Introduction to local flexibility markets

What are flexibility services and how can I get involved?

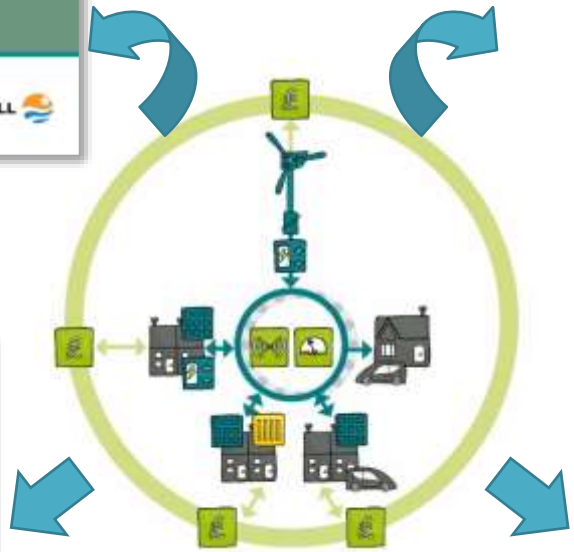
Jodie Giles – Senior Project Manager

regen
transforming energy

Regen's recent work on flexibility

November 2017

May-Aug 2018



regen transforming energy

The development of local flexibility markets in five steps

Feb – May 2018

Open Utility

FLEXIBILITY MARKETS FEASIBILITY STUDY COMPETITION

Department for Business, Energy & Industrial Strategy

CarbonCo–op

regen transforming energy

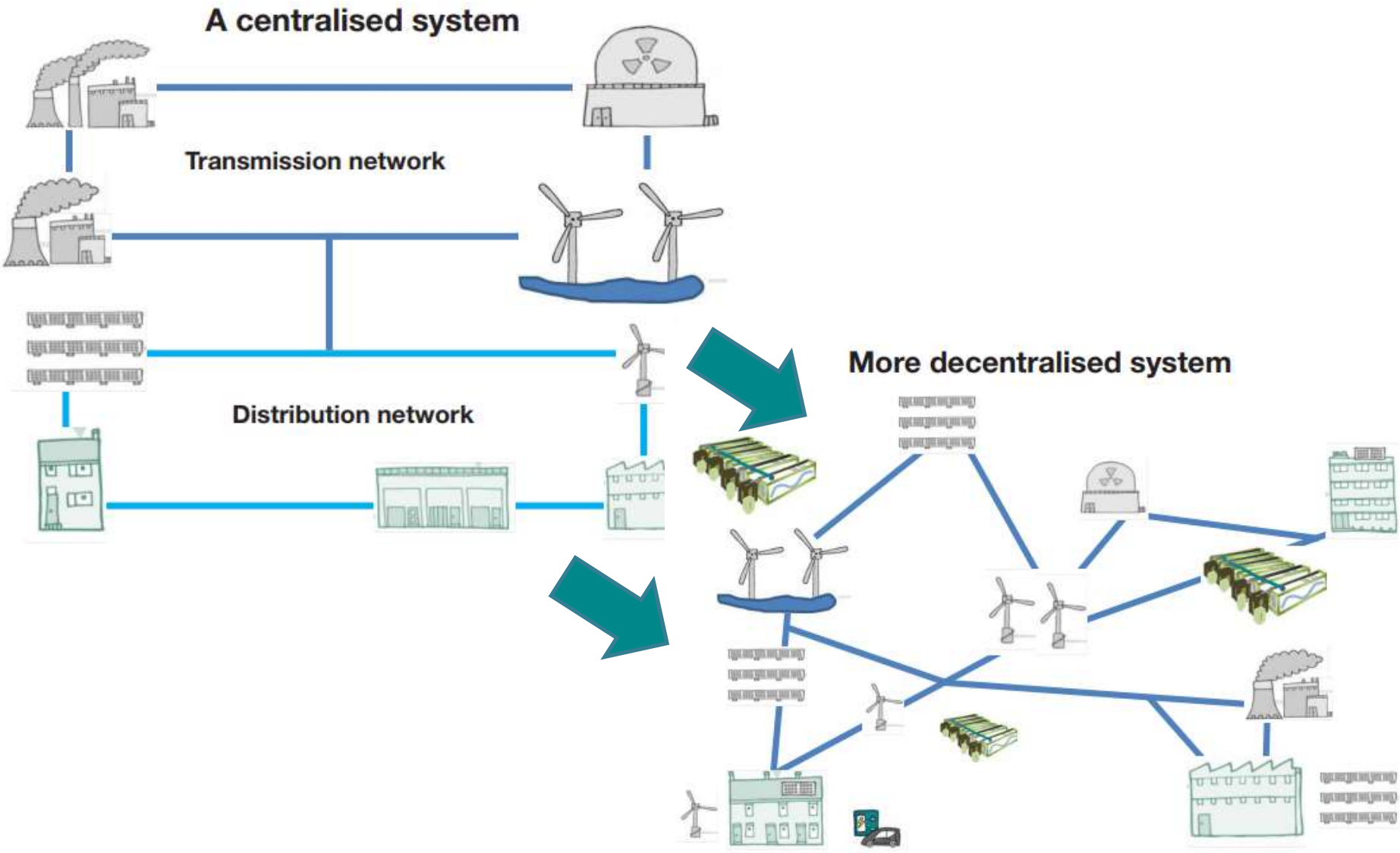
Community Energy Scotland

June-Sept 2018

Topics to cover…

- “Our system is changing” – what does that mean?
- Jodie’s Jargon Buster
- The need for flexibility – national and local
- Out now! DNO calls for Expressions of Interest
- What does this new market mean for you?

Our electricity system is changing…



…but what does that mean in practice?

