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responsive

national**grid**

Power Responsive Conference 2016
**Demand Side Response: Practical next
steps**

Event Summary

Thursday 16th June 2016



Power Responsive Conference II – 16 June 2016

Summary

Foreword

John Pettigrew, Chief Executive, National Grid

Through Power Responsive we have set out a collaborative 2025 vision for a consumer-empowered electrified future.

We're moving from a world where energy flows in a linear fashion from a generator through transmission and distribution networks to homes and businesses, to energy flowing in many different directions. This will require us to be much more flexible in the way that we operate and balance the system.

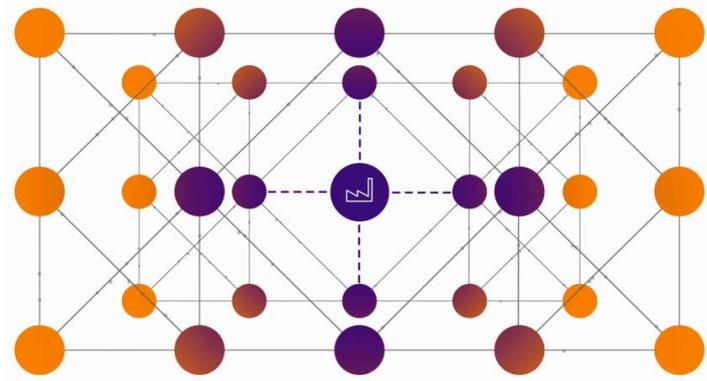


These changes mean that a huge opportunity has opened up for people and companies to have much greater control over their electricity use: via smarter technologies, digitalisation and access to real time data; as customers produce power themselves, to use onsite and/or export to the grid; and with the commercialisation of electricity storage.

Customers can reduce their costs and generate revenues by playing an active part in the electricity system. The market is ready.

John Pettigrew

Chief Executive, National Grid



Introduction

National Grid hosted the second major **Power Responsive Conference: Practical Next Steps for Business Customers** on 16 June 2016 at the Grand Connaught Rooms, London.

The event brought together over 200 businesses, energy experts and policy makers to debate the crucial issues surrounding the drive towards a more flexible energy system.

This document summarises the issues discussed during the day.

For more information on the Power Responsive programme and to register for updates, please visit www.powerresponsive.com, where you will also find more information on the conference including speaker presentations and videos. You can also join the discussion on LinkedIn. Search for the group – ‘Power Responsive’.

Cordi O’Hara, Director of UK System Operator, National Grid

We launched Power Responsive a year ago to raise demand side response (DSR) as a priority in GB electricity markets, and set out on a path to facilitate its growth at scale.

Since then we have: raised awareness with business customers – actively engaging over 700 individuals and 370 businesses; set up a cross-industry high-level Steering Group with customers to direct the programme of work; published 20 case studies of businesses benefitting from DSR; begun to change the public narrative from ‘shutting down plants’ to intelligent use of energy; produced a map of DSR products; developed a guide and training programme on DSR with the Major Energy Users’ Council, which 120 businesses have benefited from; run a major sector specific workshop for hospitals with the Crown Commercial Service; and created two new balancing products following discussions with stakeholders.

There is more we need to do, including: continuing to raise awareness; building confidence in DSR products and the investment case; and considering the future evolution of flexibility markets. Engagement at today’s Power Responsive conference will help inform our future programme of work and priorities for Year 2.

Session 1: Demand Side Markets Now & In Future

Overview of demand side markets today. How market actors and policy makers are working to enable customer based flexibility. How flexibility markets may evolve in future.

Prof. Dieter Helm (University of Oxford) chaired the session, highlighting the profound changes occurring across the energy sector with new technological advances – e.g. electricity storage, electric cars, smart meters, smart grids and decentralised generation – at the same time as the digitalisation of virtually everything. This is changing the nature of the industry, the companies within it and much of the architecture of the industry. As we shift to low carbon technologies, we see the decline of wholesale prices, and must consider what a zero marginal cost electricity system really looks like. That's why flexibility is becoming an incredibly important opportunity nationally and locally, for market actors and customers.

