Unlocking flexibility to reach net zero

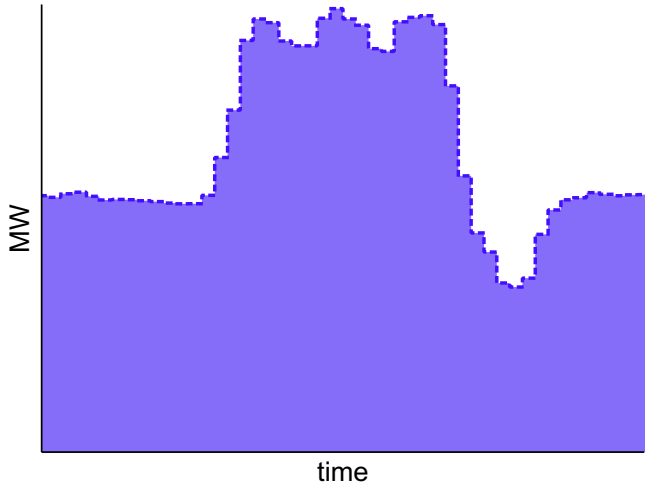
All-Party Parliamentary Group for Energy Studies

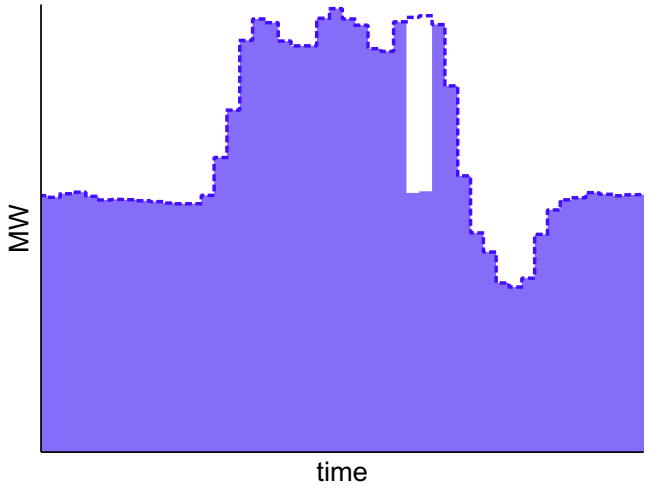
12 May 2020

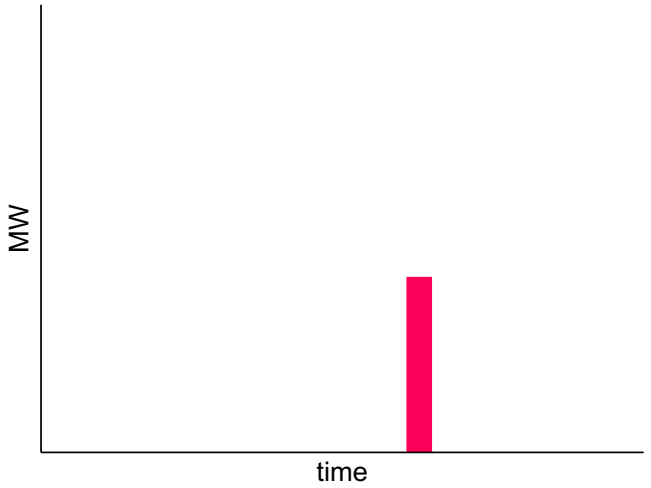
Demand-side flexibility

Reducing **demand** is equivalent to increasing **generation**

This shows a customer's electricity demand over the course of a day.







If we can persuade the customer to reduce their demand for a while, leaving this white gap, then that is just as useful in managing the balance of supply and demand …

… as increasing generation by the same amount for the same period.

