

Winning value in the fast-changing environment of power flexibility

A thought leadership paper from CGI and New Power

The idea that, instead of selling kilowatt hours, market participants of all kinds could sell their flexibility remains new. It was only in August this year that National Grid's Electricity System Operator (ESO) opened its balancing market to aggregators and Limejump began bidding in its 'virtual power plant'. But Limejump chief executive Erik Nygard was clear that it is not an end but a beginning. "Distributed asset values can be maximised in multiple markets" he said, and he pointed out that beyond the GB Balancing Mechanism there sit TERRE and MARI - new pan-European balancing markets.

Flexibility is a huge prize. Richard Sarti, UK and Ireland director at Nordpool, talks of AirBNB, which "Released a huge capacity in the lodging business, which opened up a level of flexibility which was previously unknown. ... an independent, integrated and automatic marketplace will have a similar effect in the power industry and release a previously unseen amount of consumer flexibility."

That is disruptive. AirBNB provides a beacon that seemingly-fixed markets can change dramatically. Power industry products are changing, whether long-lived like STOR or new like some frequency response products. Wayne Muncaster, UK managing director at demand-side aggregator Grid Beyond, says both are presenting "Significant challenges in gaining market contracts."

Participants, both new and old, have to understand the timescales and locations over which value can be generated, and at which voltage levels. And they have to act fast: change may be on 'knowledge industry' cycles of months. Claire Spedding, head of business development at National Grid, agrees that, "These markets are continually changing and becoming more and more interlinked. There is no

longer one single market where the associated revenue can underpin an investment case."

Nigel Turvey, network strategy and innovation manager at WPD, adds, "The greatest opportunities are yet to come. System and network operators are working hard to make the system smarter, which will enable flexibility providers to access a wide range of new markets and these are just beginning to open up."



Alongside those system operators, Sarti believes that, "An independent, neutral marketplace is needed". He goes on to say, "These arrangements should be market-led, driven by price and independently operated, so that no one entity can control who and what technology is used, or not used, during a period of constraint."

Acting now

What is the most important flexibility opportunity now?

Spedding highlights, "The ability to understand and take advantage of revenue stacking across different flexibility products; it is unlikely that a successful business can succeed through concentrating on one element of flexibility. Notwithstanding that, there are areas of flexibility that wouldn't have traditionally been actively procured and are now becoming more valuable, such as fast acting frequency response."

Muncaster says, "Different energy markets in the UK are developing at very different rates, and often with no single point of direction or consistency. Understanding the direction of travel of different markets, and the variety of challenges within each of them, is often the most difficult part of making the decision about participating." Bertie Readhead, associate director for energy and infrastructure advisory at Jones Lang LaSalle, also described current opportunities for flexibility as "Relatively opaque and difficult to access. The development cycle typically outpaces the evolutionary nature of the policy and regulatory change."

Muncaster goes on to say, "Wholesale market access is developing but not yet advanced within the major suppliers; and the DSO markets (for local balancing) are still at trial stage."

Through its Power Responsive initiative the ESO has worked to bring flexibility providers on its journey. But ideally, innovation will come from the customer side. Do National Grid's flexibility products lead or follow the market?

Spedding says it is a combination. It is a "Significant piece of work to develop the ancillary service markets in order to simplify them and reduce barriers to entry. However, we also work closely with innovators and disruptors in the market to understand what changes they are leading and how we may need to adapt our frameworks."

Turvey notes that the separation of National Grid's ESO function coincides with DSOs beginning to define their needs and developing products, so, "Now is a great time for both participants and procurers to innovate and find the right balance of technology that meets the whole needs of the electricity system."

However, Muncaster says, “National Grid’s services are often a barometer of market value for flexibility. As values drop in National Grid markets, inevitably participants look elsewhere. This drives innovation... so soon we may see National Grid having to react to other markets.”

Sarti argues for proactive, instead of reactive, change. “In many respects, the current approach is not really good enough,” he says. The ESO’s approach to flexibility is based on a historic ‘top down’ (and large-scale) approach that favours producers, so probabilistic approaches and aggregation have not been at the forefront of its market design. “We believe that tomorrow’s flexibility markets need to be designed ‘bottom up’, where the flexibility is identified at the lowest level possible in the grid.” That also makes flexibility available to any ‘balancing responsible party’, not just system operators.

Turvey backs that up. “The greatest value to the electricity system from flexibility comes from those providers connected to the lowest voltage levels.”

Which current opportunities may be superseded in time? Spedding believes that frequency response, reserve, restoration and constraint services will always be required, but the exact requirements may change. “Broadly it is the way we procure these services, rather than what we are procuring, that is most likely to form the ‘transition’.” That contrasts with Muncaster’s comments about those services losing value.

WPD’s Turvey says, “Generation of energy and availability of ancillary services will be always be in demand, but the size and location of the market will depend on the developing energy mix of the UK - something harder to predict.”

And Sarti also sees change ahead. “Rather than discussing today’s products, it could be more interesting to discuss the new roles of the flexibility provider and the new market place needed for them to operate. A market-driven approach to the flexibility issue will determine which products will be long-lived.”