Dr. Andrew Wright (Ofgem) suggested that there is real value in flexibility, which will increase as we respond to climate change and to technological change. Flexible thermal generation is coming offline, replaced by intermittent, distributed renewable generation. Electricity demand is likely to be greater and more variable in future. Barriers to flexibility include: lack of price signals; network connections; settlement arrangements; and making the investment case. There are parallels with energy efficiency in terms of asking businesses to make cultural changes and invest outside of their core businesses. The role of intermediaries will be critical.

To maintain stability of investment during the transition, Ofgem proposes some high-level principles: cost-reflective; market-based; level playing field; non-distortive recovery of fixed and sunk costs; and consistent with European integration. There are a number of ways markets might evolve in future – such as: making the existing market more granular (e.g. with locational pricing, shorter settlement periods); marketising capacity and constraints; introducing flexibility markets; and/or enabling local markets. Ofgem and DECC are undertaking a significant programme of work on the future Smart System with a Call for Evidence due shortly.

Cordi O'Hara (National Grid) also highlighted changes in the generation mix, with the growth of solar PV and improved economics of storage. For National Grid – flexibility means changing load in response to a signal – this includes DSR, distributed generation, energy storage and interconnection. The system operator is a residual balancer so only covers 3% of all energy traded. There is a much broader market opportunity across the whole value chain – in capacity, wholesale and balancing markets.

Jeff Whittingham (Dong) having listened to customers at the Power Responsive conference last year had developed innovative flexibility products – including a renewable balancing reserve and software/models to optimise customer electricity usage and onsite generation. Customers want to access revenue streams for DSR but without the risk of penalty for non-delivery, so an initial Dong balancing product is commitment free.

The audience asked whether a full unbundling of supply and generation is needed to unlock the potential for customer flexibility. The panel suggested that it is important to ensure equal access to products. Some companies offer a different model of vertical integration with renewable generation and flexibility.

The panel was asked about future prices – with more providers, prices may go down but with grid constraints they may go up. It was noted that the various markets interact and value will shift between them – we are still learning how to marry capacity and energy together – with simpler signals and products. The system operator must explore all opportunities – to ensure that the system is in balance and also that customers do not incur undue costs going forward.

Session 2: Benefits For National Infrastructure & Businesses

Phil Graham (National Infrastructure Commission) outlined the NIC's dual remit to assess the UK's long-term infrastructure needs every five-years, with shorter more detailed studies in between – including on 'Smart Power'. Rather than focusing predominantly on generation, we need to maintain and increase flexibility in the electricity system – through interconnection, storage and demand flexibility. By doing so, £8 billion could be saved per year by consumers. The USA has led the way with some regional markets meeting 15% of peak generating requirements through demand flexibility, and average across the USA of 6% met in this way. If the UK could get up to 5%, that would be the equivalent in scale to the capacity of a new nuclear power station. The Government has welcomed the NIC report, committing to cover issues in their Call for Evidence and developing a roadmap by spring 2017. The NIC plans to revisit these issues and hold the Government to account.

Business customers discuss their experiences and the opportunities for offering flexibility.

Sumit Bose (Energy Live News) chaired a panel discussion with industrial and commercial customers on their participation in demand side markets.

Tom Lee (Anglian Water Services) said as a water company, their DSR journey started with using their standby generators, which provided resilience to their sites, for Triad avoidance. They then worked to avoid usage at peak to reduce distribution costs and participated in Short Term Operating Reserve (STOR), the Demand Side Balancing Reserve, and now they are contracting directly in the capacity market transitional arrangements.

Mark Fitchett (INOVYN) said that their group had been involved in demand response for many years, over six EU countries. For a time they had not participated in DSR in the UK, as the value had been low. However, it is refreshing to see innovative suppliers coming back into the market.

Francisco Carranza (Renault-Nissan) suggested that electric vehicles (EV) could become a centrepiece to flexibility on the electricity grid. There could be significant value for car customers and society of getting involved in flexibility.

The panel were asked if demand response was just for big companies. They suggested that as long as customers have a half-hourly metered site with reasonable demand, they have an opportunity. Whether direct with National Grid or via aggregators.

It was noted that market rules sometimes act as a constraint or add costs. For example Anglian Water cannot use the same meters for STOR as for the capacity mechanism – which means paying for new more accurate meters. Concern was expressed over the review of embedded benefits and the impact this might have on cost savings achievable from distribution level flexibility.

