The UK Capacity Market

In 2018 an application was made by NGFP Ltd to develop a new 'gas powered standby generation facility' in Bishops Waltham, Hampshire. I and others were interested in the framework of how such applications for small-scale generating capacity were being made and how these installations expect to make a profit.

My superficial understanding of such installations was that they were being solicited by the UK government to ensure we 'keep the lights' on during periods of peak electricity demand. This is in the context of a reduced 'base' capacity as old nuclear power stations are coming to the end of their life and various pressures to close coal-fired capacity. It therefore seemed surprising that the application talked about a high level of 'up' time.

The planning statement, written by Enzygo environmental consultants, mentions the National Policy Statement for Electricity Infrastructure (EN-1) (2011) and quotes policy CP12 – 'Renewable and Decentralised Energy'. CP12 is laid out in section 9.10 in Chapter 9 of the Winchester District Local Plan and relates to the UK government's National Planning Policy Framework (NPPF).

Looking at this application and the related subject of the capacity market provided me with an opportunity to try to understand government policy and related legislation in this area better.

Relationship of the application to climate change policy

The planning statement made a number of claims in support of the application in relation to Climate Change mitigation – in particular the ability to support more renewable infrastructure by providing a backup when renewables output is low – for example when there is little wind - and the suggestion that local capacity is efficient because of reduced transmission costs.

Set against these claims is, for example, the much higher efficiency of larger scale gas-powered generation. Furthermore, a response to the application by a Mr Downing identified the generator to be a Siemens SGE-86 engine. He looked up the likely methane (CH_4) (i.e. natural gas – the fuel used) emissions information from the manufacturer – suggesting that if the equipment is running at 50 % capacity it would leak 5 litres of CH_4 per second.

The Capacity Market

The NGFP ltd application is couched very much in terms of 'backup' power to support renewable energy. In 2013/2014 the UK government changed the basis of their strategy to 'keep the lights on' by introducing the capacity market. This changed the emphasis for maintaining capacity during peak demand from the concept of backup generation to having regular generators also bid to receive extra payments in exchange for a guarantee to provide a certain amount of guaranteed capacity at peak load times. One reason for this was the realization of the huge subsidies being paid to suppliers which the Times claimed could be up to 300 times the normal electricity price. The capacity market also aimed to stimulate investment in new peak-time generation capacity – including battery storage.

In response to these and other concerns the then Department of Energy and Climate Change (DECC) introduced the Capacity Market as a way to 'keep the lights on' as we transition to a low carbon electricity future although part of the strategy consisted of 'driving new investment in gas …'. A key factor in this initiative was to 'deliver green, reliable electricity for the future, *at the lowest possible cost*' – arguably the wrong priority given the urgency of Climate Change and the implications of giving fossil fuels an equal role with renewables on a cost basis.

In a nutshell, as described in DECC's announcement in 2014, the capacity market works by offering electricity generators ('capacity providers') a subsidy (per kW) if they commit to supply electricity at short notice (usually around 4 hours) whenever needed during periods of high demand or unexpected outages. Essentially the requirement is to be able to produce 4 hours' worth of electricity given 4 hours' notice (energypost.eu, engie.co.uk). This subsidy is in addition to the normal price they get for their electricity. The amount of subsidy is decided by an auction which operates by successively lowering the proposed subsidy to a price (the 'clearing price') below which too many suppliers drop out. All suppliers, existing and new, can take part – existing suppliers typically get a 1-year contract (although sometimes 2-3 years) whereas new capacity is rewarded with 15-year contracts reflecting the investment involved. There are penalties if, after signing up, a supplier fails to deliver capacity when requested. Battery generation is classified as 'storage' and can apply to be part of the capacity market. T-4 auctions are held 4 years in advance of the actual generation – so the 2014 auction was for supply obligations in 2018, while, for example, the 2017 T-1 auction concluding on 1/2/2018 was for supply in 2018/2019 – topping up the earlier T-4.

