

Renewables vs. energy efficiency: the cost of carbon emissions reduction in Spain

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Abstract-

While support instruments have succeeded to largely deploy renewables during the 1996-2008 period, little attention has been paid to energy efficiency measures, resulting in a high energy intensity and large growth of energy demand. Energy-related CO₂ emissions have increased significantly. At the same time, important investments in combined cycle gas turbines have taken place. This paper analyses whether, from a cost minimization view point, renewable support has been the best policy for reducing emissions, when compared to the promotion of energy efficiency in sectors such as transportation or buildings. We use a model of the Spanish energy sector to examine its evolution in the time period considered under different policies. It is a bottom-up, static, partial equilibrium, linear programming model of the complete Spanish energy system. We conclude that demand side management (DSM) clearly dominates renewable energy (RE) support if the reduction of emissions at minimum cost is the only concern. We also quantify the savings that could have been achieved: a total of €5 billion per year, mainly in RE subsidies and in smaller costs of meeting the reduced demand (net of DSM implementation cost).

Index Terms- CO₂ emissions, renewable energy support, energy conservation

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