

Capacity Market Design for Zero Carbon

C5- Electricity markets and regulation
PS2-4

- *PS2-4. What changes to capacity market design are required to assist in achieving carbon neutrality and to effectively prioritise renewable energy generation in a multi-source or hybrid procurement. Is this the role of capacity markets? Is there a possibility of using a double-sided auction in the capacity market where multiple buyers and multiple sellers bid simultaneously? What is the possible market design in such a case including price discovery?*

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Ireland and Northern Ireland – Up to 75% of demand by non-synchronous inverter based sources.

- Ireland and Northern Ireland have approx. 7 GW of demand with approx. 5 GW of onshore wind. Significant increases in Offshore Wind, Solar and further Onshore Wind are expected by 2030.
- Right now, up to 75% of the electricity flowing on the Ireland and Northern Ireland electricity grid at any point in time can come from variable non-synchronous renewable sources.
- The Ireland and Northern Ireland power system is the first in the world to reach this level, overcoming major technical challenges associated with integrating electricity from wind farms, solar farms and interconnectors that link it with other countries.
- We are working towards 95% by 2030 in order to achieve Government renewable energy targets. This will be achieved through the delivery of the Shaping Our Electricity Future programme of work.
- For more details see “Stability Analysis on the Power System of Ireland and Northern Ireland for Operation with 75% Inverter-Based Resources” C4 PS3 11016, IBRAHIM et al. C4 Poster Session on Wednesday.



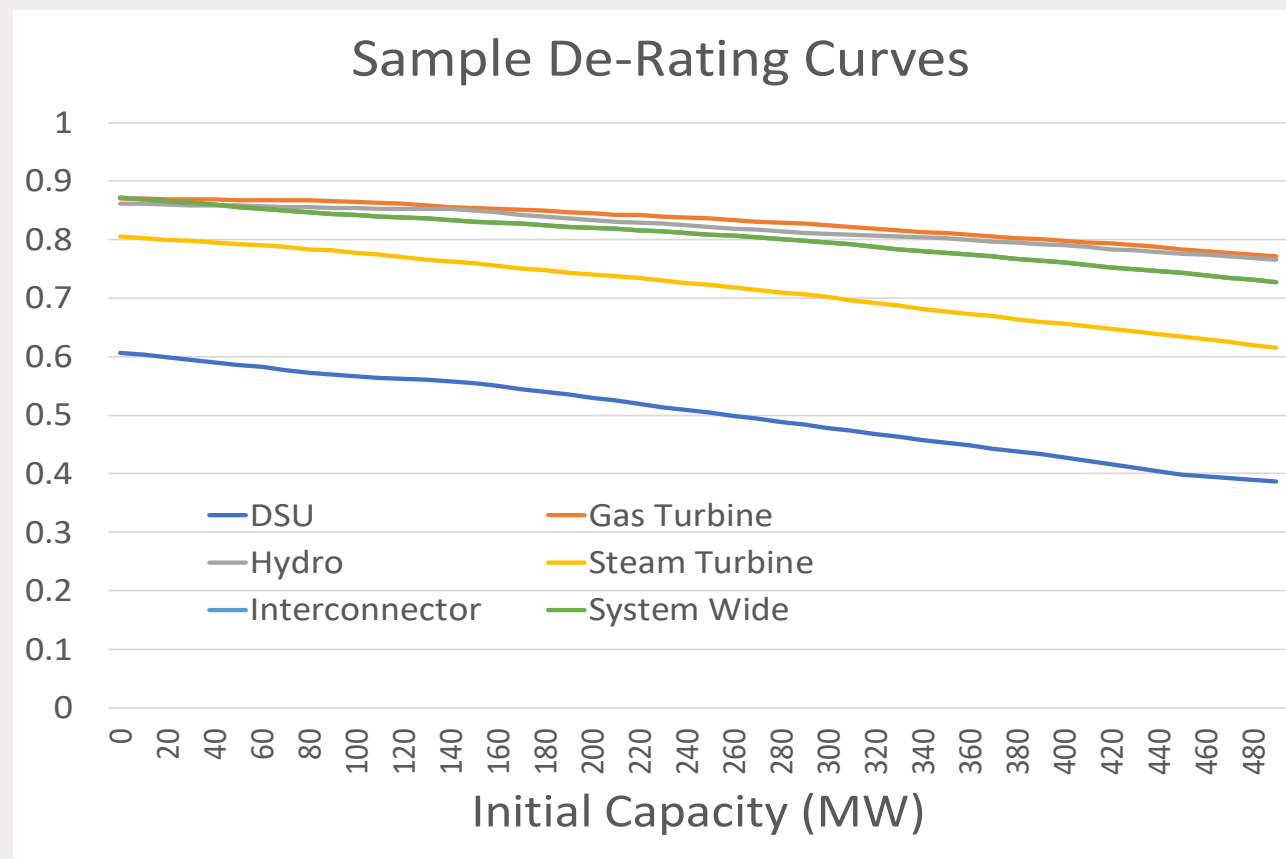
What changes to capacity market design are required to assist in achieving carbon neutrality and to effectively prioritise renewable energy generation in a multi-source or hybrid procurement.