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Shift change in supply & demand:

15GW of fossil fuel generation has come off the system since 2011

First ever 'coal free' day on 21 April 2017

10GW of wind power has come on to the system since 2009

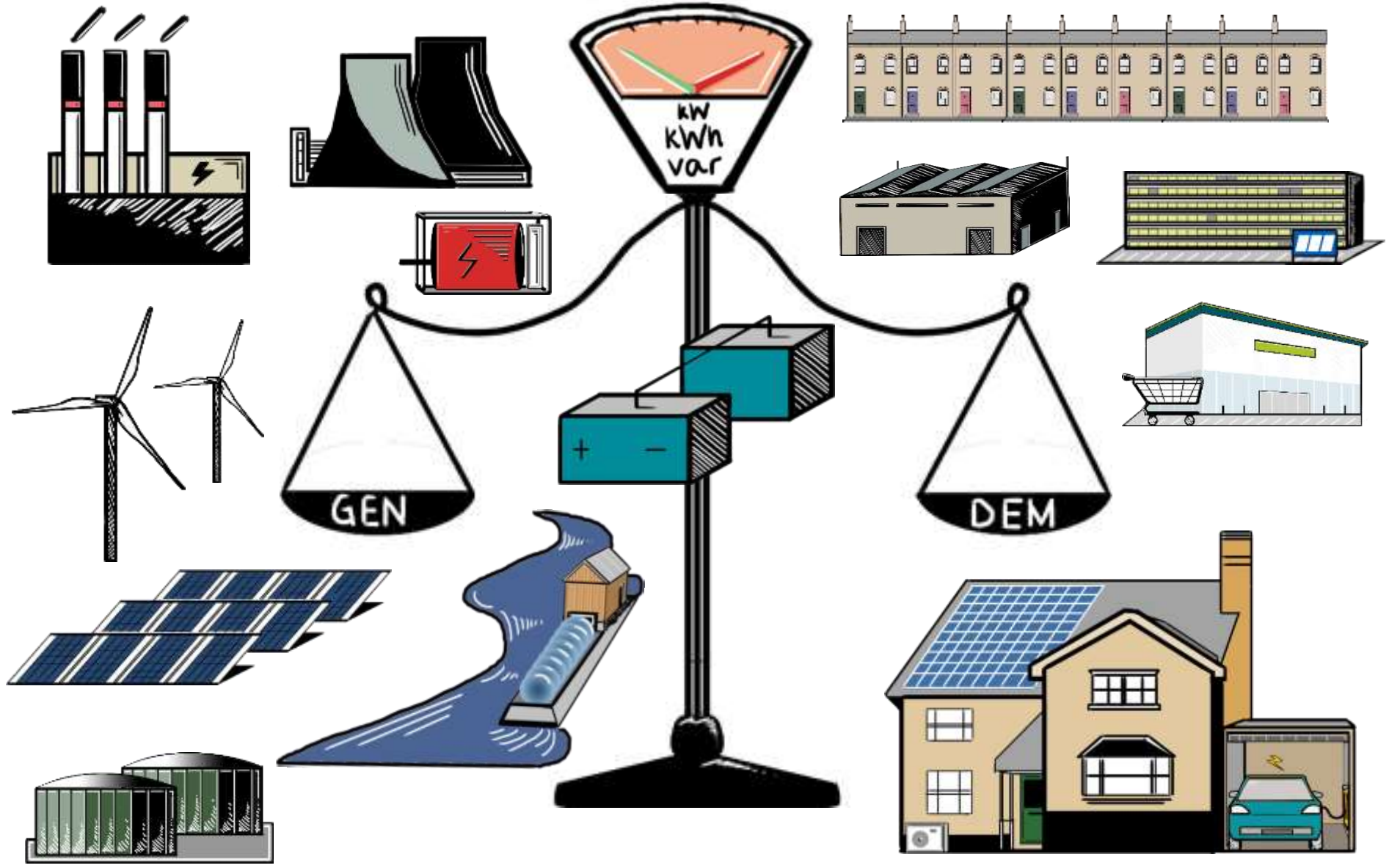
10GW of solar has come on to the system since 2009 (mostly on the distribution network)

Demand for EVs rose by 42% in 2016

"…embedded generation has come to dominate the peak power flows on the distribution networks."

Nigel Turvey, Network Strategy & Innovation Manager, Western Power Distribution
[DSO Strategy Launch Event 14/09/17]

…but what does **THAT** mean?



Jodie's Jargon Buster

SO/TSO/ESO/NETSO: UK System Operator (National Grid), look after the electricity transmission network and system in the UK, working with **DNOs**

DNOs: Distribution Network Operators, the 6 regional companies licenced to distribute electricity within 14 defined licence areas across GB

DSOs: Distribution System Operators, the evolving role of regional DNOs to "*…operate and develop an active distribution system comprising networks, demand, generation and other **DERs***"

DERs: Distributed Energy Resources, assets connected to the distribution network that could be called upon to provide **flexibility services**.

Flexibility services: Modifying generation and/or consumption patterns in reaction to an external signal for a financial reward (**revenue**).

Revenue stacking: Using assets to access multiple incentive programmes, paid for services or contracts – i.e. national balancing & local flex services

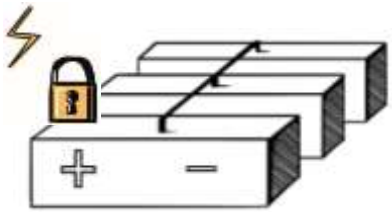
Aggregation: 'Bundling' smaller loads into a portfolio, which can participate in programmes with entry thresholds that are too high (i.e. 1MW)

National balancing services

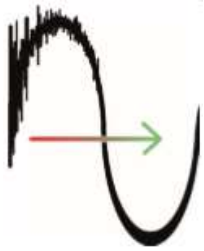
Turning to connected assets to:

- Help with “system operability”

