

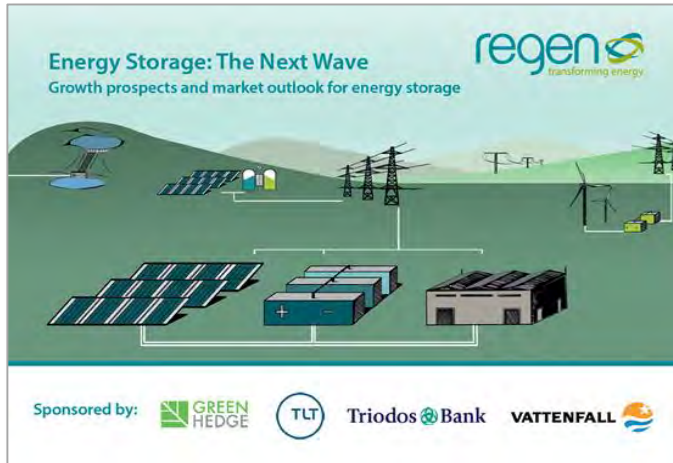


Introduction to local flexibility markets

What are flexibility services and how can I get involved?

Ray Arrell – Senior Project Manager

Regen's recent work on flexibility



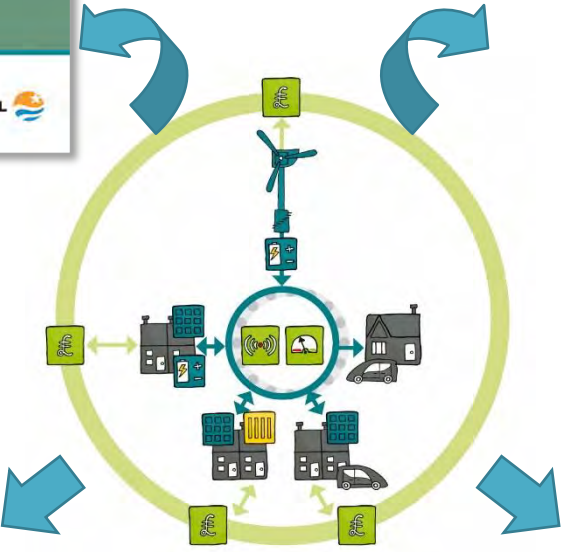
November 2017



May-Aug 2018

The development of local flexibility markets in five steps

Feb – May 2018



FLEXIBILITY MARKETS FEASIBILITY STUDY COMPETITION