Design capacity market based on needs of system not technologies.

Ireland and Northern Ireland have Centralised Capacity Auctions based on Reliability Options

Capacity providers including conventional thermal, hydro, interconnectors, batteries, wind, solar all compete alongside each other to provide reliable capacity to the power system.

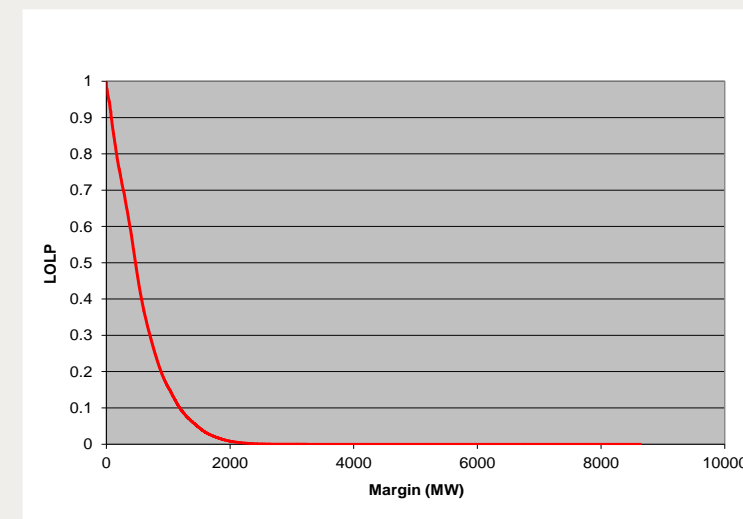
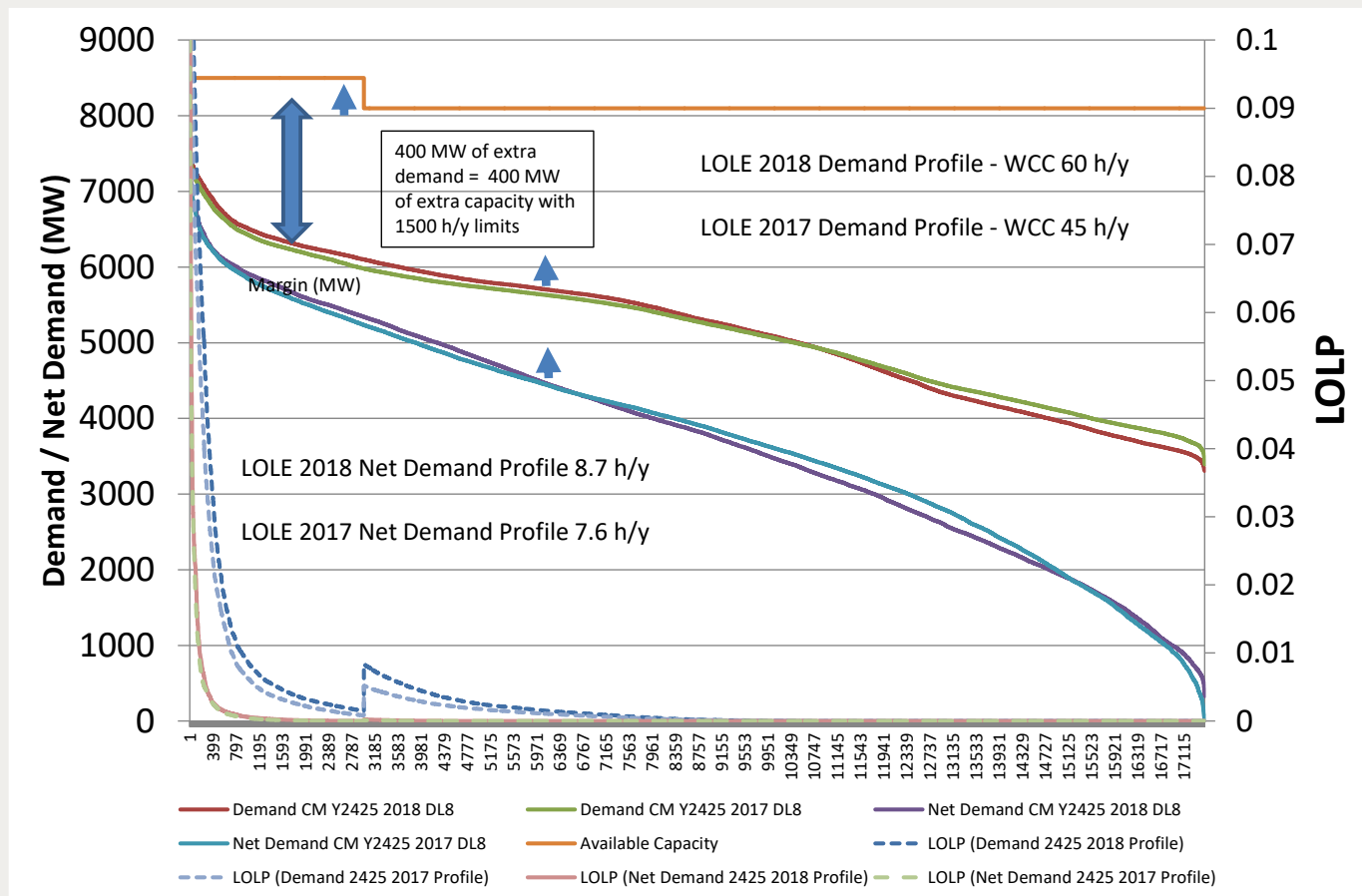
We use de-rating factors to reflect different contributions to reliability of different technologies: Outage statistics, size and energy limits have largest influence on reliability.



Capacity Markets secure investment in capacity required to balance variable renewables

Wind is a highly variable resource and unlike hydro, solar and tidal, it does not conform to any daily or seasonal patterns. It does, however, blow a reasonably constant amount annually.

The challenge of decarbonizing the power grid in Ireland and Northern Ireland is to ensure that controllable resources capable of meeting the demand are available when wind and solar output is low.

