MAKING SENSE OF MARKET TRENDS
– an ELEXON perspective

Getting the most from distributed energy resources

The energy system is undergoing an unprecedented transformation as a result of new technology and priorities, resulting in a different perspective on the function that energy serves, how it should be produced and how it should be delivered.

Policy is driving great changes, in particular at the local level with: subsidies driving increasing distributed generation; the encouragement of greater electrification of transport and heat creating opportunities for distributed storage; as well as the prospective rollout of Smart Meters capable of providing half-hour interval data, which helps open the door to time of use tariffs and greater demand-side response.

All of these changes result in increasing amounts of distributed resources in the electricity system that can be used to deliver great value to consumers. However, to achieve this will require changes in the way that the system is operated and in the market framework so that this value can be effectively exploited, whether on a commercial basis or by consumers and communities themselves.

While there has been much attention on the development of new smarter system approaches in Great Britain from a technology and network perspective, less attention has been paid to how the market operates to optimise the use of distributed resources so that providers of these resources are rewarded for the benefits they create.

This development will need to involve a variety of parties, with energy industry incumbents, such as suppliers and network operators, working with new entrants to the industry as well as communities and consumers themselves. This will include opportunities for communities to take greater control and ownership of their local generation and energy use for the collective benefits of residents and businesses.

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The market can be a key enabler sitting at the centre of this change by breaking down barriers that prevent value being exploited and realised, as well as providing tools and mechanisms that enable change. There may be business models that could take advantage of distributed resources, but which are hindered due to the centralised nature of the market. A focus on this, alongside the ongoing development of technology, will be the key to the long-term and sustainable development of smarter energy.

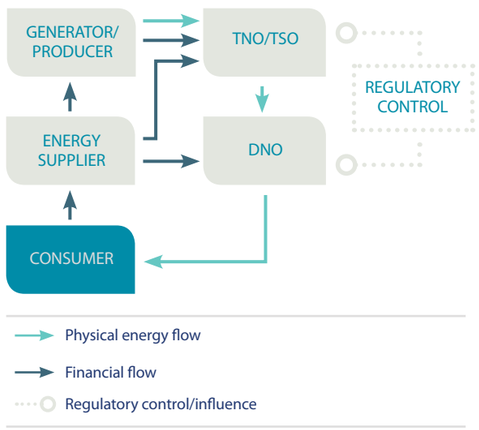
Here we explore the potential value from distributed energy resources and what the implications for the electricity market might be to enable this system evolution.

Understanding the value from distributed energy resources

The current market approach

Currently value in the GB electricity market flows top down through the wholesale and retail markets. Primarily large-scale generation connects into the transmission network and sells to Suppliers via the wholesale market through unrestricted and competitive bilateral contract trading. In parallel, payments for the use of the physical network infrastructure and its operation are made through regulated network, connection and system operation charges.

The current energy value chain



This framework has developed to suit a centralised system with large centrally held generation assets producing electricity that is delivered to distributed consumers. However, with the increasing prevalence of distributed resources such as distributed generation (eg PV, CHP and small-scale wind), an increasing ability to control and influence demand, as well as future storage opportunities, the system is becoming more decentralised.

As a result, there are new efficiency opportunities that are driven by bottom-up activities. Generation no longer has to feed into the system centrally but can operate at a local level, while local demand and storage can act as a resource for utilising generation, especially intermittent generation, when it is most available and therefore at its lowest cost.

Accordingly, the market framework may need to adapt to be able to reward these activities. A more decentralised system will require a more decentralised approach to the energy market and its associated commercial arrangements to optimally operate it and exploit its potential.

Potential value from distributed energy resources

To extract the potential value from new solutions in the energy system, new business models will need to develop which will involve new operational roles and responsibilities.

The distributed value framework shows the potential value propositions that could be unlocked through a more decentralised market approach. Fundamentally, there are two main activities linked to distributed resources that can drive market efficiency. These activities lie at the heart of smart energy development and enable a number of services that create both system and commercial/customer value through increasing the efficiency of the system.

1. Aggregation and control of distributed resources

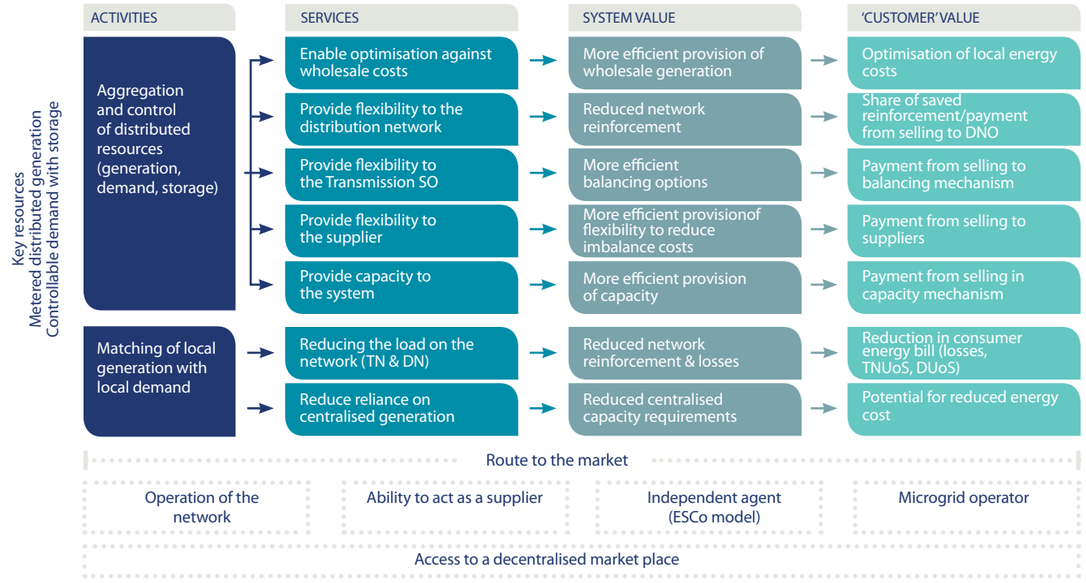
By aggregating and controlling distributed resources it is possible to optimise their interaction with the wholesale electricity market to demand from the central system when prices are cheaper and export when prices are higher.