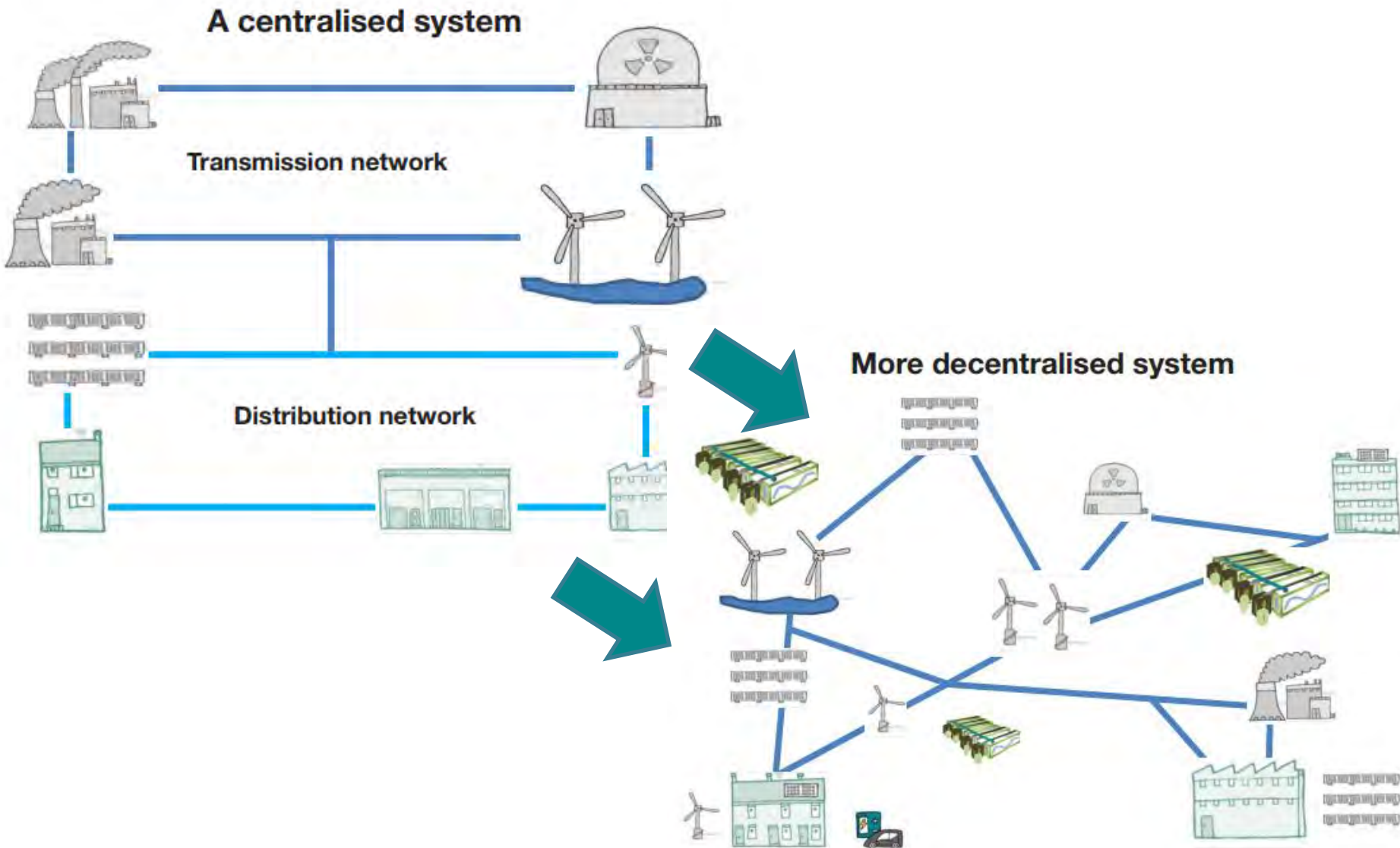
CarbonCo-op



June-Sept 2018

- **“Our system is changing” – what does that mean?**
- **Ray’s Flexibility Jargon & Acronym 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?

Shift change in supply & demand:

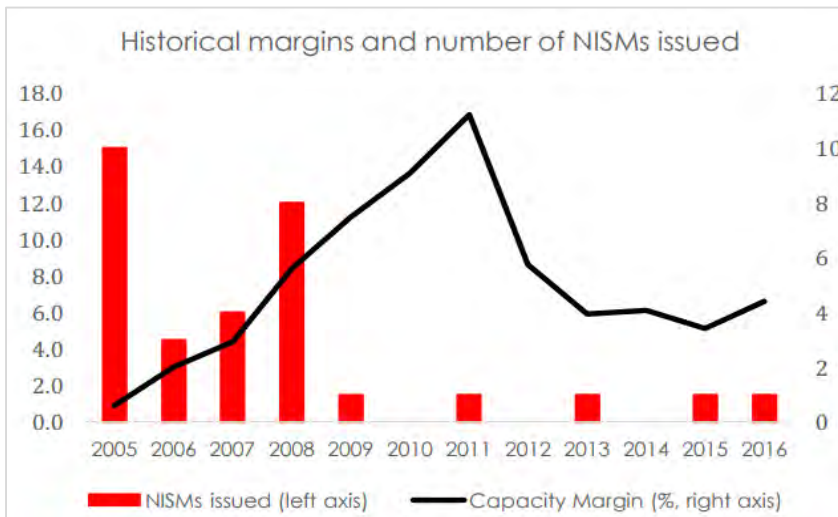
15GW of fossil fuel generation has come off the system since 2011

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)