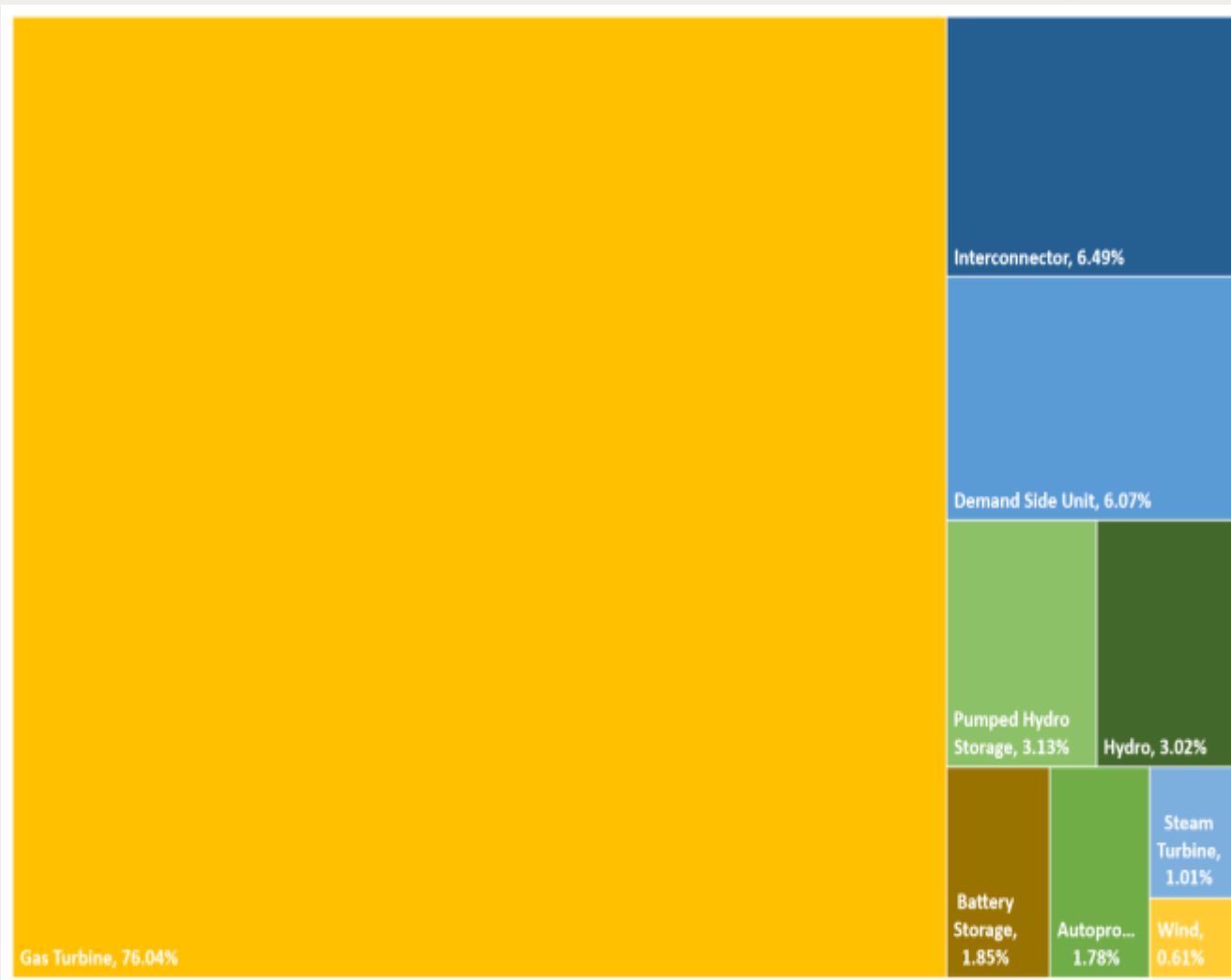


Is this the role of capacity markets?

It certainly is.

Capacity markets form part of the revenue stream for renewables insofar as they contribute to reliability (which will increase as demand moves towards low variable cost renewables).

Of equal, if not greater, importance is that capacity markets are needed to provide for the capacity that is needed to meet the net demand – in a longer term zero carbon world this is demand response, storage, interconnection and flexible hydrogen / biogas fired turbines.



Is there a possibility of using a double-sided auction in the capacity market where multiple buyers and multiple sellers bid simultaneously?

In Ireland and Northern Ireland, a double-sided auction is used;

however, the demand curve is based on TSOs forecast demand and is set by the Regulatory Authorities i.e. the amount that demand wants to buy is set using a regulated process.

Getting end users to bid is desirable but complex to implement.

Important to ensure that reliability of grid is appropriately valued.