2. Matching of local generation with local demand.

By also matching local generation and local demand, the overall reliance on centrally provided generation can be reduced allowing local communities to take control of their own use and potentially reduce their cost of electricity. In addition, this should reduce losses and potentially justify a reduction in the network charges that consumers pay.

There are also a range of services that are of use to different parties in the energy system by providing energy to the central system at specific times of need, reducing demand for energy at times of stress, and modulating to suit the requirements of the network.

The distributed value framework



These rely on core principles of providing either flexibility or capacity to the system:

- To Distributed Network Operators (DNOs), so that demand for electricity can be adjusted in response to network constraints and to reduce stress on the network. This should result in reduced requirements to reinforce the network and associated investment savings.
- To the Transmission System Operator (TSO), by offering balancing and ancillary services to assist in system operation.
- To Suppliers, by offering the flexibility to refine imbalance positions and therefore minimise potential imbalance costs.
- By guaranteeing capacity (either through provision of generation or by reducing demand) to the administrator of any future capacity mechanism.

The opportunity from accessing this value could be very significant and is only likely to increase in the future as these resources grow and become more accessible in the future. In parallel, the need to operate an increasingly complex system with intermittent generation and new loads will result in a greater demand for the services that distributed energy resources can offer. Therefore, these resources can play an important role in limiting rising prices in the future. Modelling based on the Wadebridge Renewable Energy Network (WREN) suggests that there is the potential to save up to £45 per year on each household's electricity bill purely by optimising the use of existing local generation to avoid high wholesale prices. However, this would only be possible if enabled by the market framework and with innovative new commercial arrangements in place.

What needs to change?

Capturing this value requires a route to market. The current market framework means that networks and suppliers are best placed to realise efficiency gains from the use of distributed resources, while their traditional roles can also take on different forms to allow for new entrants who may be better placed to focus on exploiting this value. New models such as third-party Energy Service Companies (ESCo) focused on aggregation, or the combining of functions in the operation of a Microgrid, also offer alternative approaches.

However, while these routes into the market enable the provision of different services, and therefore the ability to exploit different sources of value, each has different disadvantages and barriers associated with them. This is because they all operate within a centralised market framework which is fundamentally not designed to deal with the distributed resources they are looking to exploit. Therefore, while they are examples of a more decentralised system, they do not necessarily represent an efficient and tailored decentralised market.

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Enabling consumers to use energy in the lowest price period should be the starting point for energy system cost optimisation. This is achieved through utilising local generation or from shifting demand to times when wholesale market prices are lower. While there has been a top-down "push" of Government and regulatory support for networks to develop innovative approaches to increasing efficiency, the key factor that will drive fundamental change in the industry is the ability to capture commercial value through delivering benefits
to customers.

This requires cost reflectivity and a commercial framework that allows the operators of distributed resources, including consumers and communities themselves, to be able to capture the value they create. Therefore market arrangements should be tested alongside technology and consumer engagement through trials that test alternative commercial approaches to the exploitation of distributed resources. As part of this, communities should be empowered and assisted to lead their own distributed energy projects. Greater guidance that could help provide direction and advice would be of great benefit to communities that are passionate about local benefits from energy self-sufficiency but find the issue complex and confusing.

To enable cost reflectivity, so that distributed actions taken can be properly rewarded, a key factor will be the development of Settlement on the basis of actual time of electricity use for residential and small non-domestic customers (profile classes 1-4). Currently, these customers are settled on the basis of assumed daily profiles, which means that they cannot be rewarded through their energy bill for demand-side actions that they may take (such as reducing demand at peak times). The roll-out of Smart Meters will provide access to half-hourly data on customers' electricity use and therefore the opportunity to also settle on a half-hourly basis. This would act as a major enabler for the effective exploitation of distributed resources. Furthermore, derogations from the Distributed Connection and Use of System Agreement (DCUSA) should be allowed for suppliers and communities that wish to experiment with half-hourly metering, so that they are not penalised through higher DUoS charges.

Optimisation of value from distributed resources may require greater decentralisation of the market itself where market processes are disaggregated more to the local level. This could lead to the local trading of electricity at a local price to enable the optimisation of local generation against local demand and the competitive buying
of services.

Through developing an open platform for the free trading of distributed resources at a local level, more decentralised markets could allow for new arrangements between existing and new parties in the energy system, creating the basis for progressive approaches to innovation to maximise benefits. This could enable the development of genuinely sustainable smarter systems driven by bottom-up commercial imperatives, competitive innovation and community leadership. The opportunities exist to significantly reduce the increase in future customer bills and to reward innovative companies that can save customers money. ELEXON is keen to work with current and prospective BSC Parties to evolve the market, in particular through the support of trials involving half hourly settlement and localised settlement concepts.

We are keen to get your views on this
and other topics related to smarter systems.

Please contact ELEXON at market.operations@elexon.co.uk.