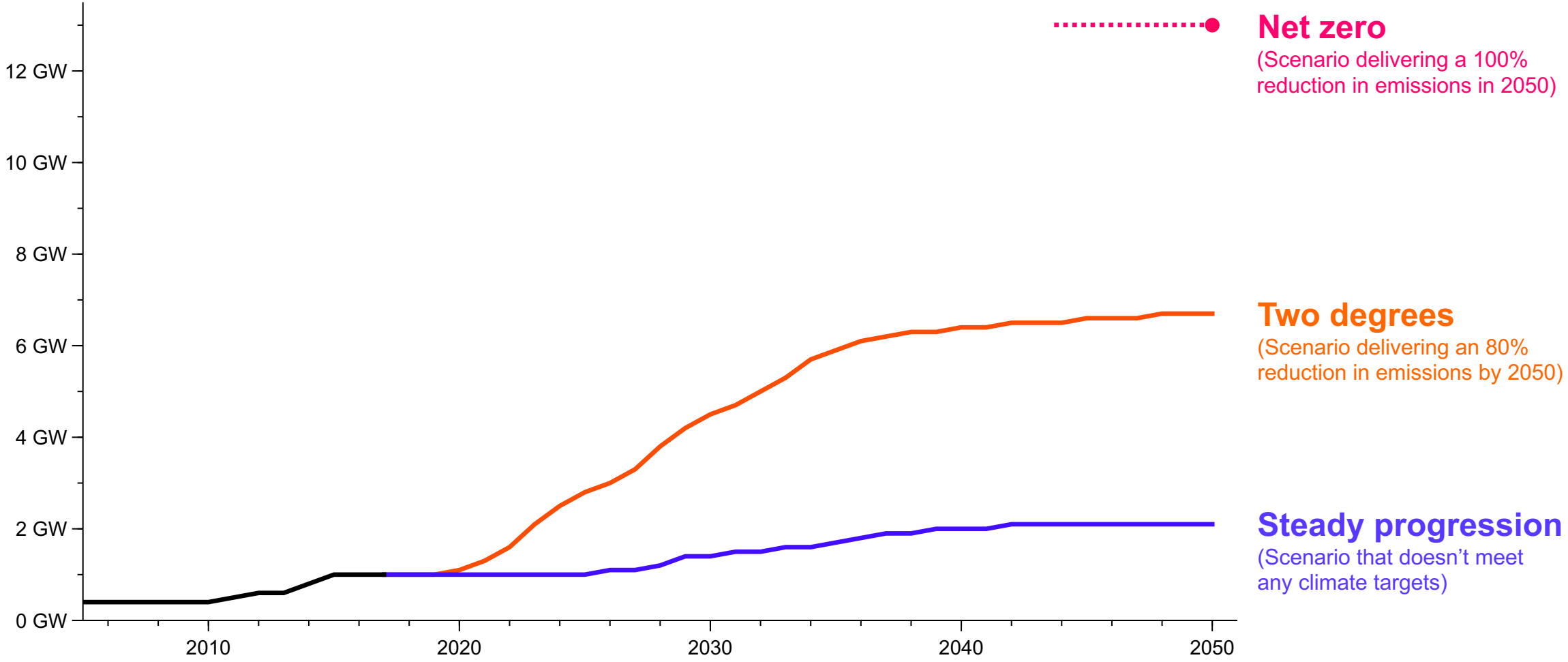
However, it can be a lot more cost effective to use the demand-side resource, as you're making additional use of the customer's existing assets, rather than having to build and maintain an additional dedicated generation asset.

It has always been a "no brainer" to use demand-side flexibility. But as we decarbonise, we will need a lot more flexibility, to manage variability in supply as well as in demand. Doing this without making good use of demand-side flexibility would be ruinously expensive.

How much demand-side flexibility do we need?

National Grid's projections of industrial & commercial DSR capacity

The more you decarbonise, the more demand-side flexibility they expect to need: 13x more than now for the net zero scenario.



Net zero
(Scenario delivering a 100% reduction in emissions in 2050)

Two degrees
(Scenario delivering an 80% reduction in emissions by 2050)

Steady progression
(Scenario that doesn't meet any climate targets)

From National Grid Future Energy Scenarios 2019, Figure 4.11 & p.155.

