INFORMATION

Fact Sheet - disorderly bidding

How is congestion managed in the national electricity market?

In the national electricity market (NEM), retailers pay, and generators receive, a uniform wholesale price in each region. This allows all retailers and generators in that region to trade with each other on the same basis. Although all generators in a region receive the same energy price, if transmission capacity is limited, then some generators may not be able to receive that price. This is because constraints on the network lead to "congestion", preventing them from being able to dispatch as much electricity as they would wish to at that price (as revealed through their dispatch offer price). This is described as being "constrained-off".

A generator may be constrained-off in the dispatch process by another generator, or as the result of insufficient transmission capacity being made available by the transmission network service provider, without compensation. This means that generators have uncertain access to the market, in terms of their ability to be dispatched and receive the regional energy price. Physical dispatch and financial access to the price are linked. If you are not dispatched, then you do not receive access to the price. Congestion therefore may prevent generators from selling their desired amount of their offered output at the regional reference price. Generators face the risk of intra-regional congestion, and the risk that it will increase if a new generator locates nearby.

Under the current NEM arrangements, generators are not guaranteed use of the transmission system. In international terms, this is an unusual market design. Other markets around the world, similar to the NEM, with uniform prices either build-out congestion (i.e., physically building enough transmission capacity so transmission constraints do not occur – which may be expensive) or make use of a system of "side-payments" to compensate generators for being constrained-off.[1]

What is disorderly bidding?

In the absence of constrained-off payments, generators have an incentive to adjust their offers into the market in order to maximise the amount of output they are dispatched for (and hence their access to the market price). Generally, this means that generators will make offers at levels lower than their costs. There is little risk that such a generator will receive a payment lower than its costs because the constraints on the network usually mean that the regional price (at which all generators are settled) will be set by a higher price generator – remembering that all generators are settled at the same price within a region.

This behaviour, which has come to be known as "disorderly bidding", can ultimately see all generators behind a constraint making offers at the market floor price (currently -$1,000/MWh), with the result being that access is "shared" amongst them. This can be seen in the example[2] below:

1 Our proposals for access reform would effectively create side payments to compensate generators for being constrained off.

2 AEMC analysis.

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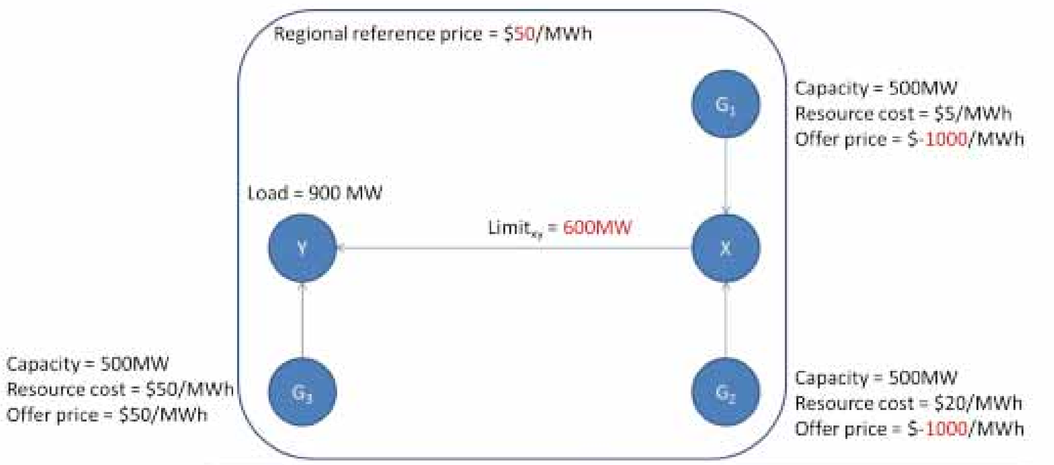

Generator	Capacity (MW)	Congestion hedge ($)	Offer ($/MW)	Dispatch (MW)	Dispatch revenue ($)	Resource cost ($)	Margin ($)
G1	500	0	-1000	300	15,000	1,500	13,500
G2	500	0	-1000	300	15,000	6,000	9,000
G3	500	0	50	300	15,000	15,000	0
Total	**1,500**	**0**		**900**	**45,000**	**22,500**	**22,500**

In this example, generators 1 and 2 are constrained down due to the transmission constraint, and generator 3 is dispatched in addition to generators 1 and 2 to serve the load at Y that is not served in full by generators 1 and 2. Generator 3 sets the regional price of $50/MWh. Here, the generators behind the constraint know that if they bid according to their resource costs, then they would not be dispatched. However, they know that the offers that they make will not affect the settlement price they receive as a result of congestion between them and the regional reference price. Therefore, each generator behind a constraint will bid at the market floor price to maximise its dispatch quantity – if either generator bids at slightly more than the floor price, then the algorithm which determines dispatch will dispatch the other generator in preference. Both generators therefore "race to the bottom".

What are the effects of disorderly bidding?

Disorderly bidding can affect the efficiency of dispatch. In normal circumstances, over the long-run, generators' offer prices represent a proxy of their costs. The market operator's algorithm which determines dispatch takes account of offer prices on the assumption that this proxy holds true. It dispatches generators on the basis of the lowest *priced* offers - and hence in normal circumstances dispatch is the lowest cost combination of generation.

But when all generators are offering at the market floor price, the market operator has no way of differentiating between them, and so some more efficient generation capacity may be displaced by a less efficient plant. The above example shows that this can result in inefficient dispatch – higher cost generation resources being dispatched instead of lower cost generation resources. Generator 1 has lower resource costs, so the optimal dispatch is for generator 1 to be dispatched at its full capacity (500 MW) and generator 2 to then make up the remainder to the transmission limit (a further 100 MW). But, because the market dispatch engine dispatches on the basis of offers, not underlying costs, this does not occur. In the example above, the inefficient cost of this dispatch is the difference between the resource cost of Generation 1 and Generator 2 ($15/MWh) multiplied by the amount of cheaper generation (Generator 1) displaced by Generator 2 (200 MW): $3,000/h.

How material is disorderly bidding?

While analysis undertaken historically (early 2010s) showed that the direct costs of this form of productive inefficiency have been relatively small to date (given the relatively similar fuel costs of generators in the NEM),[3] the likely greater spread of fuel costs

3 See: chapter 10 of this report https://www.aemc.gov.au/sites/default/files/content/147d4f18-5274-4310-8ce9-9569f0f48eaf/OFA-Final-Report-Volume-1-to-be-published.pdf

amongst generators in the NEM in the future (e.g. from zero marginal cost renewable resources, to high cost open cycle gas generators), as well as the increase in large-scale storage facilities, may affect this outcome over time.

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