The advice to both new parties and existing market participants is to be innovative and flexible - Spedding advises that approach for business models, as well as for technologies and services. How do you achieve that? Muncaster says that flexibility markets, “Are already complex and set to accelerate rapidly, so the flexible technology platform, which enables your assets to participate and seamlessly stack and switch between programmes and schemes, should be the key factor.” He wants greater transparency, “Through greater visibility of volumes and pricing in more markets.”

Who will be the next new players?

The idea of exchanging your flexibility instead of buying kilowatt hours is even more alien to companies previously on the customer side. But the boundary is beginning to dissolve. Spedding made this point: “Participants should also be aware of the steady influx of new participants with different technological and financial business models.”

For most of those, it is too early to ask what products they would like to see and how they might interact with the power market. The market framework, and even the language of the industry, is unfamiliar. But they are on the way, led by electric vehicles. Nissan is already working with National Grid, UK Power Networks and Northern Powergrid on ‘vehicle to grid’ applications. Francisco Carranza, managing director of Nissan Energy at Nissan Europe, said, “We now look at our cars as so much more than

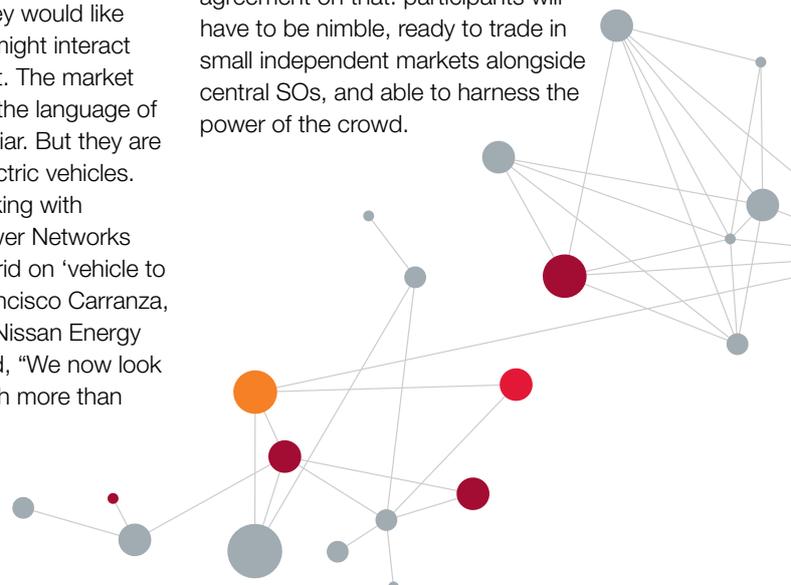
products which simply move people from A to B – they are an intrinsic part of the way we consume, share, and generate energy. Our EVs can be plugged into the grid and support the transmission and distribution companies in making the UK grid more sustainable and more stable.”

“...V2G introduction will change the rules of the game and make energy cheaper for everyone.”



Models like AirBNB or EBay are disruptive and the electricity industry will follow them; it is just a step from sharing power to sharing flexibility. JLL’s Readhead says the best way to speed that disruption is to “Improve market access to the various energy markets and enable benchmarking of different trading services offered.”

How can new entrants succeed in this changing market? There is agreement on that: participants will have to be nimble, ready to trade in small independent markets alongside central SOs, and able to harness the power of the crowd.





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Britain's electricity system is in transition, but flexibility still largely comes from dispatchable thermal generation. As that is replaced by inflexible, intermittent renewables, alternate sources of flexibility must be established.

As low carbon technologies beyond the meter grow, so does the potential for demand side flexibility to replace conventional sources. Add the rising value of alternative sources of flexibility, and the incentive for consumers to make their flexibility available to the system is increasing.

Over the last three years, CGI's market surveys have consistently identified uncertainty over market structure, roles and responsibilities as barriers to progress; as do contributors to this paper. If flexibility markets are to be established in time to facilitate access to these new sources of flexibility and enable value to flow to consumers, clear signals on the direction of travel and the desired policy and regulation are needed urgently.

But we need to think differently. Energy needs will be increasingly satisfied locally and costs will be driven through economies of scale in producing devices, rather than by optimising a centralised system. An effective market framework won't be an end-game - it will continue to evolve in response.

The Electricity System Operator recognises that business cases will be based on value-stacking: the same flexibility being used by different parties at different times for different purposes.

What are the market structures that make stacking possible? I talk about an 'eBay for Energy', but there are other models. Such models enable stacking and value to accrue from new business models and new services - including balancing wholesale and retail positions as well option value.

Market rules are needed, including redress, because of the potential for value conflicts and gaming. Participants must understand that when the value to one party may be at the expense of another there must be mechanisms to balance value between participants. Clearly such rules will change the way investment cases are evaluated, but are essential to deliver the best 'whole system' outcomes for consumers.

Finally, we have to remember that there are physical constraints. Grid limits may determine value and network topology dictate the trading (and balancing) groups. Clearly, in an increasingly decentralised system balancing will take place further down the system.

Market participants must be flexible - even in their flexibility strategy. Adoption rates are uncertain, cost curves are uncertain and consumer attitudes are uncertain. It may sound risky, but participants have to get started. Otherwise, new entrants will steal the march.



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