

Flexibility on demand



Giving customers control to
secure our electricity system



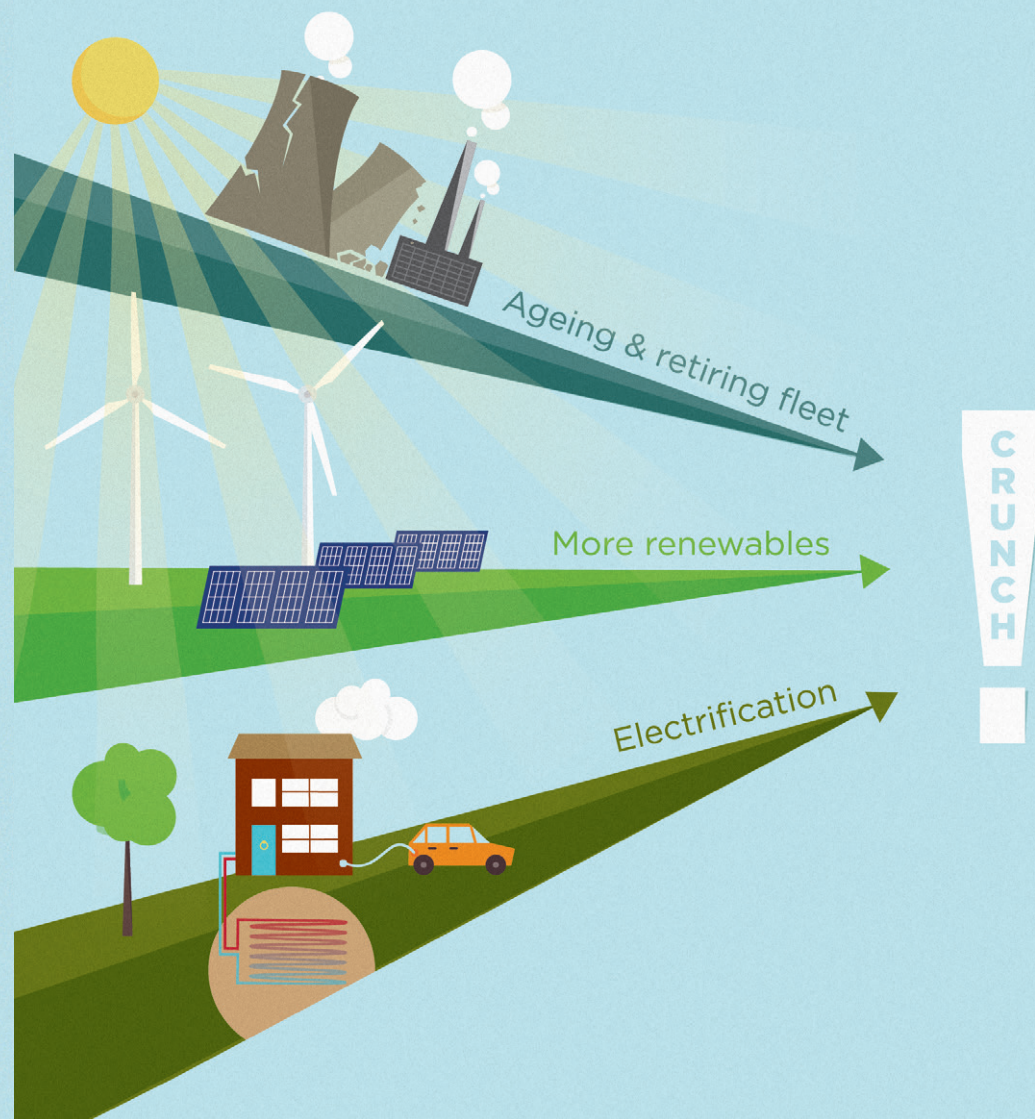
The changing energy system and role of business energy users

The way energy is generated and used in the UK is changing. By 2020 more than 30% of UK electricity demand is expected to be met by renewable generation; as intermittent solar and wind generation increases, control over generation decreases.

Coupled with the end of coal by 2025, an ageing nuclear fleet and a predicted increase in peak demand due to the electrification of heat and transport, balancing the grid will be much more difficult beyond 2030 without demand side flexibility.

