

New Power

The UK's new capacity market will never look so good again

Cliff Hamal and Ian Smyth consider the experience of capacity markets in the USA and ask what lessons those markets have for the UK

The problem with capacity markets is not the general theory. It is the nitty-gritty messy issues that seem to keep cropping up as designers with the best of intentions always need just one more tweak to clean up one more loose end to try to make the market work as desired. The efforts under way to develop a capacity market for the UK appear destined to continue this tradition.

We turn to the US experience with capacity markets to explore this issue. There is no question that those markets are transferring billions of dollars a year from consumers to suppliers. For some suppliers, this alone is sufficient proof that the markets are working and solving their “missing money” problem. For others, however, the term “missing money” has taken on a new meaning as consumers are left wondering what value they have received for all of the money they have been forced to spend.

The never-ending need for changes and modifications points to the conclusion that centralised capacity

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auctions are fundamentally flawed. These auctions suffer from a problem that mathematicians would call being over-constrained. While individual problems can be resolved, there is no way to address the combination of challenges all at the same time

The USA is composed of a patchwork of electricity markets. Capacity markets have been adopted in only three of these (PJM, New York ISO and ISO New England), with considerable controversy about any further expansion. That fact alone should give pause. Each of the three capacity auction markets has extensive and complicated market rules that have been in a constant state of revision. This year the Federal Energy Regulatory Commission (FERC) held a technical conference on the overall status of these evolving markets.

This is the first lesson from the US experience: no one should be under the illusion that once you adopt a capacity market regulators will step back and allow “competition” to act freely. Capacity market prices are the direct result of complicated market rules, not competitive market forces. Yes, there is a role for

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market participation in the process, such as it is, but these prices are not the result of willing buyers and sellers coming together at a price that both find to be acceptable. Instead, it is the result of complicated rules developed in highly-contested processes where issues are resolved by the regulator, not the market.

As an example of the intricacies of the market rules, FERC recently ruled that the price curve for parts of New York should be based on the cost of a specific technology that has never been built - an F-Class frame generator with dual fuel capability and SCR. Hundreds of pages of testimony were filed by market participants in a high-stakes battle over this technicality. Regulators with training in law, political science and public administration, made the final decision over this technical issue. This was just one issue (among many) in one open docket (among dozens) before the FERC.

Capacity auctions require a uniform product, a megawatt of supply, which will be called the capacity market unit (CMU) in the UK design. But not all capacity is the same. The USA has a wide variety of initiatives to promote a shift to renewable generation, but the capacity markets do not distinguish resources on this basis and therefore do not support this policy objective. Neither do the capacity markets encourage the kind of flexible generation that is needed when increasing amounts of non-dispatchable renewable generation is added to the system.

"Capacity markets do not provide any way to get the mixture of resources needed for optimal electricity supply."

It is not just that the capacity markets do not provide incentives for these things, but that any attempt to provide that incentive through other means is viewed as potential market manipulation by the auction market designers. Thus, capacity markets do not provide any way to get the mixture of resources needed for optimal electricity supply.

Policymakers and regulators have watched these problems develop but been blocked in taking action because of the requirements of capacity auctions. For example, a few years ago consumers in both New Jersey and Maryland were paying high prices because of capacity shortages in certain areas and politicians were having a tough time explaining why consumers should accept paying a higher price for a less-reliable system, at a time when none of the extra money was going to get any new generation built. When the states contracted to get the generators built, FERC concluded that these steps constituted acts of manipulating the capacity auction prices, although the "act

of manipulation" involved legislators and regulators formally creating open bidding processes to get new generation built for consumers at the lowest cost.

Some of these problems come from locational needs for supply, which poses a vexing problem for capacity markets. High prices in a small area will signal the need for new generation, but if the construction of new supply causes the prices to collapse, no one will build.

This problem is currently an issue in an area north of New York City and FERC is holding firm to the capacity market construct, which looks to cause prices to double or more, despite complaints from consumers and politicians. In Boston the auction rules address this problem by guaranteeing multi-year prices. When a generator was retired, prices shot up to the capped level of £110/MW, which attracted a new generator who locked in that price for five years. The other generators in the area have formally complained about the collapse in prices in later years and are seeking price adjustments.

A more fundamental problem with capacity auctions is the price-setting process. Capacity markets should produce a price that fluctuates around the long-run cost of new capacity, with prices higher when new capacity is needed and lower when it is not. Unfortunately, with a one-year capacity product, suppliers do not have any marginal costs as measured over that period. The entire cost of construction has to be incurred before the capacity can be delivered and those costs are recovered (and profits earned) over 30 years or more. As a result, those costs do not change as a result of whether the station provides capacity in the one year covered by the capacity product (ie those are not marginal costs).

There might be some small costs associated with continued operations, such as staffing, and there certainly are fuel costs, but those will all be covered by the energy markets.