Cement manufacturer – UK

Capacity market and ancillary services participation

Load reduction of 14-17 MW

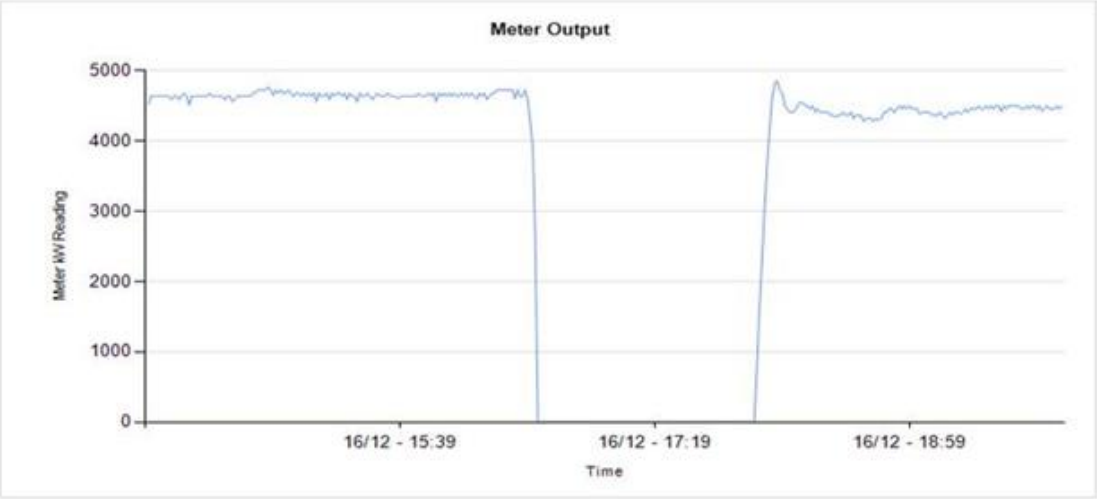
Sustainable for over 5 hours

Energy reduction plan:

- Strategy includes stopping raw mills and cement mills for 1 to 2 hours at a time
- Shut downs are staggered to ensure production throughput is maintained for some of the plant

Industrial gases – Ireland

Load reduction at a nitrogen production plant



Date & Time	Power (kW)
20/01/2017 13:48:27	0

Load reduction of ~5 MW

Sustainable duration depends on economics

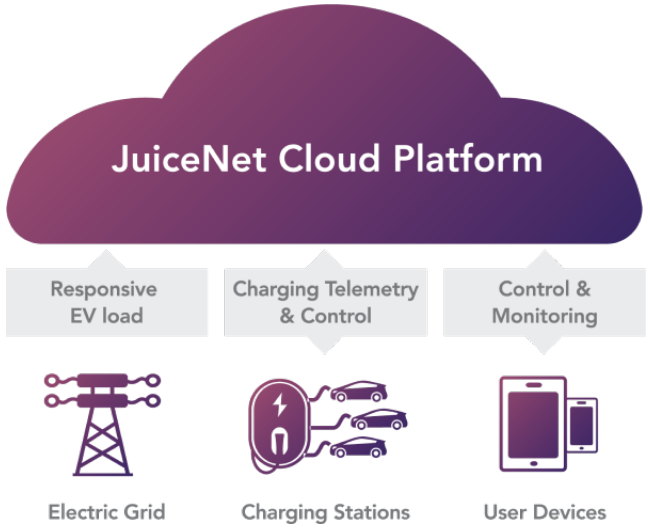
Energy reduction plan:

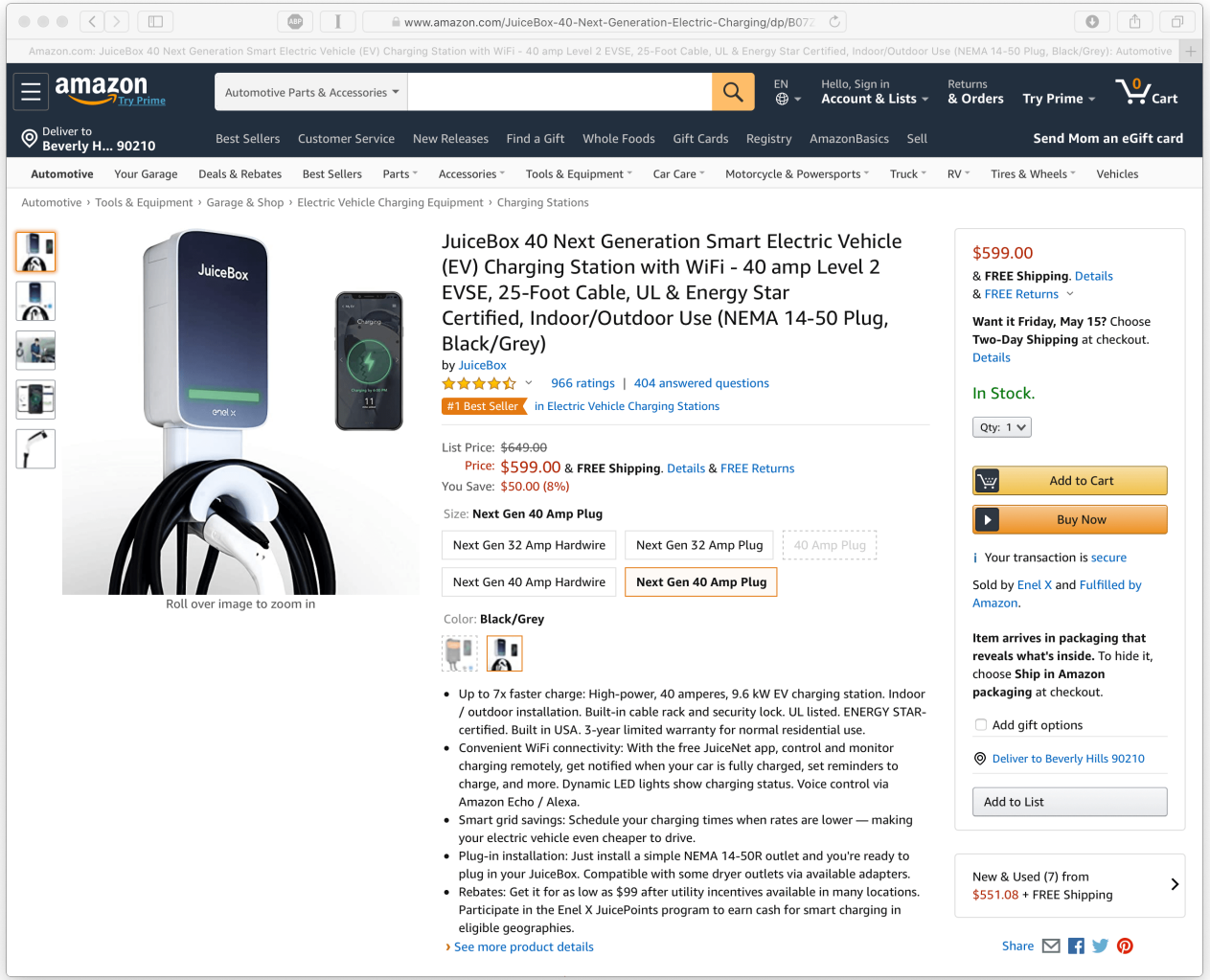
- Full shut down of air separation units and associated pumps

30 MW / 70 MWh “virtual battery”

Offered in Californian wholesale markets since late 2017

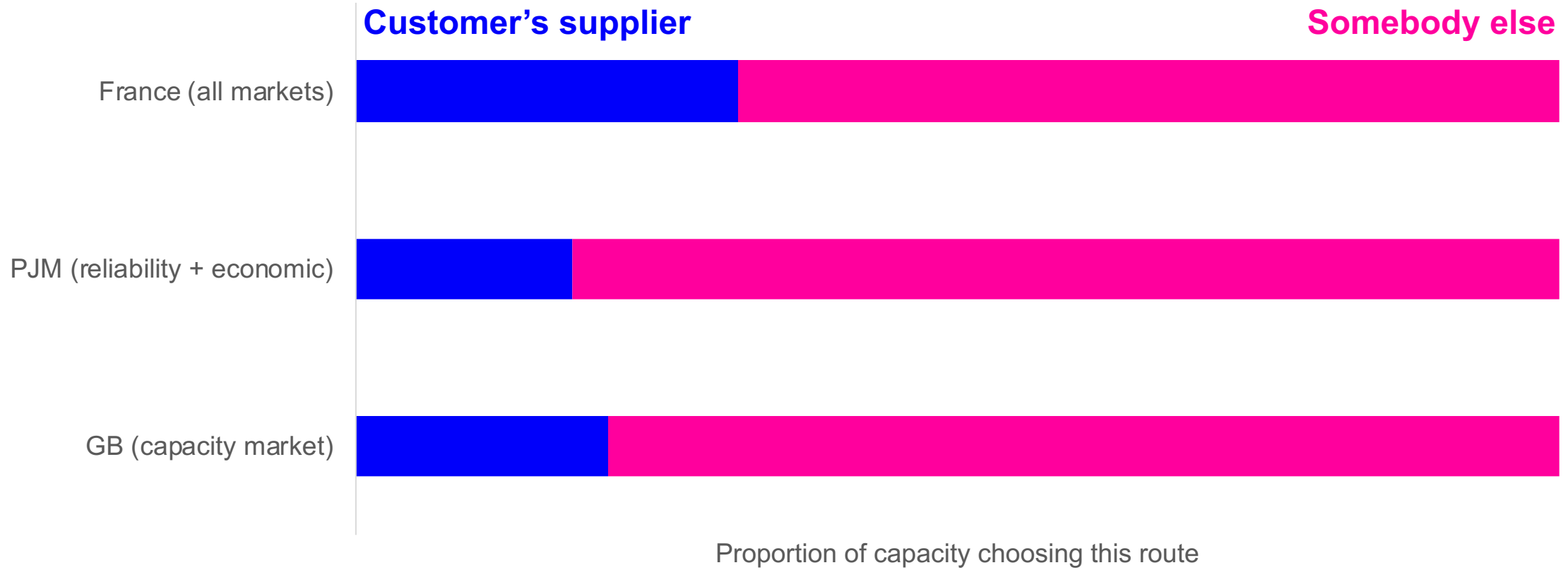
Actually consists of
~6,000 smart EV chargers