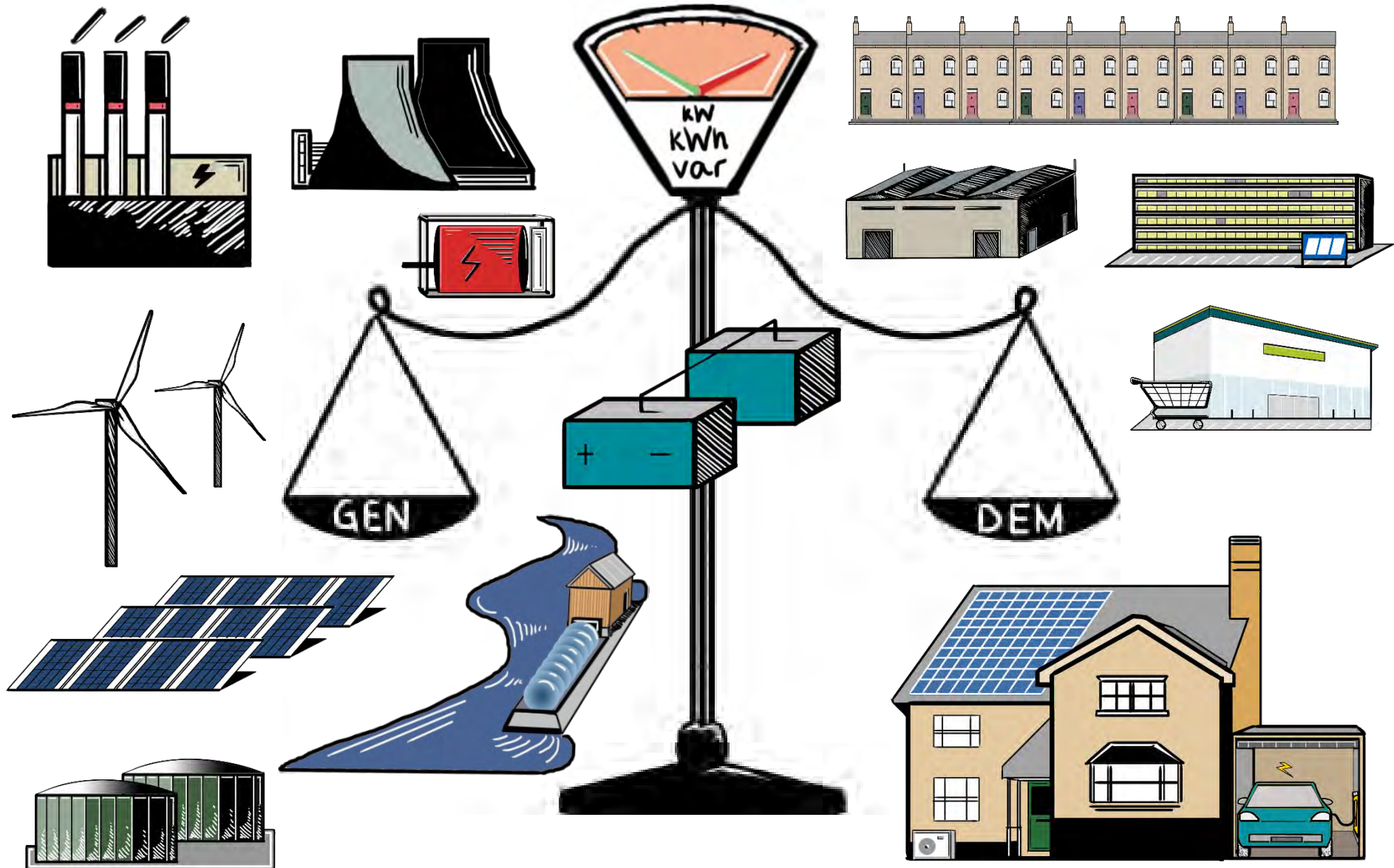
Demand for EVs rose by 42% in 2016



“...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?