The costs for the capacity market, balancing and other innovation schemes are recovered through levies on customer bills and network charging arrangements. As more customers go off-grid, the cost burden of maintaining the networks may fall on ever fewer customers. It will be important not to overload vulnerable people / businesses with those costs. However, DSR could also help reduce overall system costs.

An audience member asked whether we could replace the different schemes, each with particular specifications and different constraints, with a single short-term flexibility market. This would need further development but with flexibility, sufficient notice and a price signal – then a company could follow the price. It would need to be simple and easy to participate.

On the role of distribution network operators, they are moving from innovation trials to flexibility as business as usual. The forward-thinking DNOs are working with partners and some are starting to engage with the EV market.

Session 3: Practical Workshops On Demand Side Participation

Four parallel workshops on the practical steps to participate in flexibility schemes.

Workshop 1 - Making the business case and delivering DSR

Brendan Coyne (The Energyst) chaired the discussion on how customers can build a business case for DSR and the steps required to participate. He noted that the Energyst is currently undertaking a survey of business customers. The Energyst is also hosting a major conference on DSR, supported by National Grid, on 8 September 2016.

Julie Braidwood (Crown Commercial Service) highlighted the significant potential for DSR in the public sector, particularly from distributed generation. The Crown Commercial Service (CCS) has also developed a DSR framework to enable procurement from aggregators through direct reward or competitive tender. Typically, for an NHS trust to participate – energy managers, estates, finance, procurement and clinicians – will all need to be involved, which can take time. CCS is renewing its framework this year and developing advice and guidance – including a ‘How To Guide’ for DSR and a template for a ‘Business Case’.

Andy Pennick (United Utilities) suggested that making the business case can be challenging, with many schemes to choose from and the offers of different aggregators in addition. It is critical for an aggregator to engage early with site operators and engineers, to ensure safe operating parameters – so as not to put people’s water or the environment at risk. He recommended working with a trusted advocate or expert and considering the delivery of DSR on site or asset as any other cross-departmental project.

Chris Kimmit (Open Energi) advised customers to: find a friend – someone who has done DSR before with a similar business and similar assets; and find a partner – such as an aggregator. To successfully deliver DSR, aggregators typically need to develop: understanding of the market; a trading function; enabling technology, data systems, and algorithms; reporting, compliance and data settlement; project and operations teams. Business customers should not need to develop this capacity internally.

Jill Caine (Electricity Storage Network) highlighted the new commercial potential of electricity storage, noting also the opportunities for heating or cooling load. There is now significant interest. There are some challenges which need to be addressed for storage including: a legal definition of storage which is currently viewed as generation by default; but is treated as both demand and generation by distribution networks – going through two connection teams; and incurring double costs for renewable levies.

Confusion and risk for businesses were seen as key barriers to DSR uptake. Greater cost and price certainty would make the business case easier to make at board level. Longer contracts would be welcomed for storage providers, water companies and the public sector to align with investment cycles. The new Enhanced Frequency Reserve (EFR) service goes some way toward this with 4-year contracts, but National Grid is currently constrained by their System Operator incentive timeframe of 2-years. Simplification of schemes is also needed.

It was noted that the EFR service was oversubscribed and DNOs have received a huge number of connection requests for electricity storage. Some of which will be from established providers with a strong international track record – others will be completely new to the market. The challenges of getting DNO connections, as a storage provider or generator, were noted.

All panellists agreed on the importance of lining up the key stakeholders within a business and making sure they have all ‘bought-in’. Having a champion for DSR within the business that understands that network can help in driving the project through. Especially when there are multiple sites.

Batteries behind the meter can either be directly connected (DC) benefiting the site only or via alternating current (AC) which means the householder/business can benefit whilst also providing system services to the grid. Electric vehicle charging could provide frequency response. However, using EV batteries to provide services has a cost to battery life, which needs to be weighed against the financial benefits.

Workshop 2 - Introduction to DSR schemes

Andrew Buckley (Major Energy Users Council) chaired the discussion on DSR schemes currently available. He noted that National Grid and MEUC have developed a comprehensive guide and training programme on DSR.