Who offers this demand-side flexibility?

Some customers offer their flexibility through their retail energy supplier. But it is clear from the figures in many markets that this is a minority choice: most of the flexibility is offered independently of the supplier: either by an independent aggregator or (less commonly) directly by the customer.
A possible explanation is that the skill set required to discover and develop flexibility in customers' operations is quite different from that of a retail energy supplier. Specialists do it better.



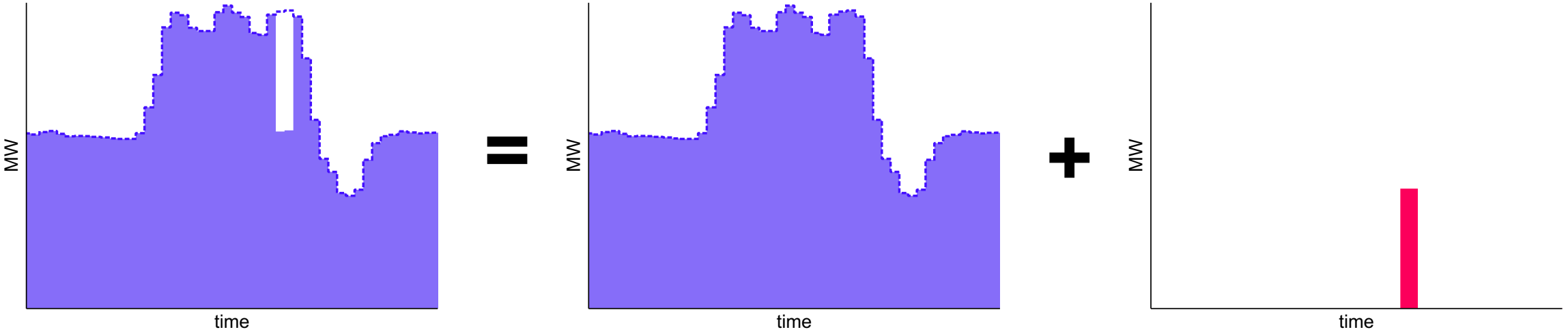
France: Data for winter 2016/17, from CRE, Market design and regulatory framework in France, Oct 2017.
PJM: Average for 2015/16 to 2019/20 delivery years, from PJM, Demand Response Operations Markets Activity Reports.
GB: Shares of DSR CMU capacity agreements awarded in all actions to date, from Enel X analysis of Capacity Market Registers, May 2020.

Flexibility offered independently of the supplier

For this to work, the market needs some mechanism to allow for different parties to be involved with a single customer connection point. Fortunately, this is quite straightforward.

This is what physically happens: the customer reduces their demand for a period, leaving the white gap.

But it can be represented for settlement purposes as two different things happening at the same time



Normal demand
bought from supplier
as usual

Demand reduction
sold as if generation

They add up to the same overall demand, but this split allows two different parties to be involved, doing two quite different things.

