

Cross-subsidies tied to the introduction of intermittent renewable electricity

An analysis based on a model of the French day-ahead market

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Executive summary

Renewable energy is a key component of the EU energy strategy and makes up about 25% of the mix of the European electricity production today. In Germany the proportion is higher, at 34%, but in France it is only 16%. Nevertheless due to the networks interconnection, German and French spot prices are largely correlated. Consequently wind and solar generation has a significant impact on electricity prices in both the domestic and the neighboring market.

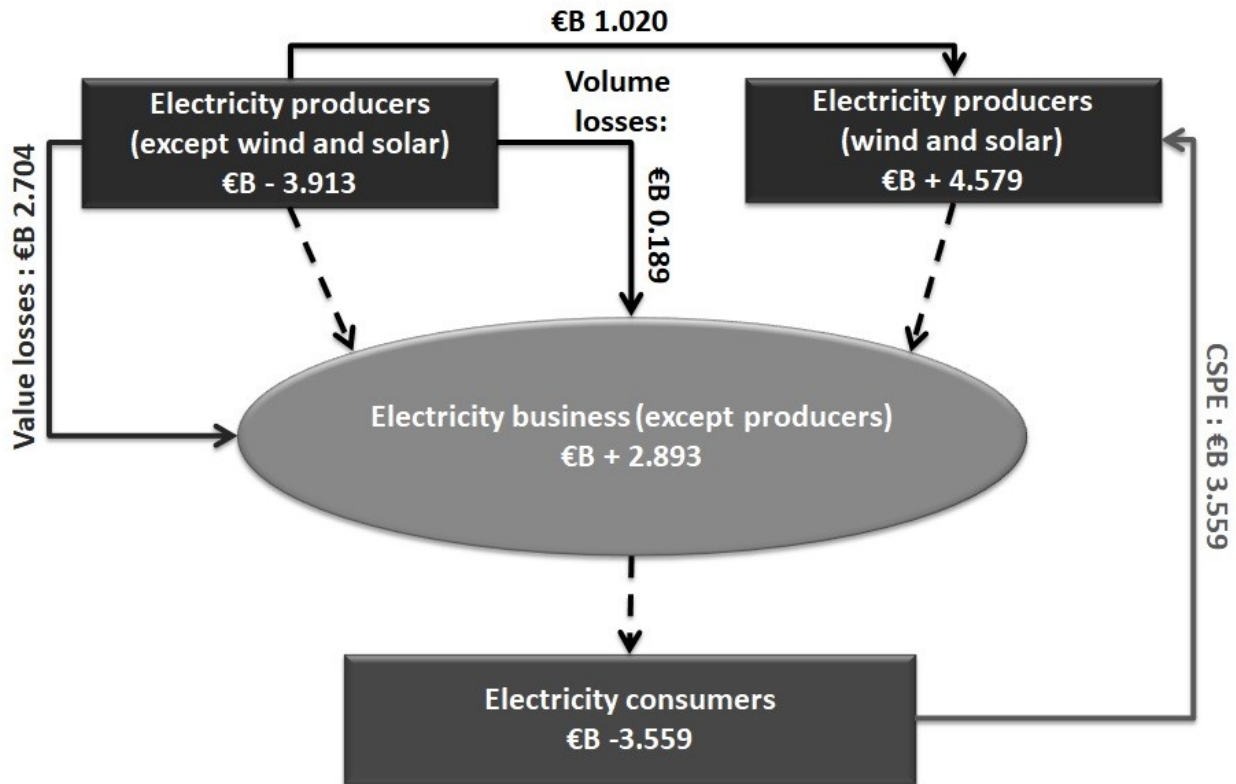
The introduction of renewable energy paid off-market disrupts the demand-price relationship in wholesale electricity markets. This paper aims at quantifying the disturbance observed and the transfers of revenues among consumers, producers and providers. The analysis is based on RTE (firm in charge of electricity transport) and the French day-ahead SPOT market hourly data. The impact of the European electricity network interconnections on demand and prices is taken into account.

To assess the economic impact of feeding in renewable electricity subsidized off-exchange, it does not suffice to calculate the additional cost stemming from the difference between the guaranteed purchase price and the market price (i.e., the CSPE in France). It is also necessary to consider the crowding-out effect that the injection of renewables exercises on the volume of conventional electricity fed in and the price effect on the average revenues of the latter. The price decrease observed on the European wholesale markets, owing in part to the feed-in of renewables remunerated off-exchange through the FITs, generates sunk costs or stranded costs for the operators of conventional thermal power stations and undermines the incentive to invest in new plants. With the drop in wholesale prices, customers with market-supply contracts in which sale prices are indexed to wholesale prices recover “with one hand” a share of the tax they pay “with the other”. Practically, revenue transfers as “cross-subsidies” among producers, providers and customers are observed (see the chart). It is thus necessary to implement in Europe a capacity market mechanism in order to finance utilities fixed costs. It explains also why a reform of renewable energy support mechanisms is now implemented with a preference for feed-in premium or auctions instead of feed-in tariffs.

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The injection of renewable electricity at zero marginal cost but paid off-market by high guaranteed prices generates revenue transfers among various categories of agents, because of the lower prices this causes on the spot electricity market. Conventional electricity producers are losing out as they sell less electricity and sell it at a lower price. Domestic consumers whose price is not indexed to the spot price are losers because they bear the additional cost of subsidies granted to renewables. Industrial consumers whose prices are indexed to the spot price are winners especially as they are often exempt from taxes intended to finance the additional cost of renewables.



Keywords merit order; renewable electricity; spot electricity market; energy cross-subsidies; France.