Paul Lowbridge (National Grid) gave an overview of the Power Responsive product map [see appendix] which gives an overview of the types of products available not just for Balancing but in other markets. This can be split into two types of opportunity. First, cost saving – for example avoiding certain half-hour ‘peak’ periods during the day / seasonally to reduce the impact of transmission / distribution costs – this tends to be what businesses try first. Second, revenue generation from: balancing services for reserve (longer notification and duration) and frequency response (shorter notification and duration); the capacity market; and other opportunities such as supplier balancing and DNO innovation at a local level. A short guide to DSR services is coming soon from Power Responsive.

John Hartley (Centrica/British Gas) explained the role of a supplier to help facilitate customer participation in DSR, de-risking the proposition and offering expertise.

Arthur Probert (Ameresco) also explained how a third party – such as an aggregator can help, by: meeting minimum volume requirements; providing a source of knowledge and support; outsourcing efficiencies/economies of scale; developing technology; and managing risks.

David Boyer (UK Power Networks) highlighted the role of DNOs, in terms of: ‘Red Zone’ charges which are announced annually; connections - historically firm, now more flexible and innovative; and dispatchable ancillary services. It was noted that DNO requirements are geographically specific.

The role of aggregators and other third parties in helping customers navigate different products was seen as increasingly important, so there is a need for some form of accreditation (this was discussed further in **Workshop 4**). In the meantime customers were encouraged to ask questions, test numbers, seek transparency and build relationships.

It was suggested that energy efficiency and flexibility should be considered together. There are opportunities for assessors for the Energy Savings Opportunities Scheme (ESOS) to also talk with customers about flexibility.

It was noted that peak winter demand has historically been the biggest issue. Summer minimum is now also becoming an issue – with demand getting down to 17 GW – but wind and solar high, and inflexible nuclear. Hence the development of a new demand turn-up product, which essentially shifts planned electricity usage to times when demand is otherwise low.

The embedded benefits review was discussed. It was noted that the review would consider whether the levels of benefits are cost reflective. The review has in part been prompted by increased uptake of new diesel generation in the capacity auctions. Defra’s review of emissions standards was also noted – which could mean new air quality and emissions standards in ~ 2018-19.

Workshop 3 - Knitting together value from DSR

Rosie McGlynn (Energy UK) chaired the discussion on how schemes interact, how different market actors can work together to benefit from DSR and how customers can deliver a portfolio of DSR services.

Nick Blair (National Grid) highlighted that National Grid is working collaboratively with other market actors on sharing the value streams from DSR – particularly with DNOs. For example working with Western Power Distribution (WPD) on a demand-turn up service, and with UK Power Networks (UKPN) on voltage support / reactive power.

Joe McDonald (Limejump) is creating a virtual power plant – working with different customers and aggregating together – electricity storage, solar, wind, Combined Heat and Power (CHP) and DSR – to simulate the same profile of a coal plant – to trade in the market. The focus is on scalable solutions, data management and optimisation. Cloud based technology is fundamental.

Yoav Zingher (KiWi Power) reiterated the huge potential for DSR, noting that the routes to market are simple in themselves but none individually make a compelling business case. Aggregators can help by offering a portfolio, enabling access to markets closed to some smaller businesses and through new technologies, with fees based on success.

Matt Watson (Western Power Distribution) noted that DNOs see value in DSR for avoiding network reinforcement and managing constraints. WPD learnt from their project Falcon that it is difficult to recruit customers when competing with Balancing services, but giving notice at least one week ahead had helped. Now they are working to avoid such conflicts, including by working together with National Grid on the demand turn up service.

There was discussion on what types of customers can participate in the demand turn up service. 309MW has been contracted – which includes generation and CHP turndown at an embedded level; pre-cooling or pre-heating, and shifting of business processes. From the audience it was noted that a tarmac manufacturer is participating with the immersion heaters in their bitumen tanks and a gas manufacturer is also taking part. A water company suggested that they could participate with their small-scale pump storage facilities between reservoirs.

The importance of cyber security was noted. As we start to connect systems and generate more data. There was discussion over whether cities and localities could become self-sustaining. As DNOs transition to Distribution System Operators (DSO) there may be greater opportunity to balance locally. It was noted that how this transition will take place and how the role will split between the DSO and System Operator is not yet clear.