Ray's Flex Jargon & Acronym 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

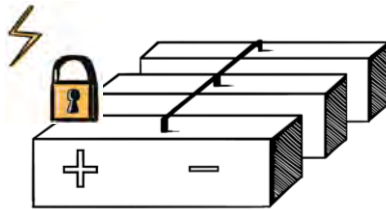
Aggregation: ‘Bundling’ smaller loads into a portfolio, which can participate in programmes with entry thresholds that are too high (i.e. 1MW)

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

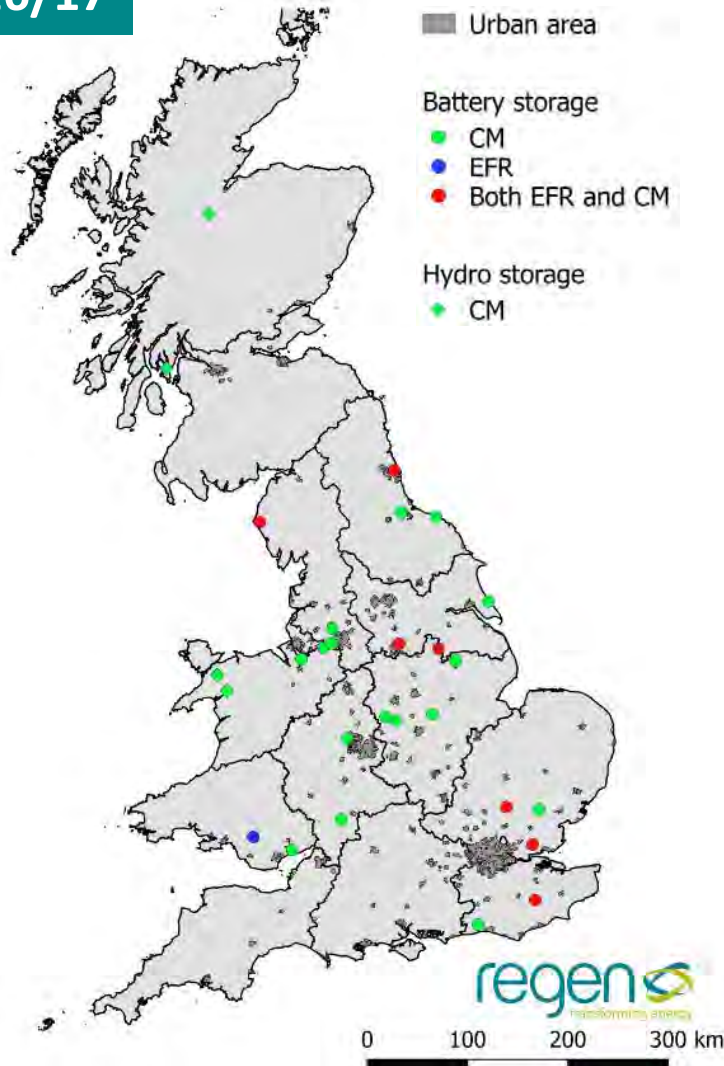
- Help with events & outages

System Restoration (aka Black Start)

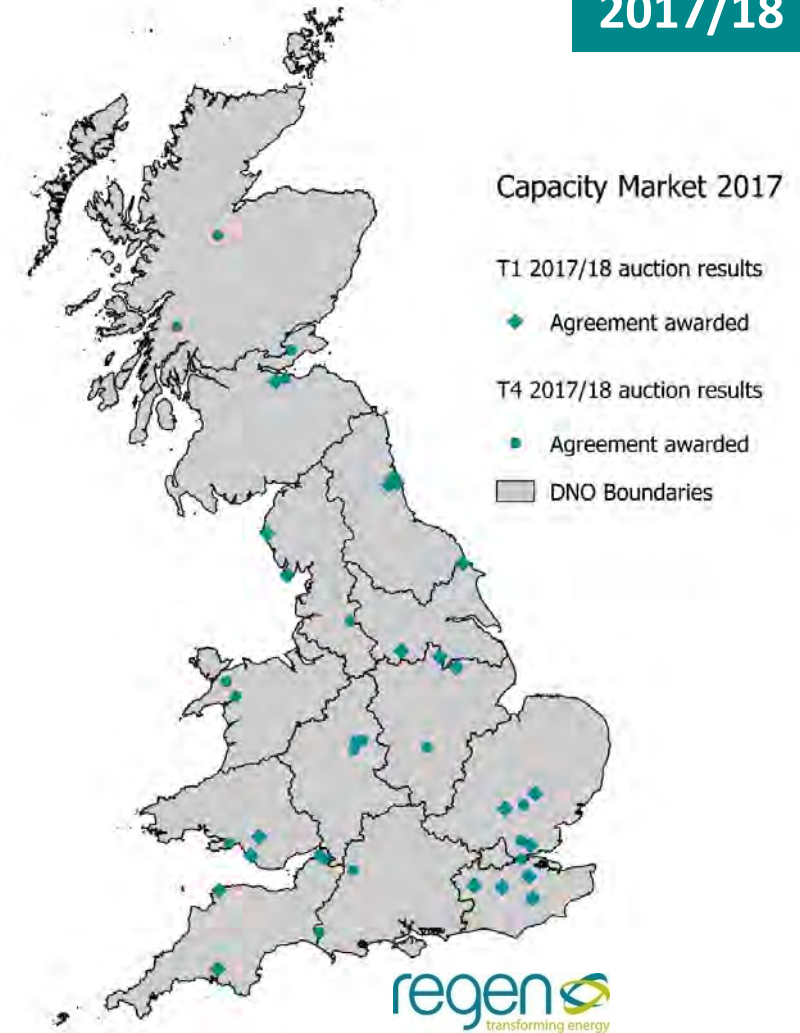
Capacity Market (system stress)

