

# The benefits of integrating European electricity markets

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The European Commission's Target Electricity Model aims to integrate EU electricity markets. This paper estimates the potential benefit to the EU of coupling interconnectors to increase the efficiency of trading day-ahead, intra-day and sharing balancing services efficiently across borders. Further gains are possible by eliminating unscheduled flows and avoiding the curtailment of renewables with better market design. In the short run the gains could be as high as €3.3 billion/yr, more than 100% of the current gains from trade. About one-third of this total comes from day-ahead coupling and another third from shared balancing.

In December 2012 the authors started work on a project commissioned by the European Commission's Directorate General for Energy to estimate the benefits of an integrated European energy market (gas and electricity). They delivered a near final draft in March 2013 (Newbery et al, 2013), after which ACER started publishing estimates of the costs of not completing the integrated market in its subsequent reports (ACER, 2013, 2014). ACER had the advantage of direct access to some of the detailed Vulcanus data needed to make more accurate estimates (although they are still hampered by that lack of powers to request relevant data), while the pressure of time and the scarcity of data meant that our original report had of necessity to take short cuts.

Estimating the benefits of integration is not straightforward, as it inevitably involves either comparing the *status quo ex ante* with a counterfactual, or comparing the situations before and after, in which many other factors may have changed, including the whole pattern of generation and cross-border flows and with that the pattern of price differences across interconnectors. In addition, as well as directly observable impacts, primarily increased flows and price changes as interconnectors are more efficiently used, there are harder to identify indirect benefits that may flow from increased cross-border competition, such as pressures to reduce cost, innovate, improve market functioning through increased liquidity, and improved sustainability if the volume of low-carbon electricity that can be delivered to final consumers increases and displaces more polluting sources. Security of supply should improve, although the full benefits of reducing EU-wide reserve capacity needed requires those responsible for assuring

security to make changes in the way they assess system security and adjust domestic capacity. In the longer run, the economics of building interconnectors should improve, encouraging further investment and allowing a more efficient location of generation across the EU to exploit the gains from improved trade.

In this paper we estimate the gains from day ahead market coupling as the additional arbitrage benefits starting from the average of the original observed price differences across borders and the predicted final prices across that border (assuming no other changes in prices and flows) times the unused capacity for a number of borders, and extrapolate to the EU as a whole. We estimate the gains from efficient market coupling compared to the 2004 case of no coupling would be €315-630 million per year, or 0.2-0.4% of wholesale market value. ACER (2014) adopted the simpler form of our methodology, ignoring price changes and measuring the initial price difference times the change in volume, valid for most AC interconnections. The estimated the 'loss in social welfare' averaged €365 m/yr, towards the lower of our estimate, but as many interconnectors had been coupled by this time, this figure is an under-estimate of the pre-coupling period.

The Target Electricity Model also aims to integrate markets intra-day and real-time, via sharing balancing services, as well as sharing reserve capacity and allowing more efficient cross-border trading up to three years before delivery. Intraday trading might be worth €40 million/yr, balancing benefits which might be €1.3 billion/yr or could be as large as €2.7 billion/yr, with proportionate scaling. These short-term realizable gains amount to €2.4 billion/yr. If unscheduled flows could be prevented (which might require a significant design change to nodal pricing) then somewhere between €500 – €900 million might be gained. Finally, the cost of curtailment might be €50-150 million. Including these longer-term potential benefits gives €3.4 billion/yr, which is 2.3% of the value of wholesale demand, but more than 100% of the current gains from trade over the interconnectors, which is a more relevant metric.

The conclusion is that market coupling delivers total benefits that should substantially exceed the costs of the required market design changes, and that the delays in market integration since the market integration project started in 1997 have been large. Further gains could be reaped from a move to nodal pricing but these would have to be counterbalanced against the claimed loss of liquidity and scope for market manipulation that such a move might risk. What emerges very strongly is the growing need for more interconnection.

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