



The private and social value of British electrical interconnectors

EPRG Working Paper 1913

Cambridge Working Paper in Economics 1941

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The paper examines the efficiency of trading over interconnectors to GB, their value, the impact of trading over different timescales ranging from over a year ahead to the IDM, the social benefits that are not reflected in the private benefits, and the extent to which other financial markets might alleviate the damage of uncoupling as a result of a hard Brexit.

The Third Energy Package (Directive 2009/72/EC) requires market coupling of interconnectors via the European Day Ahead Market (DAM) auction platform EUPHEMIA from 2014 and Intraday Markets (IDMs) shortly after. If all desired flows across coupled interconnectors are feasible, prices are equated on each side. If the flows at a single price are infeasible, then prices will be set separately in each market and the interconnector capacity fully allocated so that electricity flows from low to higher price zones. In GB, generators self-dispatch and the wholesale market clears through power exchanges and bilateral trades. Accommodating to the EU DAM was therefore unproblematic and duly completed by 2014. In contrast, Northern Ireland and the Republic of Ireland form the Single Electricity Market (SEM), which was a centrally dispatched pool model requiring major design changes to comply with the Directive. It took until 1 October 2018 for the SEM to be finally coupled to GB and to the EU DAM.

Earlier interconnector analysis was largely motivated by a desire to demonstrate their inefficiency and to make the case for the reforms, and specifically to move away from ATC calculations to a flow-based market coupling model. This paper uses the far more extensive data from the ENTSO-E Transparency Platform for the period after market coupling. It measures the private and social benefits of the controllable DC British interconnectors. The paper is in part motivated by the very dramatic rush to propose and commission new interconnectors, the concern that some of the private (but not social) benefits arise because of Britain's introduction of

a carbon tax on fossil fuel for electricity generation that is not matched by the rest of the EU, and, looming ever larger in public concern, the fear that the benefits of market coupling may be lost if the UK leaves the European Union.

The paper argues that the private benefits are indeed large (relative to the costs of the interconnectors), that these benefits have been amplified by the proliferation of increasingly liquid markets over time-scales from more than a year ahead to intra-day trading, that there are additional social benefits not fully captured by trading from substituting cheaper imports for more expensive local generation, but that the distortions caused by asymmetric carbon taxes are indeed substantial. Part of these private but not social benefits flow to the foreign half-owners of interconnectors. We make some final comments on the potential costs of uncoupling existing interconnectors (but not on the damage to potential future projects).

We have explored the efficiency of trading on the Day Ahead Market (DAM) auction platform before and after market coupling, and established that market coupling has indeed created efficient trading at the day ahead stage. The Single Electricity Market (SEM) of the island of Ireland was finally coupled on 1 October 2018 and since then the DAM auctions have efficiently used the interconnectors. Before that it was trading very inefficiently, with flows in the wrong direction almost half the time, and losses that the regulators estimated for 2010 as €30 million/yr. ACER found even larger losses, but these seem exaggerated. The arbitrage revenue for trading capacity on the DAMs for IFA and BritNed averages about €125 million/GWyr, or €375 million/yr for both.

Trading after the DAM closes allows adjustments to be made, and GB often revises its off-peak position to secure flexibility when fossil generation is at minimum load and pumping at maximum, so reducing imports is an effective balancing option. Other ancillary services are commercially confidential, but the annual accounts of BritNed suggest that non-arbitrage income can be large at around €50 million/yr (but this might include other trading activities including foreign exchange gains).

There are active forward markets for annual, seasonal, quarterly and monthly Financial Transmission Rights (FTRs). Thus for IFA 1,850 MW out of 2,000 MW available are sold, of which 1,000 is for the calendar year (in four auctions of 225 MW each). The 2015 FTR auctions traded at a substantial premium (about 35%) to the cost of securing an equivalent baseload supply in the DAM, but this premium almost disappeared in the following years, consistent with growing familiarity with, and liquidity of, the FTR auctions. Hedging using CfDs on local power exchanges appear to offer as good a hedge as FTRs, again after the first year (2015), although local CfDs appear more sensitive to news about e.g. scheduled power outages that are alleviated in the DAM auctions as wider areas are coupled.

The commercial value of these two interconnectors is substantial, with an estimated combined value of €525 million/yr, including the value of the capacity contribution to security of supply. The social value is, however, increased by about €10 million/yr from the avoided infra-marginal generation cost, but reduced by the distortion

caused by carbon taxes in GB that are not charged by our neighbours. The British carbon price floor transfers €40 million/yr to the foreign share of IFA and BritNed. It also adds distortionary costs when trade flows change. The policy implication is that the EU should implement a carbon price floor at least in the electricity sector to remove this distortion while giving more stable investment signals for decarbonising power.

At the time of writing, the future relationship of GB with the rest of the EU is unclear, but if Britain leaves the EU then she will no longer have access to EUPHEMIA, resulting in uncoupling and perhaps even tariffs imposed by the EU on the use of their transmission system. This could lead to a loss of a possibly substantial share of the coupling benefits, although trading CfDs on neighbouring power exchanges supplemented by Physical Transmission Rights (as used before coupling) might deliver much of the trading benefits. There would seem little to prevent setting up a similar DAM and IDM in GB for trading over the interconnectors, although it would not capture all the benefits of a pan-European simultaneous auction. It might even allow rather different and possibly better auction bid formats.

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Publication
Financial Support

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April 2019
InnovateUK and the UK Engineering and Physical Sciences Research Council (EPSRC) via the ‘Prospering from the Energy Revolution’ Industrial Strategy Challenge Fund’, for the project “The value of Interconnection in a Changing EU Electricity system” (ICE) (EP/R021333/1).