Some 2016-2018 Contracted Sites

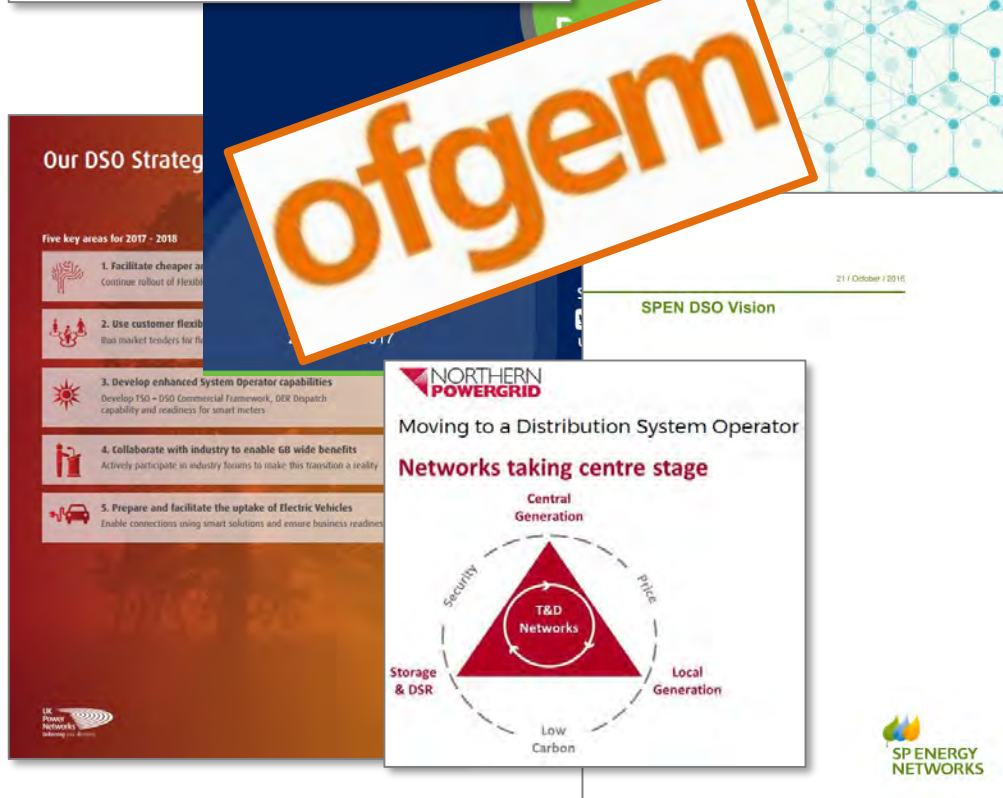
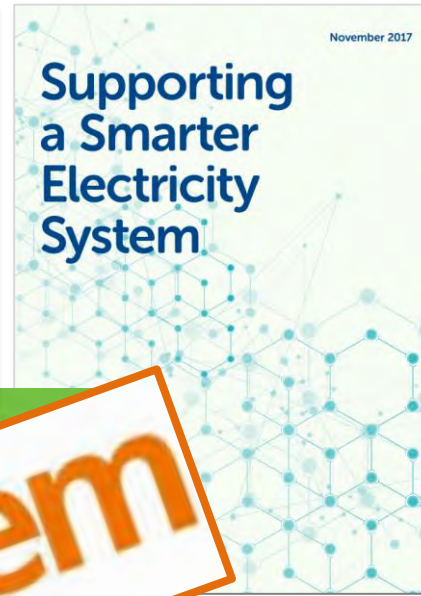
2016/17