Demand side response (DSR) can help balance this intermittency, both by helping to balance the system every half hour, as well as by helping to meet our capacity needs during periods of peak demand.

Based on these twin demands of balancing and capacity requirements, we estimate the UK will need between 4.5 GW and 8.5 GW of DSR in 2020 – the equivalent of nearly six large power stations.

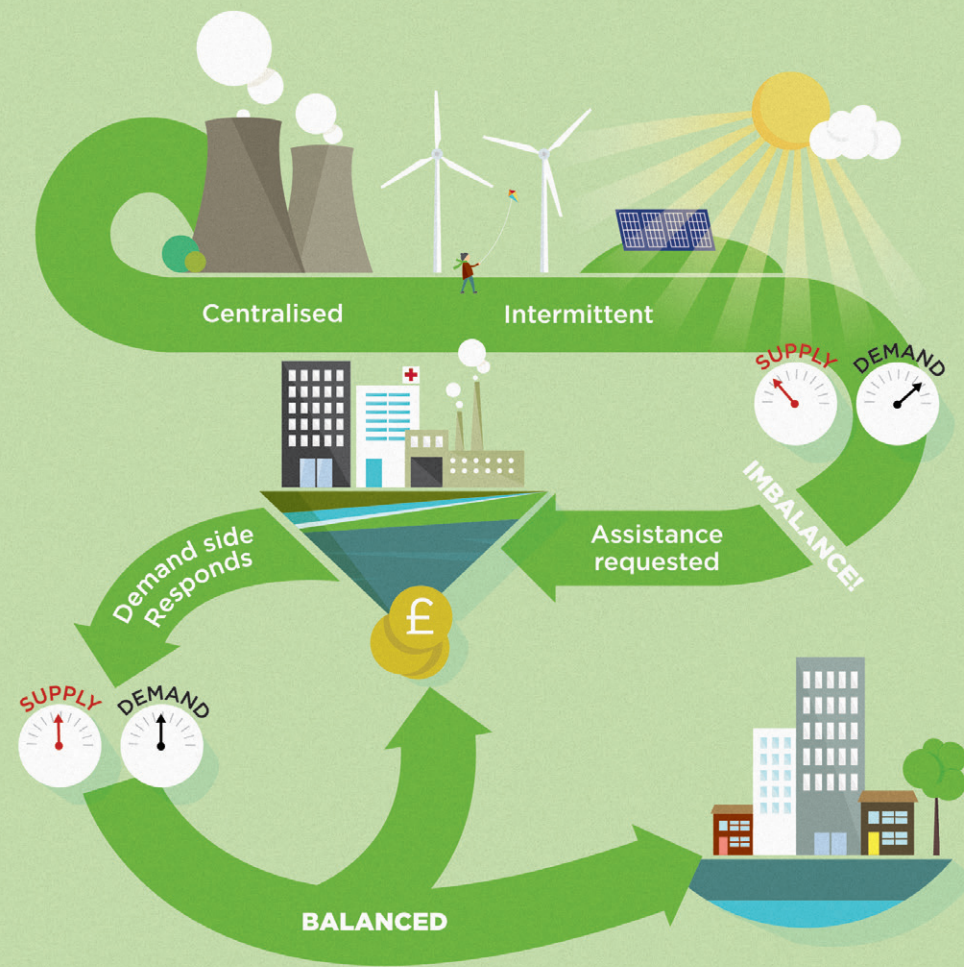


How does demand side response work?

In an electricity system, the production of power (supply) must always exactly match the usage (demand). As demand varies through the day and across the seasons, the system operator must be able to maintain the perfect balance of supply and demand. Demand-side response helps to match supply with demand when unpredicted fluctuations occur, and to shift demand to different times, including reducing peak demand.

Demand-side response depends entirely on engagement with an energy user, from industrial manufacturers to leisure centres and retail stores. These businesses become active participants in the energy system, rather than passive bill payers.

By operating flexibly, businesses can help to smooth out peaks in the system, better balance electricity supply with demand, lower generation losses, and reduce the need for additional powerline infrastructure investment.



