

CO₂ Price Impacts on Nuclear Power Plant Competitiveness in Croatia

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Long term power system planning faces growing number of concerns and uncertainties, which is especially true for nuclear power plants due to their high investment costs and financial risk. In order to analyze competitiveness of nuclear power plants and optimize energy mix, existing models are not sufficient anymore and planners need to think differently in order to face these challenges. Croatia will join EU ETS (European Emission Trading Scheme) with accession to EU (probably in 2012). Thus, for Croatian electrical system it is very important to analyze possible impacts of CO₂ emissions.

Analysis presented in this paper is done by electricity market simulation model PLEXOS which was used for modelling Croatian electrical system during development of the Croatian Energy Strategy in 2008.

Paper analyzes impacts of CO₂ price on competitiveness of nuclear power plant within Croatian power system between 2020 and 2025. Analyses are focused on how nuclear power plant influences total emission from the power system regarding coal and gas prices, average electricity price regarding CO₂, coal and gas prices price. Results of this paper are showing that with emissions from Energy strategy development scenario with two new coal power plants (600 MW each) and two new gas power plants (400 MW each) until 2020, Croatia does not meet Kyoto target due to this emissions from power system. On the other side, introduction of nuclear power plants presented in this paper (1000 MW instead of one coal and one gas power plant) means nearly 6.5 Mt CO₂ emissions less annually and gives possibility to achieve Kyoto target (as this reduced amount represents nearly 22% of Croatian Kyoto target). Results are also showing how increase in CO₂ price is enhancing competitiveness of a nuclear power plant.

Keywords: *power system planning, nuclear power plant, marginal costs, electricity market simulation, emission trading*