Frequency regulation



Power capacity



Power quality / voltage support

EFR FFR FCDM

STOR Fast Reserve

ERPS DSR

- Help with events & outages

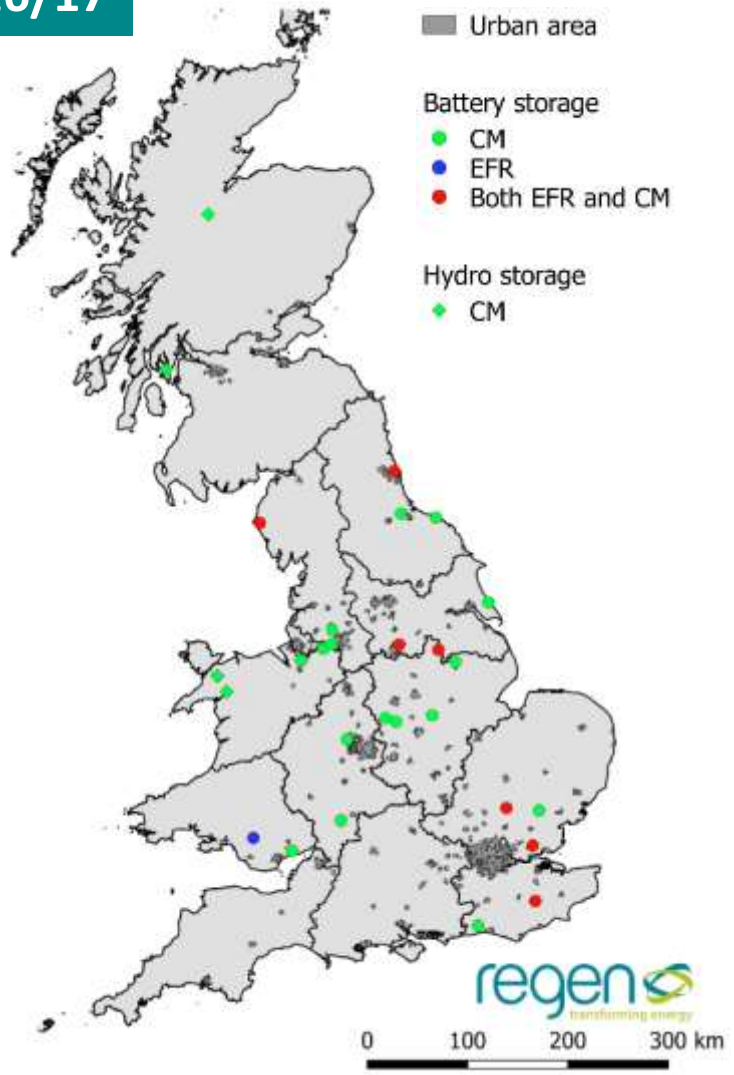
System Restoration (aka Black Start)

Capacity Market (system stress)

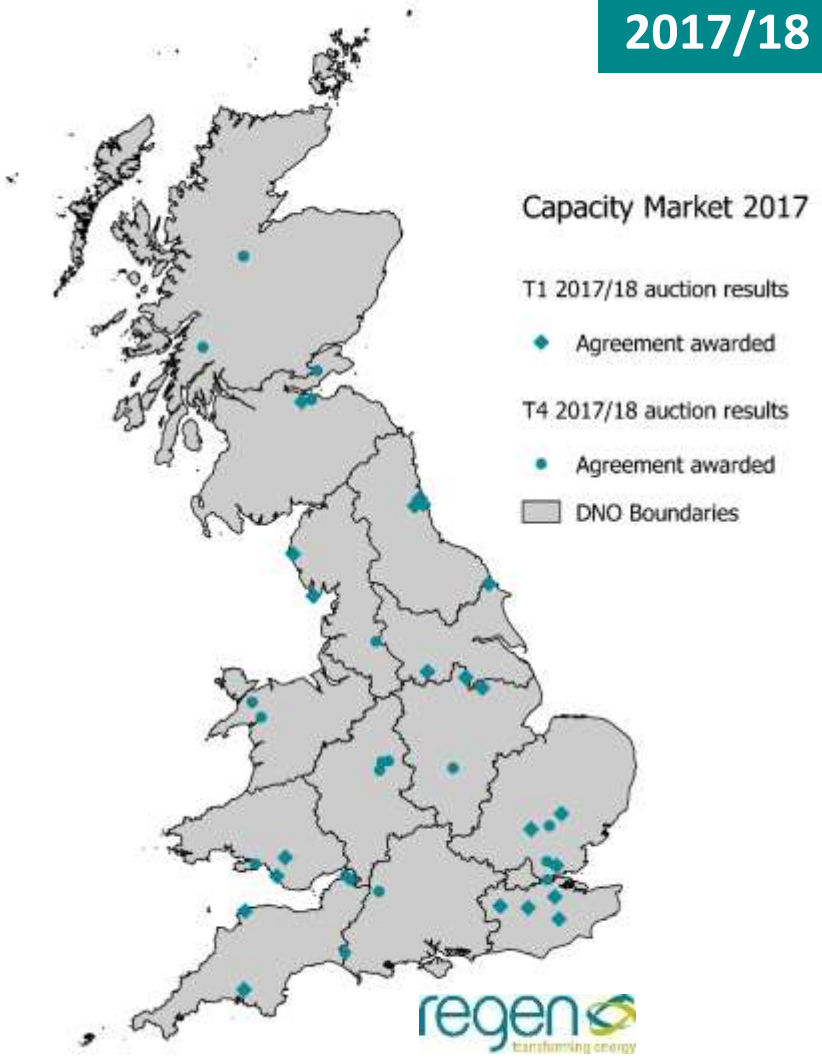
National balancing services

Some 2016-2018 Contracted Sites

2016/17



2017/18



DSOs to facilitate local flex markets

Key themes:

Enabling cheaper, quicker connections

Level playing field for customers and neutral markets

Increase use of Active Network Management

Enable local flexibility services

Enabling factors:

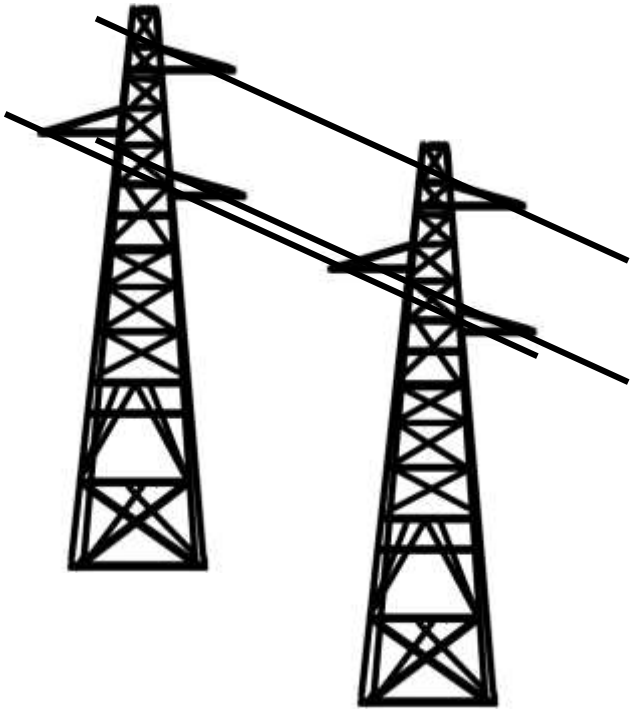
Develop System Operator capabilities

Understand policy changes to enable transition to DSO

Understand commercial arrangements between TSO←→DSO←→DER providers

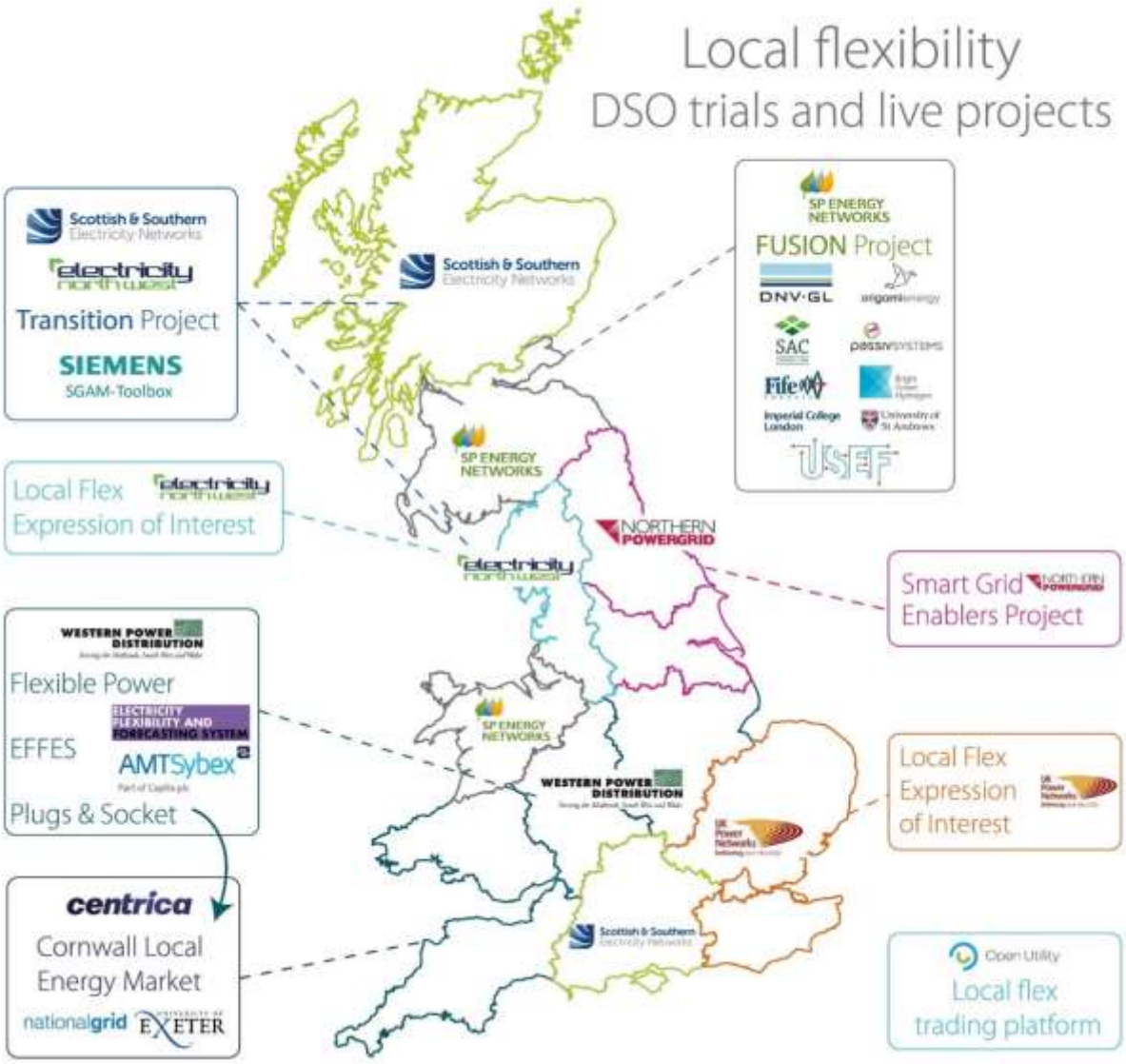
Continue to host trial and innovation projects to secure real world evidence