Many commercial, industrial and public sector energy users are well placed to help balance the grid through on site generation or by reducing or shifting their demand. Businesses can be paid to change their electricity demand in three ways:

- **Temporarily reducing** the use of electricity consuming devices, such as turning off refrigeration units for a period of time, using the fridge's insulation to maintain low temperatures.
- **Changing when** they use electricity, such as a quarry pausing its rock crushing unit if it has sufficient, stored rock supply available.
- **Turning on or increasing** production from onsite generation, such as highly efficient combined heat and power (CHP), or by using energy storage technologies.

Providing these services helps energy users reduce their energy costs and improve their competitiveness, all while contributing to our national security of supply.



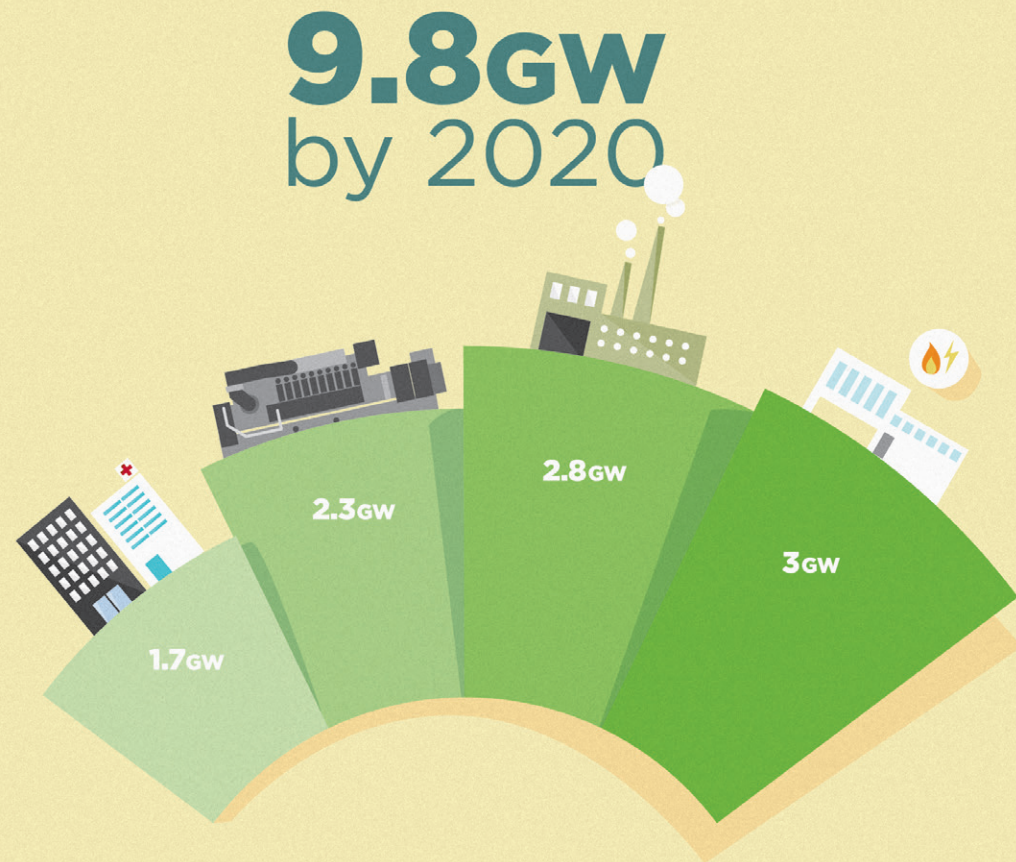
Demand response today and tomorrow

There was approximately 700 MW of DSR in Balancing Services and nearly 500 MW in the Capacity Market in 2015. However, these numbers could rise more than eight-fold by 2020.

Our analysis shows DSR could meet up to 16% of peak demand (9.8 GW) by then, accessing the flexibility in the industrial, commercial and public sectors, including highly efficient combined heat and power (CHP) assets and on-site back up generation.

- **2.8 GW** from industrial demand flexibility (24% of industrial peak demand)
- **1.7 GW** from commercial and public sector demand flexibility (10% of non-domestic sector peak demand)
- **2.3 GW** in flexibility available from CHP (48% of existing business-led CHP capacity)
- **3 GW** in on-site back up generation capacity

The size of DSR will likely grow further beyond 2020 as the electrification of heat and transport intensifies and industrial, commercial and householder participation increases.