There are, of course many details here – Ofgem attempts to describe some of the details as in this 2016 report. The various bids to supply capacity into the capacity market are termed 'Capacity Market Units' (CMUs). The report points out that the auctions are 'technology neutral' but exclude renewables.

The amount of subsidy is discussed in terms of the amount per kilowatt (kW) which is really shorthand for the amount for supplying a kW of power for a year (kWy). The amount is capped at £75 which works out, for a kilowatt hour (kWh) as £75 divided by the number of hours per year or 0.86 p per kWh - with the current wholesale price of electricity being somewhat above 8p per kWh.

So far there have been several of these capacity auctions with the clearing price varying wildly. For example the 'T-4' auction in 2016 resulted in a clearing price of £22.50/kW (see Ofgem report and EMR deliver body), while BusinessGreen reported an auction in 2018 that resulted in a clearing price of only £8.40.

Demand side response

While the focus on the Capacity Market has been on electricity suppliers – there is another component called 'Demand Side Response' (DSR) where electricity consumers can be requested to reduce their demand during peak periods.

Legislation

Sometimes it is interesting to look at the actual legislation which is all available online. Legislation may be found on www.legislation.gov.uk – for example by typing 'Energy act 2013' into the search box taking you to the Energy Act 2013 (c. 32). The easiest way to navigate the various capacity market legislation etc is through the government's capacity market page – the actual legislation (and associated regulations) appear under 'external links' which will lead to several pages including the actual legislation. The legislation is structured into The Energy Act (2013) (primary legislation) which provides for secondary legislation (statutory instruments) including the Electricity Capacity Regulations 2014 (SI 2014/2043).

The Energy act (2013) also provides for the secretary of state (presumably unsupervised by Parliament) to create various sets of rules – e.g. section 34 gives the power to define capacity market rules. These rules (e.g. 'informal' consolidation of rules) underpin the legislation. For example the rules include definition of the technology-dependent 'de-rating factors' applied to applications – but only ultimately

determined by the Electricity Market Reform (EMR) delivery body (Table 3) based on rule 2.3.5 (contained in rule 3: De-rating of CMUs). The rules also include things like submission form templates.

Operation of the Capacity Market

The Energy Act 2013 (c. 32) defines two types of agreement – one aimed at renewable energy providers – contracts for difference (CFDs) and capacity agreements.

CFDs are managed by the Low Carbon Contracts Company (LCCC) and the first-round agreements, for example, shows a high preponderance of offshore wind.

The results of capacity market auctions (for delivery starting in 2018) can be viewed on the EMR delivery body's website. These include details of applications and breakdown by type etc.

The first 2014 T-4 auction (for delivery starting in 2018) shows that close to 50 gigawatts (GW) was contracted at a clearing price (essentially the amount generators are paid to guarantee capacity irrespective of how much electricity they actually supply to the grid) of £19.4 per kilowatt (kW) and total estimated cost of £955,623,397.20. The breakdown shows that 64% is supplied by existing CMUs ('capacity market units) supply, rising to over 94% when 'refurbishment' and 'pre-refurbishment' (is this stuff being brought back into use?) CMUs are included. In contrast there is close to zero demand side reduction (DSR) CMUs. It is perhaps noteworthy (table 6 in the auction results) that around 71% of the tiny DSR applications withdrew during the auction as the clearing price reduced while only around 1.8% of storage dropped out. The bulk of supply is from gas, coal and nuclear. It seems strange that nuclear can participate in these auctions as it is effectively already heavily subsidized.

Criticisms of and challenge to the Capacity Market

There have been numerous criticisms of capacity market. Energypost.eu suggested back in 2015 that the practical result was effectively state aid because most of the contracts were won by existing suppliers who would have produced anyway. Some of the winners were Short Term Operating Reserve (STOR) suppliers who are already subsidized to produce electricity at very short notice. However, the Electricity Capacity Regulations 2014 regulation 18 explicitly prevent holds of STOR contracts participating in the capacity market – note also that regulation 16 excludes 'low carbon support scheme CMUs'. Theenergyst makes many interesting points, albeit with some apparent vested interest.