Local flexibility services



Deferring network upgrades by turning to flexibility instead

Local Flexibility Innovation Trials



Trials and innovation projects around smart networks and flex

↓

Developing market platforms and abilities

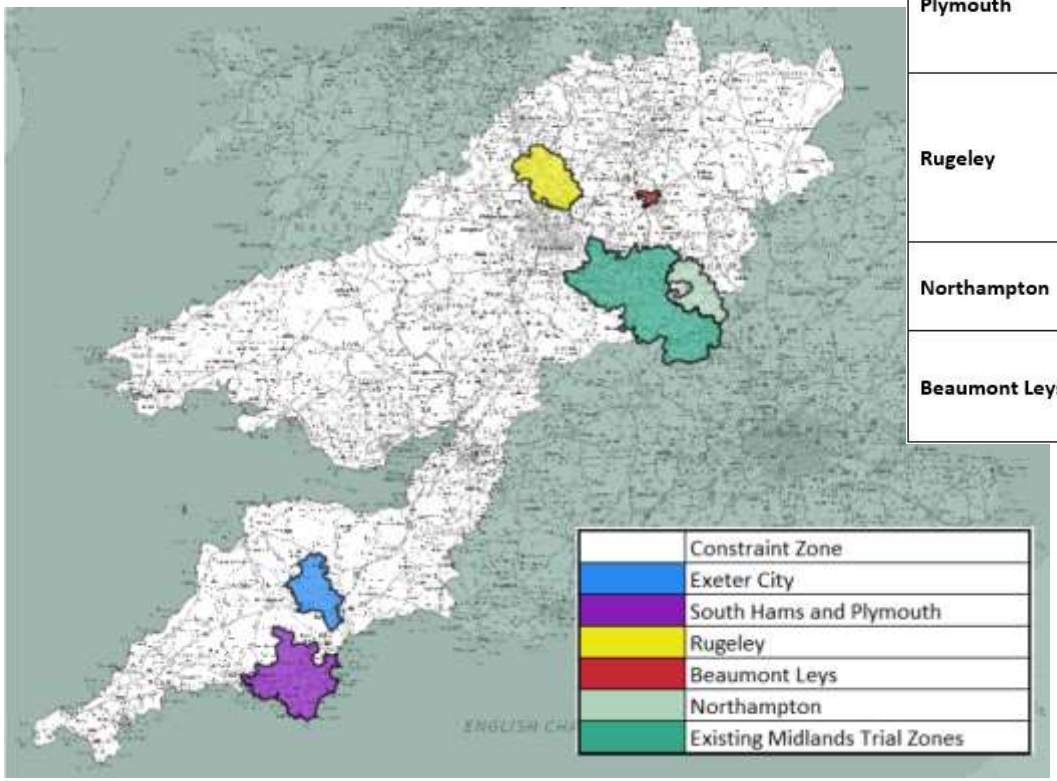
↓

Live calls for EOIs with tenders to follow

Local Flexibility Needs - **WPD**

WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales



Constraint	Flexibility Zones	Flexibility Service Requirements		
		Flex Service	Days Required	Monthly Requirement
Exeter City	Exeter City	Dynamic Restore	Mon – Sat	Jan – 230.66 MWh Feb – 14.66 MWh Nov – 49.64 MWh Dec – 105.2 MWh
South Hams and Plymouth	Plympton Milehouse Plymouth Totnes Paignton Torquay	Dynamic Restore	Mon – Fri	May – 471.95 MWh June – 296.16 MWh
Rugeley	Stafford 132 Stafford South Rugeley Town Cannock Burntwood Lichfield	Secure Restore	Mon – Sat	Dec – 43.31 MWh
Northampton	Northampton East Northampton West Northampton	Restore	*No firm MWh requirements - could be on any day and any time in the year*	
Beaumont Leys	Beaumont Leys Wider Area	Secure Restore	Mon – Sat	Jan – 92.96 MWh Feb – 28.21 MWh Nov – 12.89 MWh Dec – 7.07 MWh