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

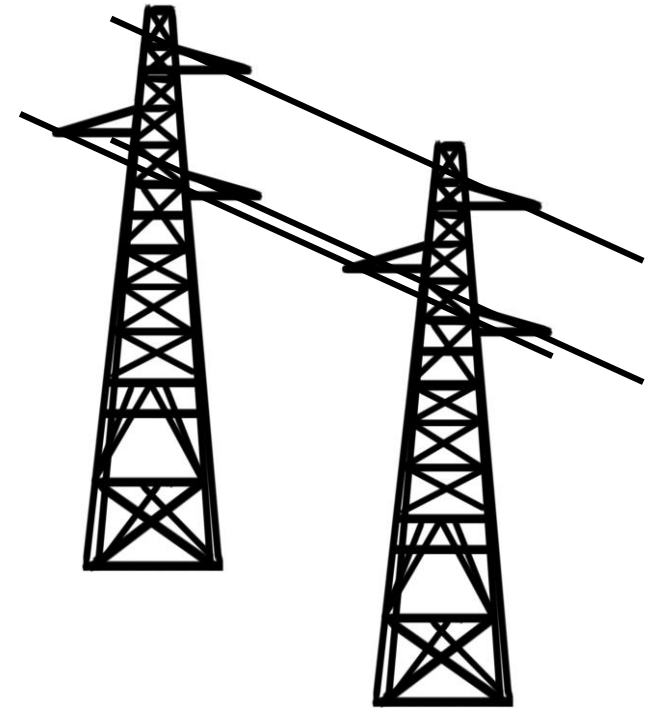
Enabling factors:

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



Deferring network upgrades by turning to flexibility instead

Local Flexibility Innovation Trials



Trials and innovation projects around smart networks and flex



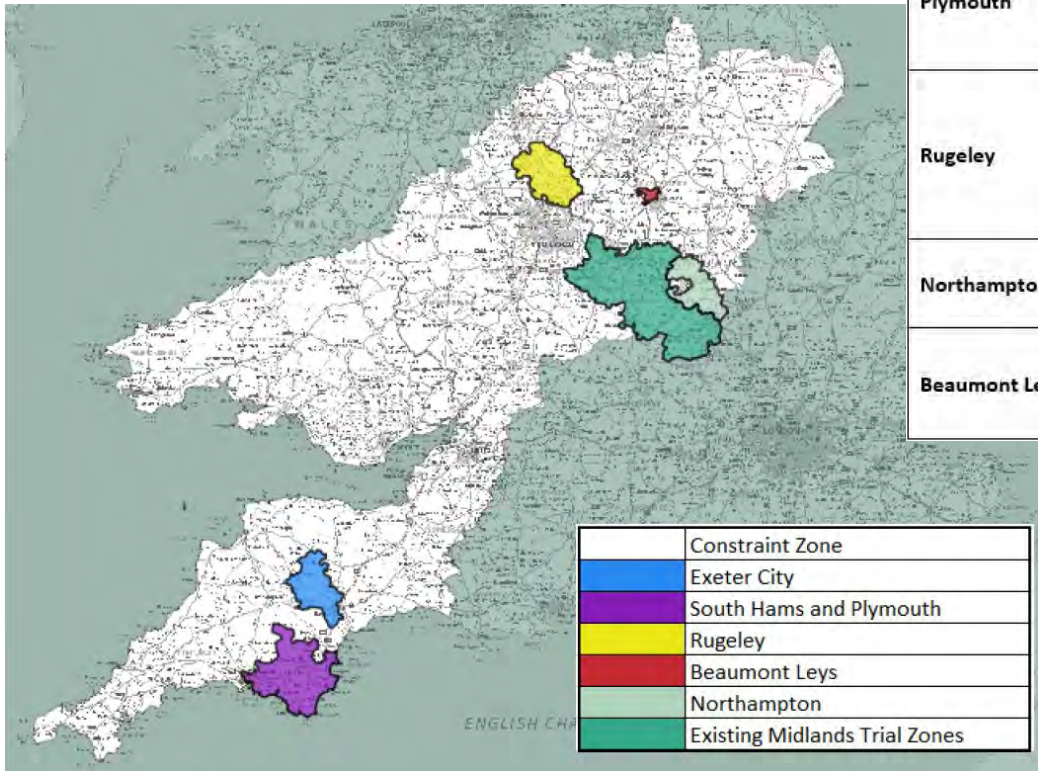
Developing market platforms and abilities



