About KiWi Power

KiWi Power believe that the current approach to the UK electricity system is in need of greater reform than has currently been carried out. Therefore the company fully agrees with the need for a policy reset, as described by the government, and welcomes the infrastructure committee's interest in the space.

KiWi Power works in the field of Demand Side Response (DSR), the company is described as an aggregator. That is a company which engages industrial/commercial sites with small amounts of power generation capability, or enterprises that have the capacity reduce power at peak times. KiWi Power is then able to control the power use from these sites at peak times, selling flexibility back to the National Grid. KiWi Power specialises in dealing with the contractual risk involved in supplying balancing services to the National Grid, which means that its product is suited to both unsophisticated electricity users as well as the experienced companies. KiWi Power also advises companies on their energy management strategy.

KiWi Power builds its own software and hardware with assembly lines in the UK, and has a business model designed around giving the software away to the potential client without a charge. The client benefits from both hardware and software. The latter provides a service that can give them full visibility of their whole company systems. Therefore KiWi Power maintains a subsidy free business model, and currently operates internationally on this basis.

Overview

The DSR aggregators, as part of the electricity market, have two major stakeholders both of which could be described as 'clients'. On one side there is the industrial or commercial company that has been aggregated, and on the other is National Grid who pays for the service. In this document the phrase client will refer to the companies that KiWi Power aggregates, and the word customer shall mean National Grid as they are the ultimate customer in any transaction.

DSR Overview

The government's position was recently made clear by the Secretary of State, Amber Rudd, in the House of Commons[1] [Hansard 14 12 2015].

"Overall, this Government is absolutely committed to a low-carbon future that is value for money and constantly provides security to consumers and families."

The capacity market has failed, especially in the goal to deliver new gas. The first capacity market auction, December 2014, contains coal plant and therefore also perpetuates a high carbon energy offering. In addition, balancing market tools such as Supplementary Balancing Reserve (SBR), endorsed by the government and Ofgem, represent extremely bad value for money. KiWi Power notes that the cost of this SBR 'back up' capacity for next winter 2016-17 is in excess of £122m, and feels that this money could be better spent. Especially as this figure has increased substantially from 2015-16 winter price of £33m.[2]

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[1] House of Commons Hansard, Column 1297, 14 December 2015, Secretary of State Energy and Climate Change, Amber Rudd.
http://www.publications.parliament.uk/pa/cm201516/cmhansrd/cm151214/debtext/151214-0001.htm#15121426000582

[2] National Grid figures on SBR and DSBR auction procurement
file:///C:/Users/Spare%202/Downloads/Winter%202015-16%20Results%20of%20Tender%20Round%202.pdf

The structure of the current capacity market auctions also promotes a policy of building new build standalone diesel plants. On that basis alone, the claim of technology neutrality is debateable. At the very least an efficient policy should be spending capacity market funds on developing existing DSR sources of generation, rather than building new unnecessary plant with no capacity to lower carbon use. At the worst end of this policy failure, the capacity market has allowed for the unbridled development of new 'diesel farms'. These new diesel assets will displace the incentive to fund, low or zero carbon, DSR alternatives derived from existing infrastructure.

KiWi Power suggest the following: that the government develop a facet within the policy process that guarantees some elements of any future policy, and that the current capacity market is reformed to provide a 'level playing field' for the whole market. Furthermore, government should acknowledge that embedded DSR could supply a large part of the UK balancing requirement, and lower the carbon content of the UK national grid at the same time.

If these issues are addressed in the right order, they will deliver a low or zero carbon alternative that can displace the remaining coal use on the system. In doing that they can also avoid the need for some of the costly new build natural gas thereby preventing a rise in electricity bills. Furthermore, they will do so in a subsidy free environment.

The key policy infrastructure pathways remain clear:

- Engage the 'reset' and amend system architecture in all future capacity auctions
- Guarantee a meaningful amount of DSR in T-1 auctions, and assure auction will take place
- Level the playing field for embedded DSR, and end displacement by new diesel farms

Questions:

What changes may need to be made to the electricity market to ensure that supply and demand are balanced, whilst minimising cost to consumers, over the long-term?

<u>Investor confidence and a government guarantee</u>

In terms of successful infrastructure policy for embedded DSR this means doing something as simple as giving a government guarantee that all the T-1 auctions will take place with meaningful levels of DSR[3]. These auctions are vital to the future growth of embedded DSR, but also act as a key enabler to lowering the overall cost of the capacity market.

KiWi Power is expecting a substantial reset by the current government. Large scale gas fired power stations are seen as a requirement, and therefore it is expected that the government will be incentivised to make changes to future auctions.

[3] The capacity market, the key UK government policy instrument for electricity delivery, is designed to work in four year time blocks. Provision of capacity is to be met at the end of a four year period. Hence, T-4 is for delivery in four years from the auction date. However, to make up for any unforeseen issues or shortfalls a smaller auction will also take place in the year just before delivery. This auction is called a T-1. It is a much smaller volume that the original T-4 auction. The point is that the KiWi Power and other DSR providers see these as key points of entry because there will be less involvement from traditional suppliers, who should have been more interested in the T-4 auctions.