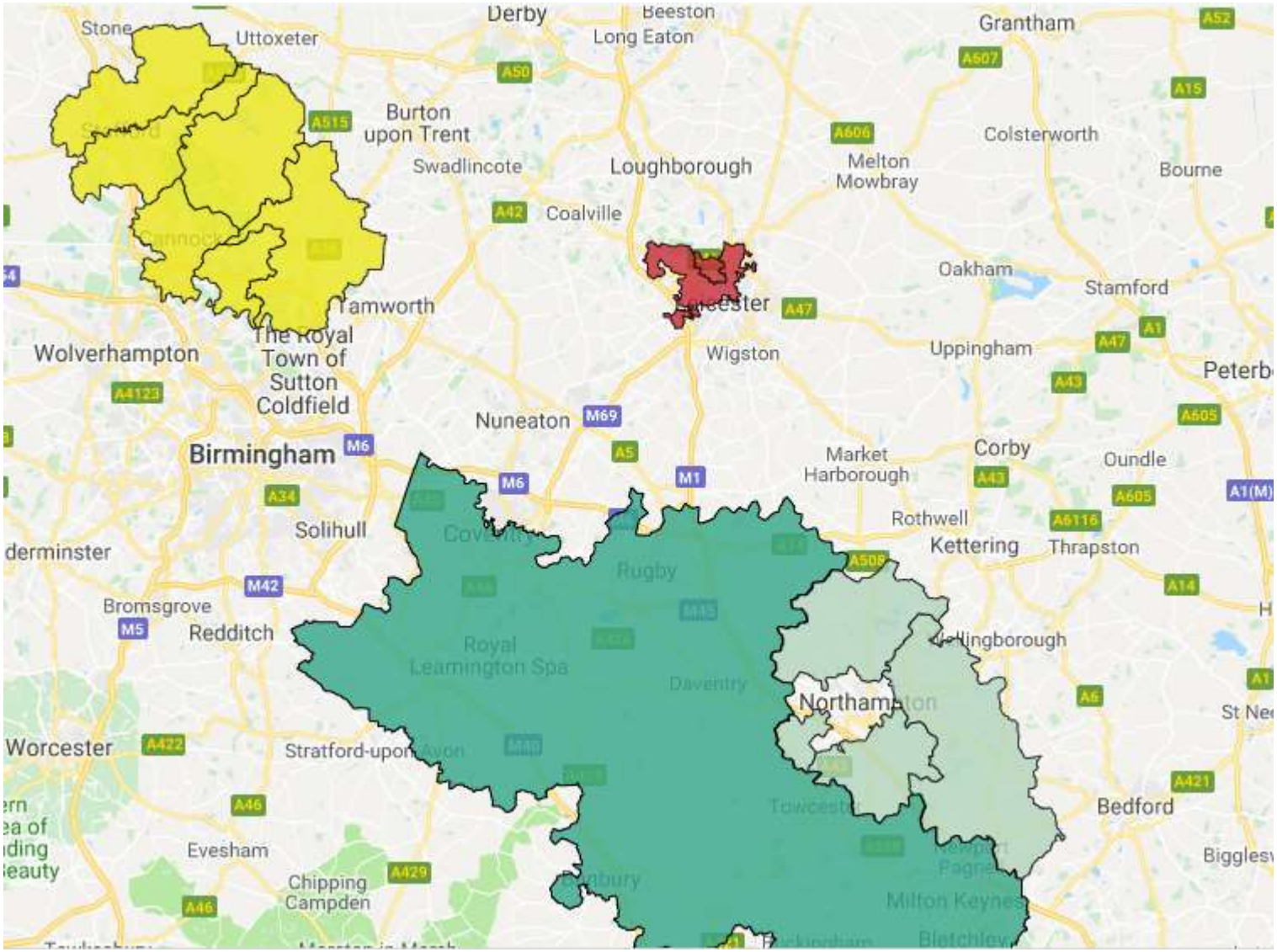
EoI live now – Jul 2018

Tender to follow – Sep 2018

Build/test – Oct 2018

Credit and source: WPD Flexible Power

Local Flexibility Needs - **WPD**



Credit and source: WPD Flexible Power

Different services for different needs

Service	Description	Requirement	Dispatch	Payment Structure
Secure	Used to manage peak demand loading on the network and pre-emptively reduce network loading.	Largely required on weekday evenings, all year round	**Declaration:** Week ahead *(Thursday for the following week, commencing Monday)* **Dispatch notice:** Week ahead notification of need and 15min signal	**i) Arming Fee:** Credited when the service is scheduled **ii) Utilisation Fee:** Awarded when flex service is delivered
Dynamic	Used to support the network in the event of specific fault conditions	Largely required during maintenance periods, likely through British Summer Time	**Declaration:** Week ahead *(Thursday for the following week, commencing Monday)* **Dispatch notice:** 15 minutes	**i) Availability Fee:** Credited when availability is accepted **ii) Utilisation Fee:** Awarded when flex service is delivered
Restore	Used to help with restoration following rare fault conditions, reducing stress on the network	Unplanned fault conditions are rare and largely in the event of equipment failure	**Declaration:** Week ahead (Thursday for the following Monday) **Dispatch notice:** 15 minutes	**i) Utilisation Fee:** Premium reward for response that aids network restoration, awarded when flex service is delivered.

Size of the prize

Approach is varied across DNOs

Market approach vs declared indicative price

Availability + Utilisation fees *potentially* a standard approach

For WPD, price depends on type of service and location

Constraint	Flexibility Zones	Service	Arming Fee	Availability Fee	Utilisation Fee
Exeter City	Exeter City	Dynamic	--	£5/MW/hour	£300/MWh
		Restore	--	--	£600/MWh
Beaumont Leys	Beaumont Leys Wider Area	Secure	£118/MW/hour	--	£150/MWh
		Restore	--	--	£600/MWh
Coventry Interconnector	Coventry	Secure	75/MW/hour	--	£150/MWh
		Restore	--	--	£600/MWh
Whitley, Rugby and Daventry	Whitley Rugby Daventry	Secure	£118/MW/hour	--	£150/MWh
		Restore	--	--	£600/MWh

Entry requirements

Must be within one of the identified zones

Must be half hourly metered

Must have minute by minute metering (verification)

Must be able to meet 15-minute dispatch signal and respond

Must be able to sustain response for at least two hours

Must be built or have a connection agreement with final milestone achieved before the end of procurement period

The provision of the flexibility must not cause participants to breach other agreements (e.g. connection agreement)

Other considerations

Demand is the driver: These services are about managing demand (i.e. gen turn-up, demand-down, storage discharge)

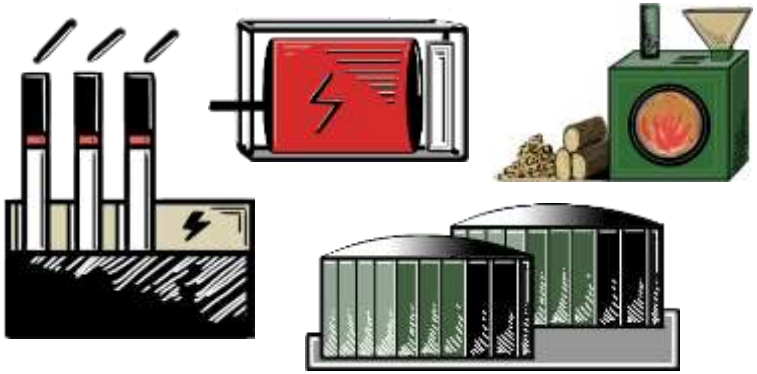
Entry thresholds: notably lower than that of national balancing services potentially 100kW - aggregation is also permitted

Contract length: likely to be 2-4 years

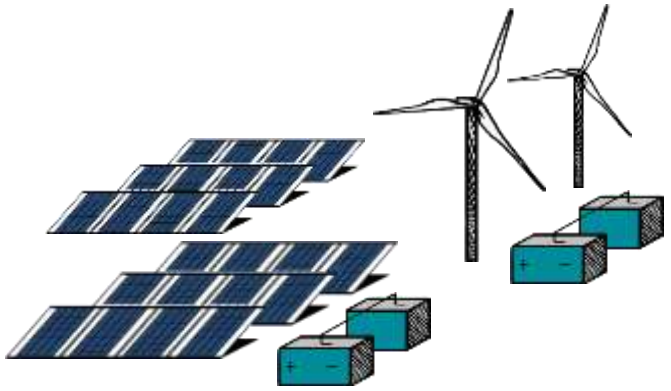
Non-response: unlikely to pay a penalty, reduction or removal of payments for reduced or non performance (e.g. WPD's sliding scale of 3% for every 1% under declared capacity). If consistent zero response ' three strikes and you're out' could be enforced

Technology: Agnostic on approach, but with a 15min notice, need to sustain for 2 hours and at any time - some technologies will be better placed than others

What could readily participate?

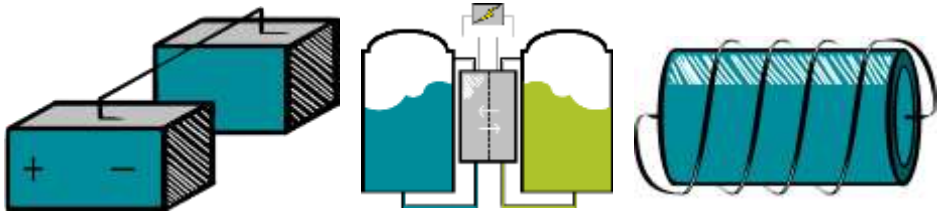


'Dispatchable' (thermal?) generation



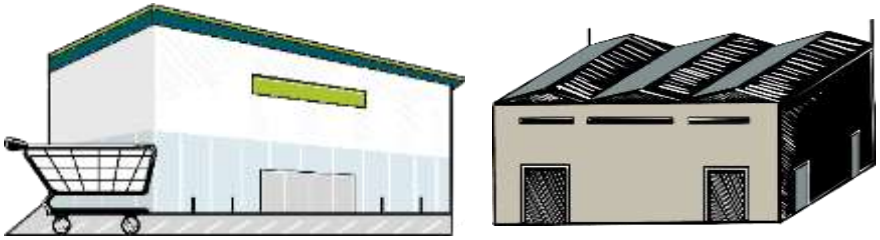
variable generation with storage

Generation Turn-Up



Quick response standalone storage (various techs)

Storage 'discharge'



Commercial & industrial equipment switch off or process ramp down

Tangible domestic flexible loads

Demand reduction

What does this mean for communities?

