

# **Sustainable Energy Supply in Germany – Scenario Analysis with Different CO<sub>2</sub> Certificate Prices**

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The member states of the European Union committed themselves in the Kyoto protocol to reduce their greenhouse gas emissions until 2012 by eight percent compared to 1990. Therefore the European Union decided at the end of 2002 to introduce the CO<sub>2</sub> certificate system starting in 2005 with a pilot phase. The regulation applies to energy-intensive enterprises (e.g. power stations, chemistry companies, steel plants among other things). At the beginning these companies will receive an initial amount of tradable CO<sub>2</sub> certificates free of charge, with an annually decreasing number distributed until 2012. Companies can save CO<sub>2</sub> emissions by applying more energy efficient techniques or by substitution of carbon-rich by carbon-poorer sources of energy. Higher CO<sub>2</sub> emissions are connected with the purchase of CO<sub>2</sub> certificates or the payment of a penalty (up to 100 € per ton of CO<sub>2</sub>).

The effects of the CO<sub>2</sub> certificate system were examined with the energy systems model TIMES D2 for Germany. Within the model prices of CO<sub>2</sub> certificates were varied within the framework of a scenario analysis. The effects on the German energy system and fulfilling of reduction targets are analyzed. It is pointed out, which sectors, technologies and measures to what extent and at which system costs are able to contribute to the avoidance of the CO<sub>2</sub> emissions.

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