry and oil refineries are included. National authorities in each country have allocated initial emission allowances to plants covered by the system in their National Allocation Plans, which are to be approved by the European Commission. The EU emission trading is expected to be a major change in the operating environment, especially for energy production and for the energy-intensive industry.

In Finland, an exceptionally large part of all activities producing CO₂ emissions are included in the system (62%, whereas the EU average is 55%). This is mainly due to the energy-intensive structure of the Finnish industry and the cold climate. The efficiency of the fuels used is among the highest in OECD ([Kara et al., 2004](#)). Combined heat and power (CHP) production is commonly used both in energy production and within industry. About one-third of electricity is generated in CHP plants in Finland. The already high efficiency of fuel use makes additional improvements more difficult. In addition, the electricity intensity of the Finnish economy is remarkably higher than in OECD and EU countries on average ([Fig. 1](#)). Due to these reasons, the EU emissions trading will be exceptionally significant for Finland.

Various energy-intensive industries are in very different relative positions with regard to emissions trading, depending on their structures of electricity supply and on their access to alternative energy sources (e.g. bioenergy). Especially metals industry has expressed serious concerns related to their future competitiveness with the expected rise of electricity prices. The energy-intensive export-oriented industrial sector is very important for the national economy of Finland, and a stable and competitive electricity price is of crucial importance for the energy-intensive industry.

The Nordic countries Finland, Norway, Sweden and Denmark form a common electricity market. More than 70% of all electricity production is carbon-free, consisting of mainly hydro-power and nuclear power. However, most of the time the marginal production mode is coal

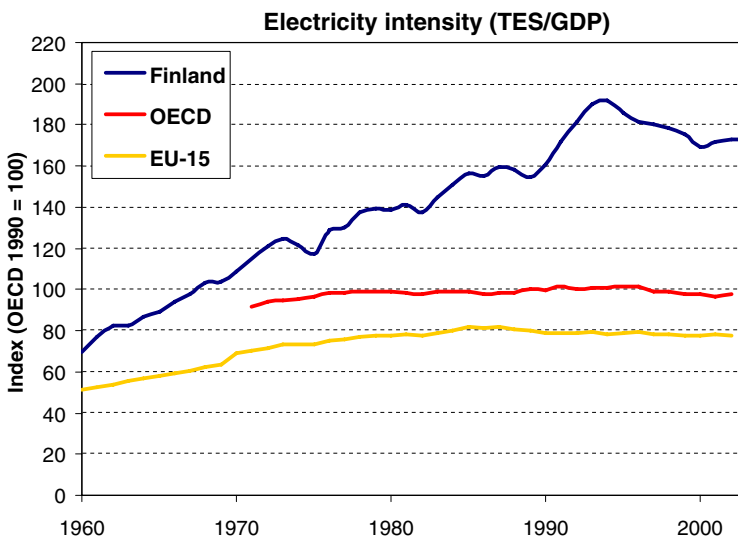


Fig. 1. Development of the ratio of TES to GDP in Finland, OECD and EU-15 between 1960 and 2002.

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