"Politicians were having a tough time explaining why consumers should accept a higher price for a less-reliable system."

On the demand side, designers abandon any attempt for full consumer participation and move straight to an administrative demand curve. The exact shape and parameters of the curve are intensely debated, with controversies over inflection points and slope angles merely emphasising the non-market nature of the mechanism.

In all US markets some demand can participate as

capacity supply and, unlike generation, will have marginal costs tied to providing the product for a year. Problems have arisen, however, based on the lead-time requirements. Auctions with a forward component, such as the three-year-ahead PJM auction, give developers an opportunity to construct new generators, but demand side marketers are left with auction commitments years before they can make arrangements with customers.

In any event, demand side participation is only at moderate levels and does not resolve the problems caused by the lack of marginal costs among generators or the administrative demand curve.

There are market power problems everywhere. The amount of capacity that is needed can be determined with precision. From a market perspective, however, when we have what we need, everyone has market power. It makes no sense to build substantially more than that, simply so that we can create a competitive auction. The annual reports of the PJM Market Monitor point out the severe market power problem and make clear that there is no expectation that sufficient excess capacity will ever be built to solve it.

Market power on the supply side is managed through bidding restrictions, which are must-offer requirements for most supply, and cost-justification of bids in other cases. On the demand side there are rules and market interventions that attempt to keep buyer-side market power under control. With all of these constraints, the price outcomes are evaluated on the basis of whether the final prices meet the designers' expectations, with ongoing adjustments made to get the desired outcomes.

This sampling of US capacity auction problems highlights challenges in three areas. Each of these three can be addressed, but a market cannot adequately address all three at the same time.

The auction process requires all capacity to be treated the same, but it is not the same. The differences include performance attributes, timing needs (construction, retirement, lead-times) and location.

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While there is a desire for prices to fluctuate around the levelised cost of new generation, virtually no supplier has a marginal cost around this level; the vast majority of supply has no marginal cost at all.

Market power issues are rampant and intractable.

While market designers might agree to the pattern of capacity prices they want, these issues prevent an auction from achieving those prices through market forces. The result is that near-constant regulatory intervention is needed to get the desired prices. Investors in new generation are not building based on the auction process itself, but instead on confidence that the regulator will continue to adjust the auction as needed to provide an adequate revenue stream in the future.

Lessons for the UK

Innovative features of the UK design will include, on top of the typical one-year contract for most capacity, the potential for 15 year contracts for new facilities and three year contracts for facilities undergoing refurbishment.

"with the procurement now divided among several auctions, the market power challenges are much greater."

The longer contracting period should improve the ability to provide longer-term financing which will lower costs, particularly for the newer facilities. In addition, the auction will clear most capacity on a four-year-forward basis for most supply, with an additional incremental procurement on a one-year forward basis. This different timing allows for the long lead time needed for construction of new facilities (four years), and the limited lead time most appropriate for demand side resources (one year).

These features do more to address the non-uniform aspects of capacity supply than any US market, and should be particularly beneficial in providing for longer-term financing of new generators.

Nevertheless, these different auctions stages do not provide a perfect fit for every resource. Generators facing retirement may be reluctant to make commitments on a four-year forward basis. And four years may create additional problems for new simple cycle combustion turbines and wind generators that have shorter construction schedules. Nor does this address performance attributes (such as ramping capabilities) or environmental characteristics.

Of bigger concern is that with the procurement now divided among several auctions, the market power challenges are much greater.

The essence of the US approach to the market power problem is to have a single auction, administrative curves and must-offer requirements of suppliers.

That is easier to do if there is just one auction. GB will not only have four-year and one-year auctions, but will rely on multi-year pricing for new and refurbished generation.

This will make it much more difficult to construct rules to ensure competitive behavior. It will also compound the difficulties in dealing with other capacity market problems, such as locational needs, flexible generation, environmental characteristics and other operational issues.

"The fundamental problem remains that supply essentially has no marginal cost upon which competitive bidding behaviour can be based and prices could reasonably be established."

The problems compound, and the fundamental problem remains that supply essentially has no marginal cost upon which competitive bidding behaviour can

be based and prices could reasonably be established.

We hope that this can serve as a caution in drawing a distinction between what may be the best possible design, and one that is adequate. Having achieved the former does not ensure the latter. When the market goes forward we expect complaints, revisions, turmoil and concerns for years to come. That is the true US legacy of these markets.

It is not that these markets fail in some outright and catastrophic manner. Frankly, there is far too much oversight and intervention for that to occur. But these auction processes do not work as promised and end up costing consumers much more than necessary.

The alternative would involve a process of competitive bilateral contracting to provide resources as needed. The savings from such an approach could be significant. Such an approach has its own complexities, and we will not detail them here. We believe people will be far more receptive, however, after they have been wrestling with several years of changes in capacity auction approaches.

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New Power is a specialist monthly report for anyone with an interest in the UK energy industry.

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