We have multiple separate schemes currently because of the way the services have developed from a generation-led market. Changes are being made to promote flexibility. The markets interact in complex ways. Having a capacity market contributes to dampened wholesale prices. We do not yet know if changes to cash-out / imbalance will unlock the potential for supplier led DSR pre-gate closure. The potential for moving to a different system in future – such as a flexibility trading platform – was discussed.

Workshop 4 - Working with aggregators and suppliers

Jonathan Graham (The Association for Decentralised Energy) chaired the discussion on the role of aggregators and suppliers in enabling customer participation in DSR/flexibility schemes. He noted that the ADE is currently developing a code of practice for DSR providers.

Maxine Frerk (Ofgem) noted that suppliers are a licensed entity but aggregators are not. Ofgem is undertaking work on the role of aggregators and third party intermediaries to give customers confidence when engaging in the market. Including their access to the balancing mechanism. Self-regulation is an option. Ofgem is encouraging the ADE to make progress rapidly, but it can be difficult for Trade Associations to enforce sanctions. The joint Call for Evidence with DECC will ask what Ofgem could usefully do in this space.

Dr. Alastair Martin (Flexitricity) suggested that participating in DSR can be difficult, requiring realism and persistence. To find a suitable aggregator, customers should ask difficult questions about; their track record, who else they are working with – with a similar load, and how the core business will be protected physically and commercially.

David Middleton (Origami Energy) is a new type of ‘disruptive’ electricity supplier. Using technology for arbitrage and self-balancing.

Eddie Proffitt (MEUC) suggested that the benefits of working with an aggregator include: knowledge expertise; relationships with market actors; having a portfolio so if a customer cannot flex, someone else can. However, there are challenges in choosing a reliable aggregator to work with. MEUC members get a lot of cold calls from aggregators, some of whom lack an understanding of their businesses. Regulation or accreditation is needed.

The ADE is looking to develop a set of standards for DSR providers to meet, covering: promotional materials and communications; sales; contract arrangements; data protection and use; and information transparency. This will need to be auditable, reviewable, with a clear complaints procedure. Sanctions are still under consideration – but could range from being taken off the list to fines. ADE has experience of setting up a similar scheme with the Heat Trust.

Session 4: Widening Demand Side Participation In Britain's Electricity Markets

Drawing together the discussion over the day to consider the priority issues and next steps to deliver demand side participation at scale, working with business customers.

Jo Butlin (Cornwall Energy) chaired the closing session, highlighting some of the themes emerging about making it easy, engagement, sharing of expertise, and that this is an exciting market – which needs to be open, agile and collaborative.

Dr. Brian Tilley (E.ON UK) noted that E.ON's shareholders in Germany have recently made the decision to spin off the group in two directions: Future E.ON – focused on renewable, distribution, energy solutions; and Uniper – conventional plants, gas storage. Business models are changing. Flexibility is crucial. Ancillary services may not be the right approach in the future, a level playing field is needed and an open / transparent market.

Dr. Tim Rotheray (ADE) suggested that there are two key challenges. First, the main cost to transact in the flexibility market is the cost of the customer journey. This is not as easy to understand as for traditional generation where the main costs are the kit and fuel. Second, innovation versus culture – significant innovations have happened in other sectors through enabled technology and disruptive start-ups, but there have not been large regulated monopolies sitting in the middle. How do we get the big companies to change their culture?

For the market to take off we need: independent access to the wholesale and balancing markets; fair and equal treatment in the capacity market; and simplification & innovation in balancing services. The ADE will shortly publish a report assessing the potential for DSR by 2020 with an estimate of 9.8GW.

Jim Cardwell (Northern Powergrid) highlighted that we are moving to a more active system with more engaged consumers. Which will mean a shift in the business models for DNOs to DSOs. The label means different things to different people currently. In the meantime, there are low regret steps we can take and industrial and commercial DSR is one of them. Industry must collaborate to make this as simple as possible for customers.

Barnaby Wharton (CBI) the big challenge for government will be looking across the whole system, with involvement of different government departments, and not just DECC by themselves.

There was some discussion about whether we could actually achieve a 'level playing field'. The panel agreed that this would be difficult, although we need to look at the schemes today and assess how these could be made fairer by looking at how the markets interact as a whole.