In 2015 the Guardian criticises the rise of diesel farms citing both the capacity market and STOR, although these are now effectively mutually exclusive. It seems unlikely, due to the costs involved that diesel could compete in the capacity market while the STOR subsidies seem much more lucrative for less efficient suppliers like the one in the Bishops Waltham application.

There have also been issues because of the simplistic distinctions between types of supply – for example this proposal to change the rules when suppliers fall between the capacity market and STOR supplier definitions.

The roll out of the capacity market appears to have been aimed at and ultimately favoured regular fossil fuel electricity producers.

Tempus energy challenge

In 2018 the European Union ruled on a case brought by Tempus Energy in 2014 on the basis that capacity market constituted illegal state aid (Guardian report). This brought about an immediate 'pause' in the capacity market, also halting payments to suppliers.

The government's response has been essentially to set up interim arrangements to effectively keep payments going by having the necessary subsidy (paid by 'suppliers' – presumably from customer bills) etc. I'm not a lawyer but this would seem to create a minefield for future litigation by customers, capacity market providers and others. Meanwhile the UK Government is supporting the European Commission in appealing the CJEU decision.

Embedded benefits and STOR schemes

As hinted above numerous other, mainly older, agreements and schemes can come into play. The STOR scheme is for even shorter-term supply and still seems to be open. Embedded benefits relate to benefits/reliefs for small-scale suppliers manly related to the relative higher cost of connecting to the grid, which were drastically reduced recently causing some controversy.

Bishops Waltham application – what happened?

It's not clear to me what the business model for the application was. The application by NGFP Ltd was supported by Enzygo, although its web site doesn't mention such services the director of planning lists 3 successful gas-powered STOR applications on his linkedin page. Running such a small installation based simply on the capacity market subsidy alone doesn't seem viable because these subsidies have been so low - e.g. 0.22 p per kWh when the clearing price was £19.4 / kWy in the first T-4 auction - and wouldn't even start to cover the necessary investment. The assertion in the noise assessment that the facility would only operate during peak power demand supports the assumption that this is predominantly a backup facility. However, Winchester Action on Climate Change (WinACC) inferred that the facility would operate for around 13 hours per day. Maybe, with the STOR subsidy, it may make sense once the plant has been built, the marginal costs indicate that more continuous operation is more profitable.

Currently the application is marked as rejected. The inspector's report suggested that CP12 was not relevant in supporting the application as it referred to 'CHP/district heating/cooling systems and the development of larger scale renewable energy developments'. Subsequent correspondence failed to address this limitation. Amongst other comments the report refers to the recent climate emergency declared by Winchester City Council and WinACC's calculation on the levels of expected greenhouse gas emissions from the plant.

Thoughts

While trying to find out more about this what I'm struck by is the forest of documents, policies, consultants, government employees, committees and other activity that is going on, and how little this is contributing to the mitigation of Climate Change. This is stark contrast to the extraordinary level of growth in renewable energy once the feed in tariff (FIT) was introduced, and corresponding crash in installation of new renewable activity when the government stopped supporting. The capacity market itself has had a rocky start with widely varying auction results and the preponderance of existing suppliers among the successful applications who would probably have supplied the energy without this incentive.

As the government has quietly removed many oversight bodies the responsibility to oversee government policy and actions has shifted from these bodies to private individuals so it is important that as many people as possible make it their business to understand what is going on in important areas such as energy policy. As can be seen, the relevant information is spread across numerous websites and sources including national government including immensely complex legislation, local government, participating bodies, press and commentary while much important information is 'commercially sensitive'.

As well as raising many further questions (how does DSR operate? How do CMUs manage servicing downtime?) there are many other aspects of UK electricity policy as it relates to climate change - including feed-in-tarriffs, renewables obligation etc.

Further related articles

Very informative and detailed submission from Emma and John Rosling on the Bishops Waltham application.

Hampshire chronicle – campaign against the power station plan.