New gas fired power has not been forthcoming, because neither of the two T-4 auctions delivered a high enough price. This outcome was driven by existing power stations bidding into the auction. These existing units do not require the expensive upfront building costs, and therefore they can outbid competition from a new build gas fired power station.

The capacity market also lacks a 'level playing field', and from a DSR perspective this is best demonstrated by the different lengths of contracts available to bidders. DSR, using existing infrastructure, is only allowed to bid using a 1 year contract. However, power stations are allowed to bid using a 15 year contract. This rule has perpetuated a rise in contract wins for so called 'diesel farms'. Embedded DSR finds it difficult to compete under such different conditions.

KiWi Power are of the view that the government will come up with a solution to this issue. However, it is imperative that when any solution is enacted for the T-4 auctions, it should also be mirrored in any future T-1 auctions. Thus both auctions can then avoid being flooded by existing power stations. Furthermore, this expected future change to the capacity market auctions must also make sure that the reset embodies the 'level playing field' required for successful DSR.

The government could add a level of certainty, and then work on gaining cross party support in the event that a future new executive could at least agree to keep policies in place with a right to review after 10 years from 2015. This would further help to build confidence that the UK was a place for long-term energy investment. This would then, in turn, further reduce the risk and therefore the cost of investment, which would mean there would be lower cost over the long-term to consumers.

What role can changes to the market framework play to incentivise this outcome:

- Is there a need for an independent system operator (SO) how could the incentives faced by the SO be set to minimise long-run balancing costs?

- Is there a need to further reform the "balancing market" and which market participants are responsible for imbalances?

Reform

Creating an independent system operator or (ISO), is a near-term aspiration. KiWi Power currently feels that there are more important elements of the policy infrastructure that need to be amended. In terms of creating the level playing field an ISO should be developed as a final stage. KiWi Power, very much endorse the ADE response to this question as well.

In reference to the "balancing market", KiWi Power understands that the question refers to the half hourly settlement of supply and demand on a daily basis. As such DSR companies are not currently, at the time of writing, incentivised to access this market.

KiWi Power is not in a position to answer which market participants are most responsible for the imbalances, as it does not have the visibility or data to draw any conclusions. However, KiWi Power is aware that in the UK the traditional supply side of the industry, essentially the big six, are likely to see a significant change to their business model as customers become more efficient at power management. KiWi Power suggest that it is for the supply side to adapt to these changes, and feel that greater transparency will do much to allow old infrastructure to evolve. In particular, data sharing and communication between parties is to the benefit of all. This will also foster the creation of a visible 'real-time' second by second market settlement system.

- To what **extent** can demand-side management measures and embedded generation be used to increase the flexibility of the electricity system?

KiWi Power's business model in the UK was predicated on the anticipation that up to 15% of daily load on the UK grid could be taken up by a mature DSR market[4].This would equate to between 6 and 9 gigawatts (GW), depending on the time of year. To put these figures in context a gas fired power station, with a build cost of approximately £8-900m, will deliver around 1.2GW. The UK's largest single power station which is Drax Power has a capacity of just under 4GW and the UK average daily capacity requirement is between 40-60GW.

Government figures indicate that DECC suggests the potential capacity is 2.5GW in 2018/19. Trilemma UK that points out that the figure should be taking into account what a developed DSR market can deliver.

"Indeed, the Government has assumed that up to 2.5GW of the demand side response (DSR) will ultimately contribute to capacity requirements in 2018/19 and evidence from regional capacity markets in the US suggests that demand response potential could be significantly greater than this."[5]

These sources of embedded DSR will stem from both turn up and turn down generation. However, the exact split between the two types and the total achievable carbon saving remain to be analysed. The overarching point is that the UK could avoid building at least 6GW of gas plant and possibly more, as this is a conservative estimate. It is also probably worth noting that this figure would almost cover the shutdown figure of coal fired power plants. This is on the basis that coal makes up around 20% of the UK energy mix[6].

2. What are the barriers to the deployment of energy storage capacity?

- Are there specific market failures/barriers that prevent investment in energy storage that are not faced by other 'balancing' technologies? How might these be overcome?

- What is the most appropriate scale for future energy storage technologies in the UK? (i.e. transmission network scale, the distributed network or the domestic scale.)

Although not specified particularly earlier, KiWi Power has also been working with the development of batteries as a means of electricity storage. In terms of the future deployment of electrical batteries, local and national infrastructure should follow a deployment idea based on where the most need is required.

Batteries should also be placed on a 'behind the meter' basis. This means that they need to be embedded into the electrical infrastructure of a commercial premises. In the event that there is a supply shortage, or that frequency services are required, the site can run off-grid. However, the positioning will also be important geographically. Batteries should be placed in metropolitan areas of

[4] Trilemma UK have put this figure at approximately 10% based on the Pennsylvania-New Jersey-Maryland Interconnection (PJM).

