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## **ECONOMIC IMPACTS FROM THE PROMOTION OF RENEWABLE ENERGY TECHNOLOGIES: THE GERMAN EXPERIENCE**

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### **OVERVIEW**

The allure of an environmentally benign, abundant, and cost-effective energy source has led an increasing number of industrialized countries to back public financing of renewable energies. Germany's experience with renewable energy promotion is often cited as a model to be replicated elsewhere, being based on a combination of far-reaching energy and environmental laws that stretch back nearly two decades. This paper critically reviews the current centerpiece of this effort, the Renewable Energy Sources Act (EEG), focusing on its costs and the associated implications for job creation and climate protection. We argue that the German renewable energy policy, and in particular the adopted feed-in tariff scheme, has failed to harness the market incentives needed to ensure a viable and cost-effective introduction of renewable energies into the country's energy portfolio. To the contrary, the government's support mechanisms have in many respects subverted these incentives, resulting in massive expenditures that show little long-term promise for stimulating the economy, protecting the environment, or increasing energy security.

### **METHODS**

The EEG guarantees 20 years of subsidies from the moment of installation of a renewable energy source. To quantify the extent of the overall financial burden from this law, we focus on the total net present cost of subsidizing electricity production by wind power plants and photovoltaic (PV) modules both for those plants and modules that were already installed between 2000 and 2009 and for those that may be added in 2010.

Any assessment of the real net present cost induced by subsidizing renewable technologies requires information on the volume of green electricity generation, technology-specific feed-in tariffs, as well as conventional electricity prices, with the specific net cost per kWh being calculated by taking the difference between technology-specific feed-in tariffs and market prices at the power exchange. Our estimates are based on the past electricity production figures for wind and solar electricity for the years 2000 through 2009 and on forecasts of the capacity growth for 2010. For all calculations, we assume an inflation rate of 2%, which roughly corresponds to the average rate since the German reunification. Future market prices for electricity are taken from the "high price scenario" assumed by NITSCH et al. [1], a study on the future development of renewable energy technologies in Germany. In this scenario, the impact of the European Emissions Trading System on electricity prices is incorporated.

### **RESULTS**

Figure 1 shows how the estimated amount of feed-in tariffs for PV modules installed between 2000 and 2009 is distributed over time.

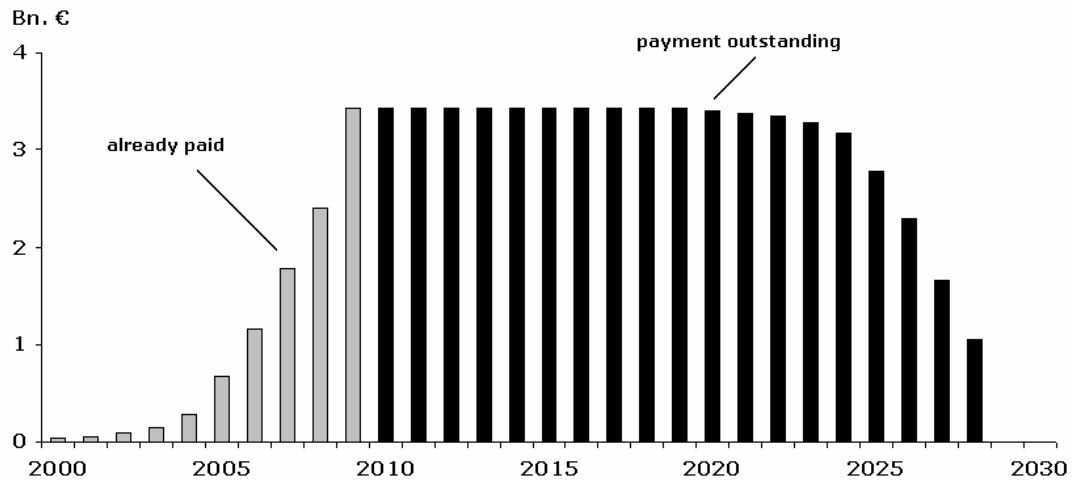


Fig. 1. Annual Amount of Feed-in Tariffs for PV for the cohorts 2000 through 2009

Based on these assumptions, we find that PV modules installed between 2000 and 2009 account for real net cost worth 48.6 Billion (Bn) € Wind converters installed in the same time account for about 11.5 Bn €

These estimates demonstrate that producing electricity on the basis of renewable energy is extremely costly. As a consequence, these technologies are far from being cost-effective climate protection measures. We calculate that PV is among the most expensive greenhouse gas abatement options, with costs amounting to 716 €/t CO<sub>2</sub> under the German subsidization regime. Although the abatement cost of wind energy is considerably lower, at 54 €/t CO<sub>2</sub>, they are still considerable higher than the price of the European Emissions Trading System's CO<sub>2</sub> certificates.

## CONCLUSIONS

Although renewable energies have a potentially beneficial role to play as part of Germany's energy portfolio, the commonly advanced argument that renewables confer a double dividend or "win-win solution" in the form of environmental stewardship and economic prosperity is disingenuous. In this article, we argue that Germany's principal mechanism of supporting renewable technologies through feed-in tariffs, in fact, imposes high costs without any of the alleged positive impacts on emissions reductions, employment, energy security, or technological innovation.

## REFERENCES

1. Nitsch, J., Staiss, F., Wenzel, B., Fishedick, M. (2005) Ausbau der Erneuerbare Energien im Stromsektor bis 2020: Vergütungszahlen und Differenzkosten durch das Erneuerbare-Energien-Gesetz, Stuttgart, Wuppertal