Cordi O'Hara (National Grid) highlighted the tension between parties wanting a level playing field and calling for targets. She suggested that we need to think long-term and embrace criticism early. The importance of data was also highlighted.

Cordi O'Hara, National Grid, closed the event by thanking attendees. Looking back over the past year, Power Responsive has started to tackle some of the barriers to DSR participation – including raising customer awareness and developing a shared commitment with market actors large and small to achieve flexibility work.

The conference has highlighted some further challenges for the year ahead. The Power Responsive steering group will take forward feedback from the day into the next phase of work.

The key themes for Power Responsive in Year 2 are:

1. **Continue Customer Engagement on opportunities in flexibility markets** – deepen our focus with sector specific industrial and commercial customers, and broaden our approach to wider flexible technologies.
2. **Increase confidence in the 'sell' of flexibility** – support the role of aggregators and third parties. Ensure information is produced which gives customer and investor confidence.
3. **Help to progress the evolution of flexibility markets** – short-term amendments and improvements and longer-term changes that need to be made.

Thanks for your involvement

We are grateful for the participation of our speakers and chairs.

We'd like to thank both our sponsors - The Association of Decentralised Energy and Energy UK for their valuable contribution and support to this event – and Sustainability First for its on-going support of Power Responsive programme and for producing this Power Responsive conference summary.



Website - www.theade.co.uk



Website - www.energy-uk.org.uk



Website - www.sustainabilityfirst.org.uk

We'd also like to thank those who have assisted us in inviting their memberships and stakeholders to the conference

- CBI
- Crown Commercial Service
- Energy Institute
- Energy Managers Association
- Major Energy Users' Council
- The Energyst

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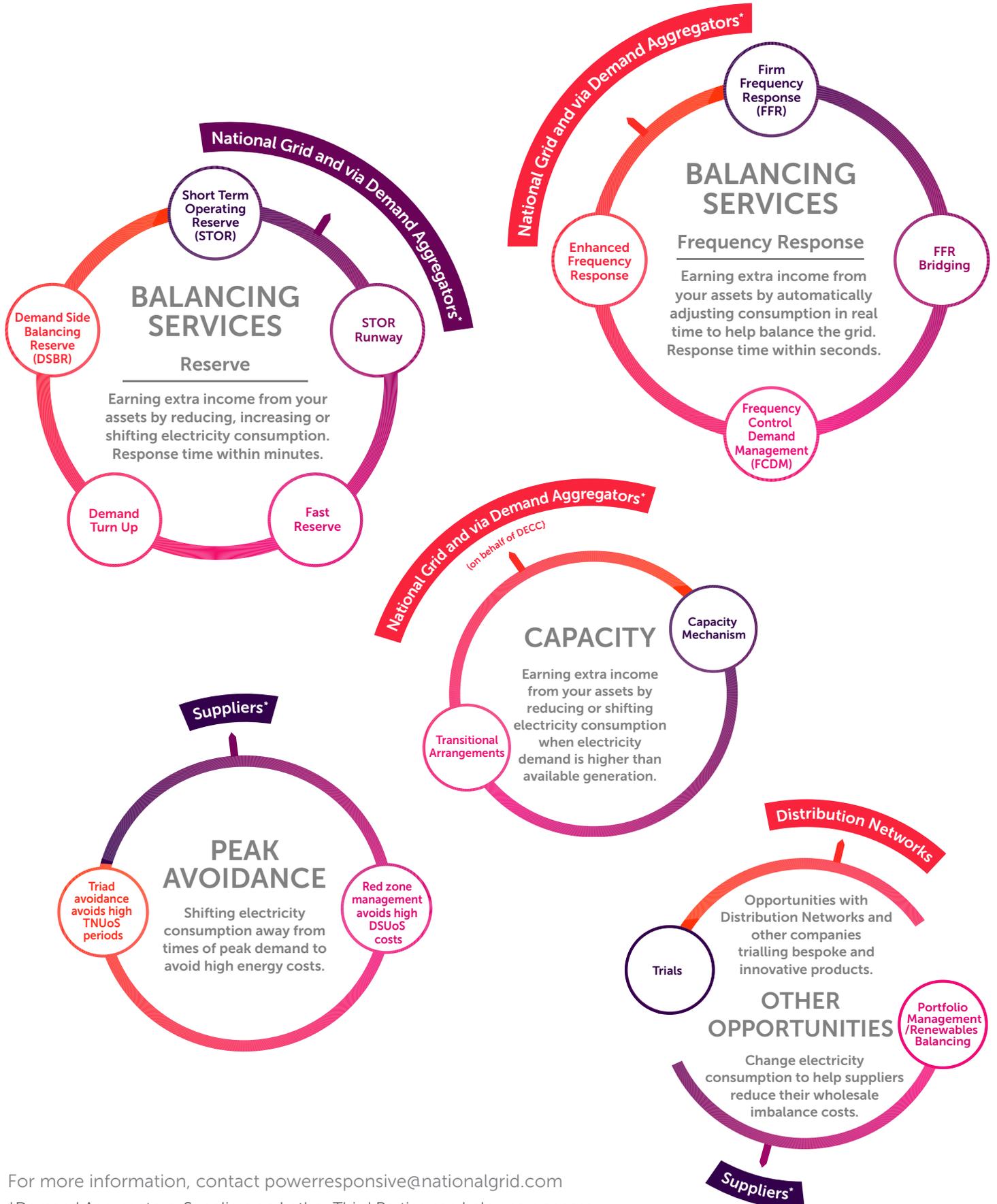
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- Hope Construction Materials
- Iggesund Paperboard
- Imperial College London
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- YPO