Opportunities

Brand new market, not yet regulated or dominated by any sector/provider

Localised network issues, being tackled by local providers, to unlock local network capacity

If too much flexibility is procured, smaller providers may be prioritised in some cases (reduced redundancy)

Market trading approach likely to follow, rather than fixed pricing

New platforms that could help with P2P trading and local supply

Barriers/Considerations

“You have to be in it to win it”

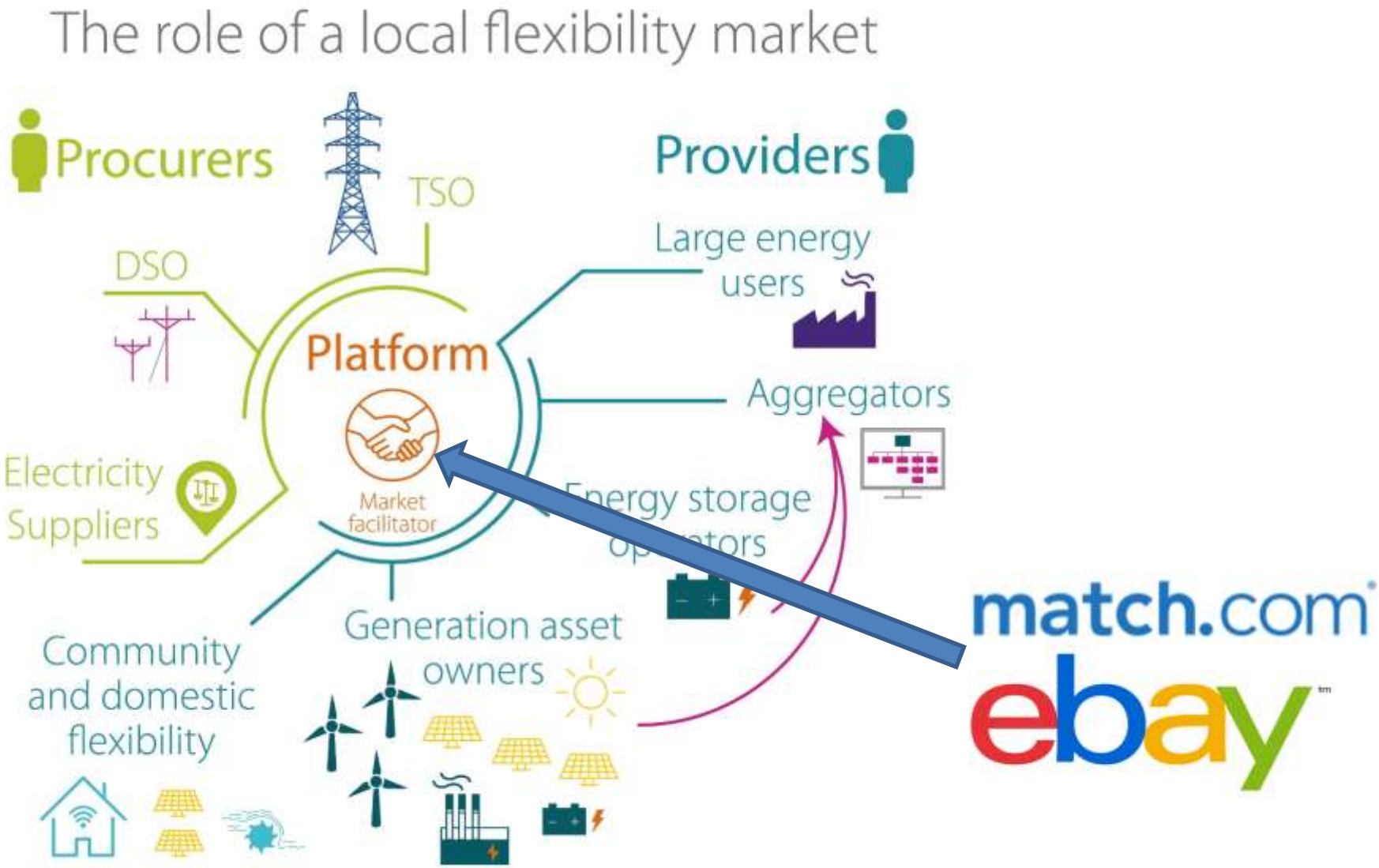
Technical conditions (i.e. metering) could make domestic flex difficult

Difficult for community owned solar to compete without storage

Permitting aggregation is positive, but still a ‘single point of failure’