Markets for demand-side flexibility

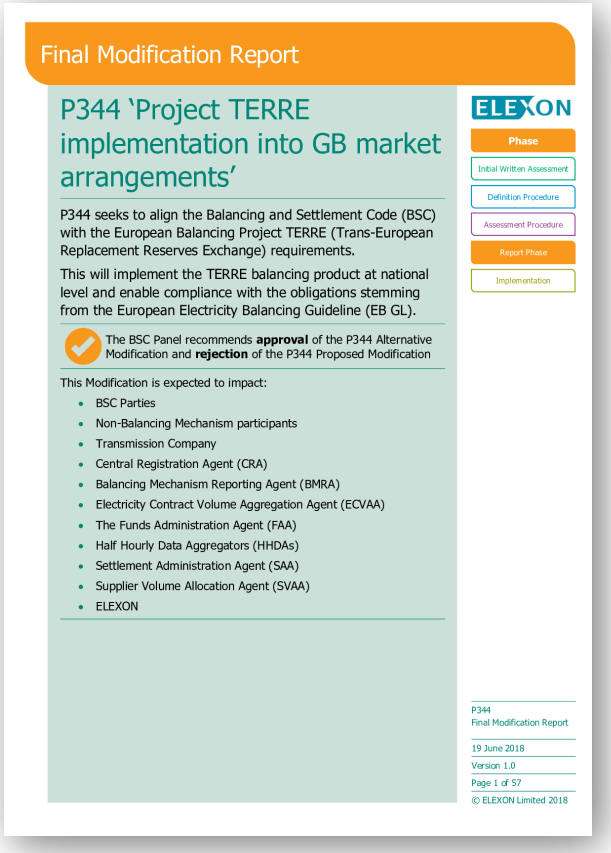
	Capacity market	Ancillary services	Wholesale markets	Balancing mechanism
Traded how far ahead?	Years	Years to days	Years to 1 hour	Less than 1 hour
Who buys from this market?	Government only	National Grid only	Many parties	National Grid only
Open to independent aggregators?	Yes	Yes	Not yet	Yes

The wholesale markets are interesting because they are genuine markets, with multiple buyers and sellers making offers and bids and discovering price between them. They also work over a wide range of timeframes, up to the 1-hour gate closure, and they are where much of the value of additional flexibility that's needed is expected to appear. But they currently lack a mechanism to allow flexibility to be offered independently of supply. A customer can only offer their flexibility in the wholesale markets via their supplier. So there is a lot less demand-side flexibility offered than there could be.

Allowing independent access to wholesale markets

A natural extension of the Virtual Lead Party role introduced in P344

Most of the hard work has already been done through the P344 wider access modification, or is in being done, through other modifications to introduce sub-metering and baseline methodologies. The extra step to apply the same mechanism to the wholesale markets is comparatively simple.



Final Modification Report

P344 'Project TERRE implementation into GB market arrangements'

P344 seeks to align the Balancing and Settlement Code (BSC) with the European Balancing Project TERRE (Trans-European Replacement Reserves Exchange) requirements.

This will implement the TERRE balancing product at national level and enable compliance with the obligations stemming from the European Electricity Balancing Guideline (EB GL).

The BSC Panel recommends **approval** of the P344 Alternative Modification and **rejection** of the P344 Proposed Modification

This Modification is expected to impact:

- BSC Parties
- Non-Balancing Mechanism participants
- Transmission Company
- Central Registration Agent (CRA)
- Balancing Mechanism Reporting Agent (BMRA)
- Electricity Contract Volume Aggregation Agent (ECVAA)
- The Funds Administration Agent (FAA)
- Half Hourly Data Aggregators (HHDAs)
- Settlement Administration Agent (SAA)
- Supplier Volume Allocation Agent (SVAA)
- ELEXON