Benefits of demand side response to the system

- **Lower cost security of supply:** With 4 GW of user-led DSR in the Capacity Market, the UK would avoid building 50 new OCGT power plants or over 1,300 new small diesel engines, a net saving for consumers of £600 million by 2020 and £2.3 billion by 2035.
- **Controlling system balancing costs:** A further 4.5 GW of the the UK's DSR potential could help increase competition for balancing services, controlling costs of balancing the system for consumers.
- **Improving businesses' competitiveness and profitability:** By gaining additional revenues from the electricity market through DSR, businesses in the industrial, commercial, and public sectors are able to reduce their energy costs, improving competitiveness and their bottom line. Businesses have already earned more than £100m by providing Capacity Market services since 2014.



- **Reduced energy bills by cutting network costs:** Work by Imperial College London and the University of Cambridge Energy Policy Research Group found that DSR, as part of a flexible system, could deliver network investment savings of up to £8.1 billion a year by 2030.
- **Reducing emissions:** By using zero-carbon ‘turn down’ flexibility and by employing more local, efficient generation, DSR is able to displace existing and avoid new fossil fuel generation that would otherwise only run for limited periods, reducing emissions and helping the UK meet its carbon targets.
- **A more competitive energy market:** Energy users who provide DSR deliver substantial benefit to the system by diversifying the sources of supply. This increases market competition and, in the US, it has helped deliver lower retail prices for consumers.



How to deliver the 2020 demand side response opportunity

To unlock DSR potential in the UK, DSR must be able to secure fair value in three different energy markets.

Independent access and participation in the Wholesale Market and Balancing Mechanism

Problem: DSR providers are not able to access the Wholesale Market or Balancing Mechanism without going through the customer's licenced supplier.

Potential value: The highest price in the Balancing Market in 2016 was £225/MWh, and a period in 2015 had prices as high as £2,500 per MWh.

Actions needed: Allow DSR participants to access the Wholesale and Balancing Market independent from a licensed supplier.

Fair treatment in the Capacity Market

Problem: The Capacity Market was principally designed for large, centralised generators, and this has limited the ability of DSR providers and distributed generation to participate.

Potential value: £15/kW to £62/kW.

Actions needed:

1. Fairness in contract lengths;
2. Minimum year-ahead procurement amount;
3. Simplified and accessible rules, including component reallocation and simplified testing and metering.

Simplified, user-friendly Balancing Services

Problem: Energy users find Balancing Service schemes very complex to navigate, creating obstacles to DSR participation; Balancing Services do not always equally value DSR services.

Potential value: Commercial frequency response generates an estimate of £30k per MW of capacity per year.

Actions Needed:

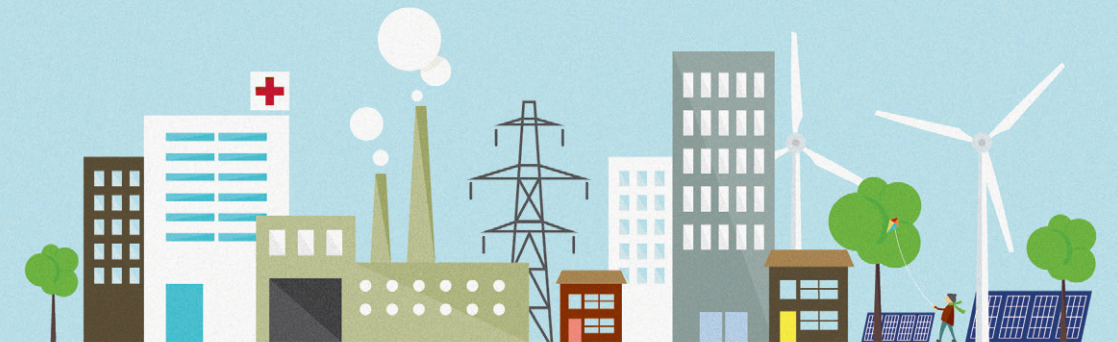
1. Reform Balancing Services to make them simpler, more user-led and more focussed on delivering best value, whether supply or demand;
2. A larger role for Distribution System Operators and local balancing services.

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