Comments on the Capacity Investment Scheme

1- Incentive properties of the CIS

The CIS makes a provision to (a) guarantee a revenue floor and (b) claw back revenue in excess of a ceiling, where the level of these floor and ceiling are the elements to be auctioned off.

These characteristics run completely counter to the *social* benefits that storage delivers; they eliminate the essential revenue sources of storage; they also introduce a new source of moral hazard.

Storage operates as an arbitrageur that buys low and sells high; the wider these price variations, the larger the arbitrage revenue and the more investment in storage can be sustained. Price variations are good for storage; removing these variations, which a floor and a ceiling do, mutes the incentive for storage to enter the market. The fact that storage exploits these price variations is good for the rest of us: the mere fact that storage buys when the price is low, increases prices (say for solar farms) and conversely when selling, prices drop – which is good for consumers. In other words, storage is the supplier of insurance for all participants in this market. A floor and a cap essentially render this service redundant.

In addition, offering a revenue floor and a ceiling introduces moral hazard: upon reaching the ceiling, for example, there are weaker incentives to operate the storage unit since its revenue must now be rebated. But this is exactly the time at which we want the storage unit to sell more energy; it needs strong incentives to do so. The more must be rebated, the worse this problem becomes; for example, in the limit, at 100% rebate, the storage operator prefers not partaking. The lower the revenue ceiling, the worse the problem becomes too. The same applies in the other direction for the revenue guarantee.

Lastly, storage units do not buy independently of selling; they buy only in order to sell. So, meddling with the incentives to sell also affects the incentives to buy.

If the Federal Government insists on subsidizing entry into storage operations, which may be needed, then it should rather conduct a standard procurement auction for storage units. Once the units are built, that cost is sunk and the operators face the normal incentives of the market: buy low and sell high. In doing so, they provide a valuable social service.

2- Market design considerations

The current market design of the NEM is not conducive of successful storage operations, for at least two reasons. One is the lack Locational Marginal Pricing (LMP). LMP values the impact market participants have on inducing or relieving congestion in the network. This is of first order importance to induce to efficient siting decisions and provide sufficient incentives for storage operations. That is, to take advantage of all the renewable output, storage should (*a*) co-locate with renewable generation ("behind the constraint") and (*b*) have arbitrage opportunities *at that location*. These incentives do not exist under the current market design; instead, storage must pay the market price for energy that has *no social value* (as curtailed because of transmission constraints) and receive a market price that is at times *below* the *social value* (since uniform). Even if entry subsidies are provided to storage, operators face significant price distortions from this outdated market design that does not value the congestion relief benefits storage can provide. Contrary to popular discourse, computing these LM prices is not difficult; it is already done in NEMDE through network constraints. LMP has been successfully

implemented in many markets that experience significant renewable penetration. There is a practical roadmap to implement it.

The second reason is that the NEM lacks a day-ahead market. When bidding in the spot market, storage operators are exposed to the risk of demand variations that exist between the bidding decision and the clearing decision; that is, upon bidding, an operator does not know how much it may be called to discharge. This renders the remaining stock of energy uncertain, and so (*a*) affects future bidding and (*b*) in turn affects current bidding. The result is excessively conservative bidding, too little energy being traded and missed trading opportunities. This problem does not exist for thermal generation: they have no stock of energy to care about.

The solution to this problem is to remove the uncertainty at the bidding stage in the following sense: bidding and clearing should occur based on the same information. This is exactly what a day-ahead market offers; in a day-ahead market, there is no uncertainty to worry about. Then storage can bid more confidently and better exploit all of its capacity. Of course, adjustments are still necessary in real time, but the quantities involved are much smaller, and therefore so is the magnitude of the problem. Day-ahead markets have also long been in operation in most markets around the world.

3- Surveillance

Receiving Government-funded subsidies is not without obligation. In the draft term sheet, clauses are listed that attempt to ensure the operation of any storage assets that receive public funding meets certain standards. For example:

9(d): Throughout the Support Period, the Operator must use reasonable endeavours to operate, maintain and repair the Facility so as to optimise amount of energy, timing of generation and export to correspond with peak periods and to maximise green products; and in 9(e): operate the Facility to dispatch electricity in good faith in accordance with market signals; and 9(g): provide operational data to the Commonwealth in accordance with the reporting schedule set out.

Clauses 9.3 and 9.4 assigns reporting requirements to the operators to ex-ante state their trading protocol and then confirm ex-post that they have indeed operated as stated. Regardless of the contract/subsidy design, we recommend an independent expert committee (similar to the market surveillance committees common to US markets) produce the evaluation report. In particular, items 9(d) and 9(e) are key to ensuring taxpayers see the best return on their subsidy investment in these assets. This is not a trivial exercise to conduct as storage requires regularly buying and selling energy, and perhaps is easily obscured by a self-interested storage operator. Consequently, independent scrutiny and verification of their operations is likely to better align their operations with the public interest.

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