[5] Simon Skillings, Phil Baker, Alan Smart, Assessing the balance of risks associated with coal plant closure, Page 12, February 2015.
http://www.trilemmauk.co.uk/sitebuildercontent/sitebuilderfiles/assessing_the_balance_of_risks_associated_with_coal_plant_closure.pdf

[6] UK's coal plants to be phased out within 10 years, BBC News, 18 November 2015,
http://www.bbc.co.uk/news/business-34851718

the country where constraints exist on the district or national grid. Batteries clearly have a use at a domestic scale too, but they require a mass market business model.

In the best possible circumstances batteries will be placed in new developments, so they do not have to compete against sunk costs of existing infrastructure.

3. What level of electricity interconnection is likely to be in the best interests of consumers?

- Is there a case for building interconnection out to a greater capacity or more rapidly than the current 'cap and floor' regime would allow beyond 2020? If so, why do you think the current arrangements are not sufficient to incentivise this investment?

- Are there specific market failures/barriers that prevent investment in electricity interconnection that are not faced by other 'balancing' technologies? How might these be overcome?

KiWi Power, have chosen not to answer this question.

4. What can the UK learn from international best practice in terms of dealing with changes in energy technology when planning to balance supply and demand?

Using DSR to balance supply and demand is not a new technique. It has been prevalent between power stations and heavy industry since grid systems were first invented. The most mature market remains the US, and as a market it contains several independent system operators (ISO). The variety of these different participants have meant that most of the possible models, for DSR, have been tried and tested. PJM is often highlighted as the US system operator with the best formula for success. However, it's worth noting that even in America successful DSR policies are not found in all states. Using DSR to balance grids in Europe is also not a particularly new phenomena either. Market maturity is signified by using aggregation technology to collect smaller MW values, from previously less efficient sources. The volume of MW at which this can profitably take place, is a good measure of the maturity of a countries system. National Grid has recently commissioned a report looking at how DSR is conducted in other countries. The consultants, Baringa Partners, presented findings in November 2015 and isolated four challenge areas that related to the UK. These examined the different DSR schemes, the level of participation, market access, and baseline measurement techniques.

KiWi Power believes that the Baringa analysis contains many useful observations. Especially where the report describes the strengths of the American market infrastructure, and some of the pitfalls experienced in the German electricity markets.

PJM's market holds many of the answers to a better market infrastructure. The first is the level playing field, as mentioned before, is most starkly demonstrated by the length of contracts. PJM offers only one contract to all participants, and traditional supply side entities compete on a level playing field where contracts are 3 years in length. In the UK there were three different contracts in the first

auction, with embedded DSR excluded from refurbishment and new build contract lengths of 3 and 15 years respectively.

The second important element is that in the PJM model, DSR participants are paid an availability charge, as well as the utilisation charge.[7] This payment is necessary as the aggregator's client has to be incentivised to provide the reduction. In some European cases where an availability charge is not paid, interest in DSR is driven by stipulating a minimum amount of activations in a given year.

Capacity auctions seem to be a relatively standard way of providing assets that might meet the requirements of STOR. However, some services provided by the demand side are considered 'ancillary', these might be frequency response and be responsible for very small second by second change to electricity infrastructure. It has been suggested that PJM has a very flexible approach to aggregation with the minimum asset size only 100KW. The UK has a requirement of 3MW, however this is not a critical difference. The level playing field is far more important in the short term.

The measurement of power reduction at a given site is also important as it is linked to payment and therefore different tariffs. This is often referred to as 'base line' methodology. A change by the NYISO to this measure resulted in a significant decline in participation, as less DSR was able to qualify under the new method. Baringa suggest that there was also poor communication between the ISO and the DSR participants. The system operator also used a day ahead scheme, in which only small energy quantities were scheduled.

In European markets some mistakes have been made which have prevented the smooth uptake of aggregated DSR. In particular, Germany has managed to create a particularly Kafkaesque system that requires several different parties to sign a contract before a site can be aggregated. These signatures include all the parties involved in the German electricity system. Whilst this process gives the supply side, TSO's, DSO's and federal electricity apparatus some visibility of an impending change to a sites electricity use, it also allows them to exercise too much control over the process. The volume of paperwork requires legal cost and time which means that the any potential site is incentivised to make arrangements with an existing supplier. This issue with excessive bureaucratic control was also picked up by the Smart Energy Demand Coalition (SEDC).

"While the German markets appear open, in practice, access is problematic due to a series of regulatory barriers."[8]

Further Reading

Europe Examples

- Demand response experience in Europe: Policies, programmes and implementation
- Mapping Demand Response in Europe Today – 2015 Smart Energy Demand Coalition (SEDC)

[7] Enernoc Frequently Asked Questions
http://www.enernoc.com/our-resources/brochures-faq/get-paid-to-reduce-energy-with-enernoc-demand-response-in-pjm

[8] Smart Energy Demand Coalition (SEDC)Mapping Demand Response in Europe Today – 2015 p.153.