Not a huge amount of money on offer

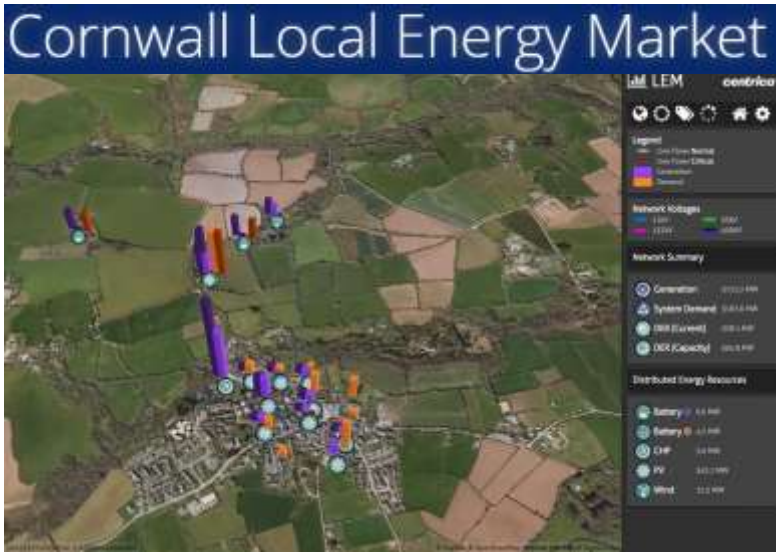
Local flexibility markets



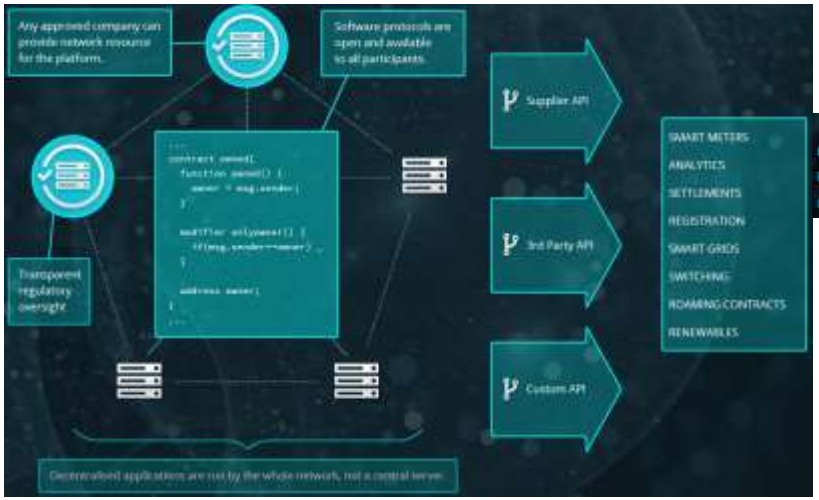
Local flexibility market platforms

Credit and source: Open Utility Piclo

centrica



Credit and source: Centrica



ELECTRON

Credit and source: Electron

In conclusion

- Decentralisation + decarbonisation drives the need for a more flexible/responsive energy system

- Local flexibility builds on national balancing, but will address local constraints and potentially defer network reinforcement = value for customers

- The role of a DSO includes facilitating and enabling local flexibility (i.e. Ofgem want these markets to happen)

- There are live calls for expression of interest out now, but the potential to participate is more accessible for some parties

- The current phase is around defined procurement processes with DNOs, but the future may be conducted through online markets





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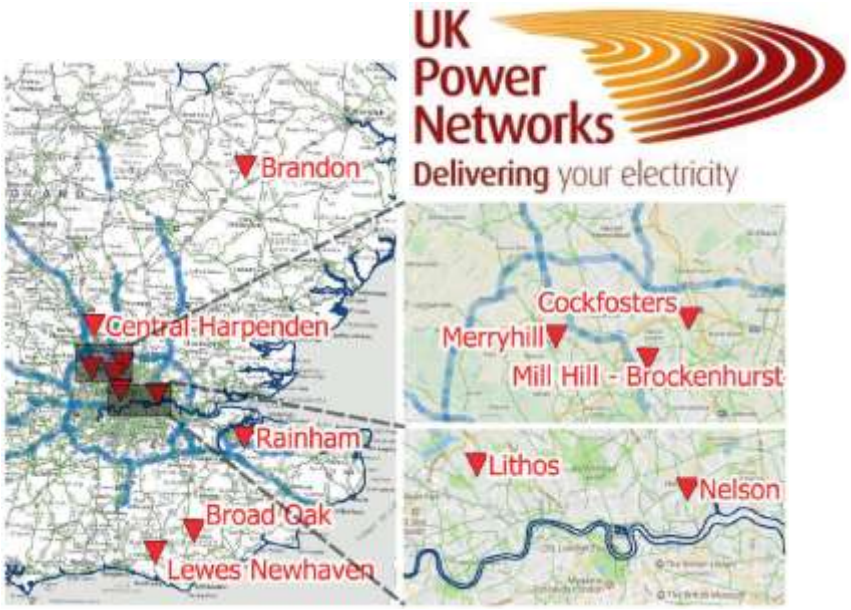
Local Flexibility Needs - **UKPN**



Network location	License area	Voltage level	Requirement 17/18 (MW)	Months	Times	Days
Broad Oak	SPN	11kV and below	Up to 10	Sep-May	7:00 - 8:00am 4.30 - 8.30pm (5hrs)	All
Lewes Newhaven	SPN	33kV and below	Up to 8	Sep-May	7:00 - 8:00am 4.30 - 8.30pm (5hrs)	All
Rainham	SPN	11kV and below	Up to 3	Sep-May	7:00 - 8:00am 4.30 - 8.30pm (5hrs)	All
Nelson	LPN	11kV and below	1.5	Nov-Mar	4:00 – 7:00pm (3hrs)	All
Lithos	LPN	11kV and below	2	Jan-Mar	5:00 - 8.00pm (3hrs)	Weekdays
Merryhill	EPN	11kV and below	2.7	Nov-Feb	5.30 - 8.30pm (3hrs)	Weekdays
Mill Hill - Brockenhurst	EPN	11kV and below	1.4	Dec-Feb	5.30-7.30pm (2hrs)	Weekdays
Cockfosters	EPN	11kV and below	1.4	Dec-Feb	5.30-7.30pm (2hrs)	Weekdays
Central Harpenden	EPN	11kV and below	2.7	Nov-Feb	5.30-7.30pm (2hrs)	Weekdays
Brandon	EPN	11kV and below	2.7	Nov-Feb	5.30-7.30pm (2hrs)	Weekdays

Results of EoI

Other tenders to follow

Credit and source: UKPN

Open Utility

Piclo Flex

POWERVAULT

Local Flexibility Needs - **SSEN**

Scottish & Southern Electricity Networks

Constraint Managed Zones (CMZs) were launched in 2015 (i.e. Yeovil)

Seeking 'Constraint Management Services'

Other regional CMZs to follow, as flexibility services

Also advertising through Piclo Flex

Open Utility
Piclo Flex

Credit and source: SSEN & Google Maps

Local Flexibility Needs - **ENW**

Evaluate EoI – Jun/Jul 2018

Publish tender – August 2018

Network location	Voltage	2018/19 Flex Requirement (MW)	Availability window		
			Months	Times	Days
Alston	LV or HV	0.5	Nov - Mar	06:30 to 21:30	All week
Coniston	LV or HV	1.0	Nov - Mar	All day	All week
Easton	LV or HV	2.0	Nov - Mar	All day	All week
Nelson	HV or 33kV	20.0	Oct - Mar	06:30 to 21:30	All week
Blackfriars	LV or HV	0.5	Jan - Feb	16:30 to 21:30	Weekdays
Cheetham Hill	LV or HV	2.5	Nov - Mar	11:30 to 21:30	All week
Stuart Street	HV or 33kV	9.5	Nov - Feb	06:30 to 21:30	Weekdays

Credit and source: ENW