ELEXON

Phase

Initial Written Assessment

Definition Procedure

Assessment Procedure

Report Phase

Implementation

P344
Final Modification Report

19 June 2018

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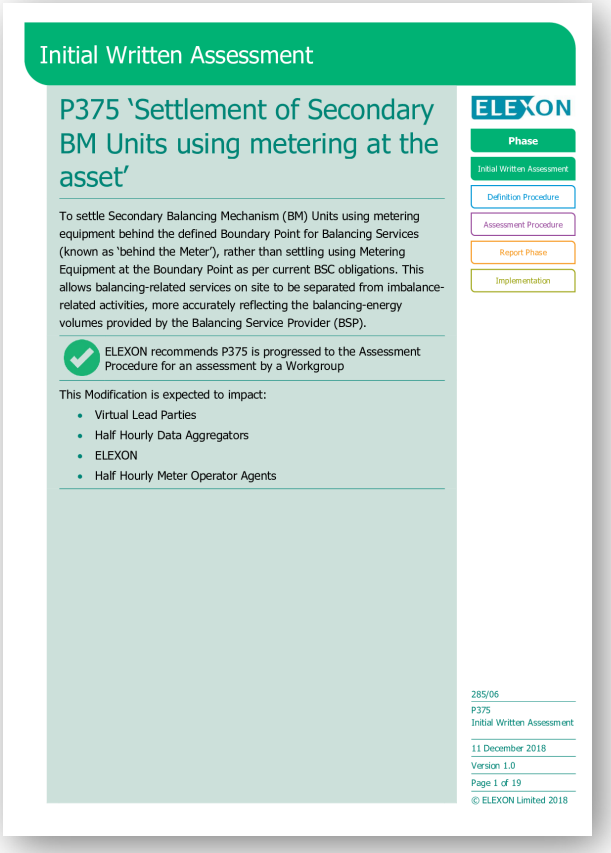

Initial Written Assessment

P375 'Settlement of Secondary BM Units using metering at the asset'

To settle Secondary Balancing Mechanism (BM) Units using metering equipment behind the defined Boundary Point for Balancing Services (known as 'behind the Meter'), rather than settling using Metering Equipment at the Boundary Point as per current BSC obligations. This allows balancing-related services on site to be separated from imbalance-related activities, more accurately reflecting the balancing-energy volumes provided by the Balancing Service Provider (BSP).

ELEXON recommends P375 is progressed to the Assessment Procedure for an assessment by a Workgroup

This Modification is expected to impact:

- Virtual Lead Parties
- Half Hourly Data Aggregators
- ELEXON
- Half Hourly Meter Operator Agents

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Phase

Initial Written Assessment

Definition Procedure

Assessment Procedure

Report Phase

Implementation

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P375
Initial Written Assessment

11 December 2018

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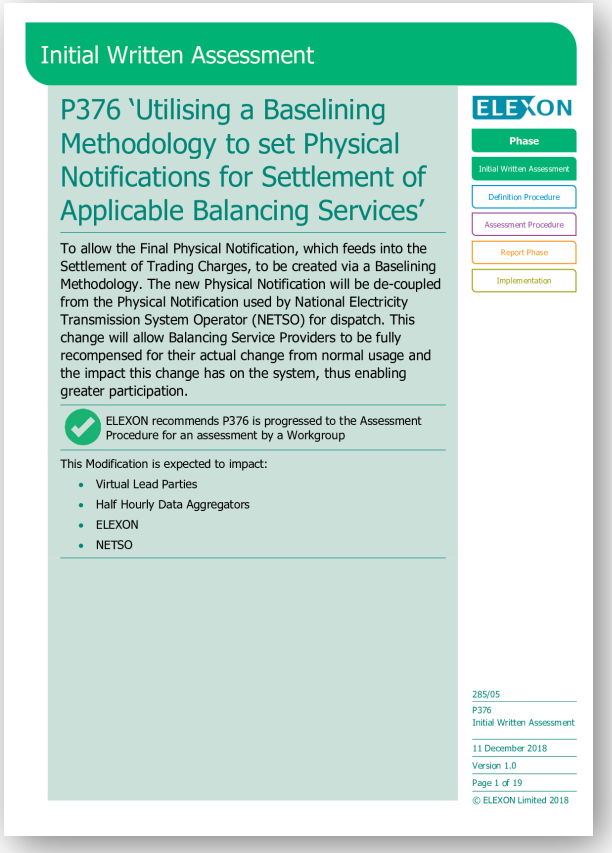

Initial Written Assessment

P376 'Utilising a Baselining Methodology to set Physical Notifications for Settlement of Applicable Balancing Services'

To allow the Final Physical Notification, which feeds into the Settlement of Trading Charges, to be created via a Baselining Methodology. The new Physical Notification will be de-coupled from the Physical Notification used by National Electricity Transmission System Operator (NETSO) for dispatch. This change will allow Balancing Service Providers to be fully recompensed for their actual change from normal usage and the impact this change has on the system, thus enabling greater participation.

ELEXON recommends P376 is progressed to the Assessment Procedure for an assessment by a Workgroup

This Modification is expected to impact:

- Virtual Lead Parties
- Half Hourly Data Aggregators
- ELEXON
- NETSO

ELEXON

Phase

Initial Written Assessment

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Implementation

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P376
Initial Written Assessment

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Thank you

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