Appendix

DEMAND SIDE OPPORTUNITIES

Opportunities for large electricity users by category and procurer



For more information, contact powerresponsive@nationalgrid.com

*Demand Aggregators, Suppliers and other Third Parties can help users access these opportunities and identify combinations that work best for them.

Demand Side Opportunities: Product Glossary

Balancing Services: Frequency Response

- **Firm Frequency Response (FFR)** – A monthly electronically tendered service through which National Grid procures energy that can respond within 30 seconds.
- **FFR Bridging** – A bilateral agreement that allows businesses to build up volume over a one or two year period to transition in to the FFR tender.
- **Frequency Control by Demand Management (FCDM)** – A bilateral agreement for businesses to interrupt electricity supply within 2 seconds for 30 minute duration.
- **Enhanced Frequency Response** – A new, faster frequency response product, which requires businesses to provide full response in less than a second.

Balancing Services: Reserve

- **Short Term Operating Reserve (STOR)** – An important source of reserve energy for National Grid. Procured via 3 tenders throughout each year, a response time of up to 20 minutes is required.
- **STOR Runway** – An alternative route in to the STOR market, via a growth contract; designed to help businesses get off the ground in demand side services.
- **Fast Reserve** – A monthly tendered market designed to procure large blocks of reserve energy of 50MW to respond within 2 minutes.
- **Demand Turn Up** – A service currently being developed which will pay businesses to increase demand when there's too much energy in the system, typically responding within 10 minutes.
- **Demand Side Balancing Reserve (DSBR)** – A time-limited tendered product aimed at major energy users willing to reduce their electricity use between 4pm and 8pm on winter weekdays in return for payment.

Capacity

- **Capacity Mechanism** – The capacity mechanism is a catch-all term for the auctions for the Capacity Market that National Grid runs to guarantee capacity for any given year. The Capacity Market is one of the main building blocks in the UK Government's Electricity Market Reform (EMR) programme.
- **Transitional Arrangements** – auctions that are in place to help demand side providers enter the Capacity Market; working in exactly the same way as the main Capacity Market auction, but for a much shorter term.

Peak Avoidance

- **Triad Avoidance** – Reducing consumption at periods where peak winter national demand is forecast, in order to proportionally reduce TNUoS (Transmission Network Use of System) charge.
- **Red Zone Management** – Shifting consumption to avoid periods of highest distribution network cost (DUoS; Distribution Use of System), often referred to as "red-zones".

Other Opportunities

- **Trials** – Distribution Network Operators are running bespoke local trials for demand response which offer opportunities for business users to get involved.
- **Portfolio Management/Renewables Balancing** – Some Suppliers offer revenue opportunities for businesses via services to aid balancing of their portfolio.