

## Press

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### **GB power market can adapt to a high renewables scenario to achieve ambitious climate change targets by 2050**

- The 2008 Climate Change Act set out an ambitious decarbonisation target for greenhouse gas emissions reduction to 80% of 1990 baseline level by 2050
- The aggressive electrification of the heat and transport sector will result in a 65% increase in power demand to 530TWh by 2050
- An additional 93 GW of low carbon generation will be required for the power sector to meet its 2050 target - a 230% increase from today's 40GW
- Wholesale markets will follow a distinct seasonal pattern, with low carbon generation fulfilling all of summer demand and gas generation operating for winter period
- Summer prices will fall to £10/MWh and winter prices will remain in line with today's level
- Power plant economics will be focused on winter months, with wind farms making more than 90% of annual revenues in this period
- Bringing new gas generation onto the power system will require significantly higher capacity payments, exceeding £40/kW

New analysis revealed today by leading European analytics firm Aurora Energy Research, explores what happens to the power market in a very high renewables world as Great Britain (GB) approaches a zero-carbon power system. The analysis considers a 2050 scenario with a combined total of 130GWs of wind, solar and nuclear capacity (up from 40GWs today) in GB. Power demand will grow by nearly two thirds (relative to today) as it is assumed that all cars and 80% of residential heating is electrified.

Aurora's report highlights that significant growth of renewables would fundamentally alter the workings of the power market with an excess of renewables generation leading to prices crashing during the summer months. This raises questions about whether the current wholesale market design can persist in the long term as we approach a zero-carbon system, or whether we need to

learn lessons from other 'zero marginal cost' sectors (such as the internet) on how the power market might need to be restructured in the future.

The future power market described Aurora's new report sees some dramatic changes compared to today. In summer, there is an excess of low carbon generation relative to demand – in part due to the significant amount of solar generation during the summer months. In winter, the significant growth in renewables can not entirely fulfil power demand - the balance will be made up by gas generation and storage.

Aurora's research shows that a highly seasonal prices pattern emerges, with very low prices during the summer (more than three-quarters of hours see prices below £10/MWh), and much higher prices during the winter (average around £60/MWh) when thermal power stations are still setting the price. Battery storage also plays an increasingly important role with more than 10GWs of grid scale batteries deployed by 2050.

These findings have some significant implications for existing power generation assets and the deployment of new assets. Existing gas power stations and renewables plants would be profitable, even though they would make almost all their revenues during the winter months. New build thermal assets would require a significant "capacity payment" outside the wholesale power market in order to be viable. Renewables such as wind and solar would need to see significant reductions in cost (of up to 85%) to be viable without Government subsidies in such a scenario.

Aurora's report provides some pointers about what happens if we push even further in decarbonising the power system. The analysis shows that it is possible for the power system to be entirely free of greenhouse gas emissions if enough low carbon capacity is built alongside large amounts of inter-seasonal storage. However, this would result in wholesale power market prices reaching a very low level – raising questions about how low carbon capacity and storage could be built economically under the current market structure.

The report also looks to the example of other sectors, such as the internet, which are also based on zero-marginal cost technologies – to offer some lessons on how the power market might need to be restructured in the future. This analysis suggests that the current model of pricing electricity on a half-hourly basis, may become less relevant over time – whilst we may see a move towards 'capacity contracts' with the Government or the electricity system operator 'procuring' capacity.

The GB power market has already moved in this direction with the introduction of a Capacity Mechanism in 2014, but this model would need to evolve considerably in order to ensure that market outcomes are also consistent with the government's decarbonisation objectives.

Commenting on the significance of the report's findings, Weijie Mak, Lead GB Power Expert at Aurora said:

"The advent, and implications, of a near zero-carbon power sector have come to the forefront of policy debate in recent months with the publication of the Labour party's energy policy paper and the IPCC Report. Tripling Great Britain's current low carbon generation capacity in a bid to reach "net zero" in the power sector is possible, but also challenging. The wholesale market will continue to function and provide the majority of revenues for existing assets, especially in winter months when wholesale prices are high. New assets will however, be increasingly reliant on capacity market payments for economic viability. To integrate a large buildout of renewables at minimal cost, regulators should aim for a harmonised policy across all technologies".

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#### Downloads

To view the public report, click [here](#)

#### Media contact

Dr Rachel Roffe: [rachel.roffe@auroraer.com](mailto:rachel.roffe@auroraer.com) M: +44 (0)7584254232

Twitter: Follow us @AuroraER\_Oxford

Website: <http://www.auroraer.com>

#### About Aurora

Aurora Energy Research is a leading European independent energy market modelling and analytics company founded in 2013 by University of Oxford Professors and economists. Aurora provides deep insights into European and global energy markets supported by cutting edge models and data driven analytics to support project development and investment decisions. Services include subscription-based forecasts, reports, forums and bespoke consultancy services. Aurora Energy Research has offices in Oxford and Berlin. For further information, please visit: <http://www.auroraer.com>