Live calls for EOIs with tenders to follow

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	<i>No firm MWh requirements - could be on any day and any time in the year</i>	
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

Eol live now – Jul 2018
Tender to follow – Sep 2018
Build/test – Oct 2018

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 (<i>Thursday for the following week, commencing Monday</i>) 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 (<i>Thursday for the following week, commencing Monday</i>) 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.

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

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)

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

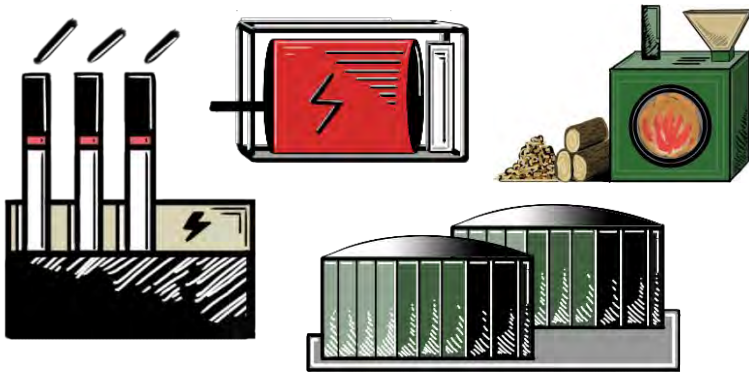
Entry thresholds: notably lower than that of national balancing services potentially 100kW - aggregation is also permitted

Contract length: likely to be 2-4 years

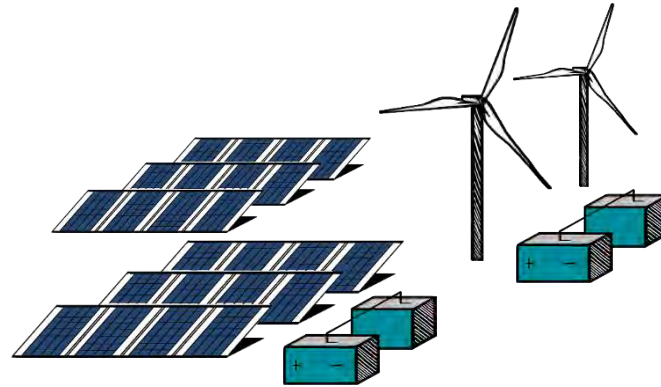
Non-response: unlikely to pay a penalty, reduction or removal of payments for reduced or non performance (e.g. WPD's sliding scale of 3% for every 1% under declared capacity). If consistent zero response 'three strikes and you're out' could be enforced

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?



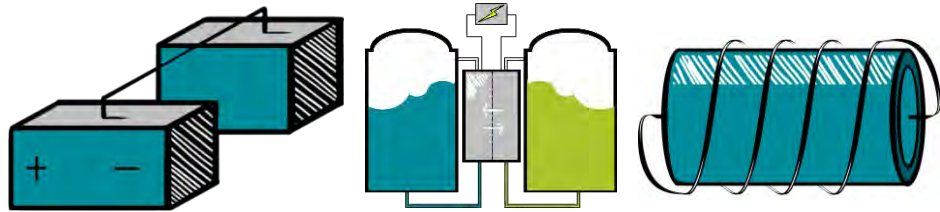
'Dispatchable' (thermal?) generation



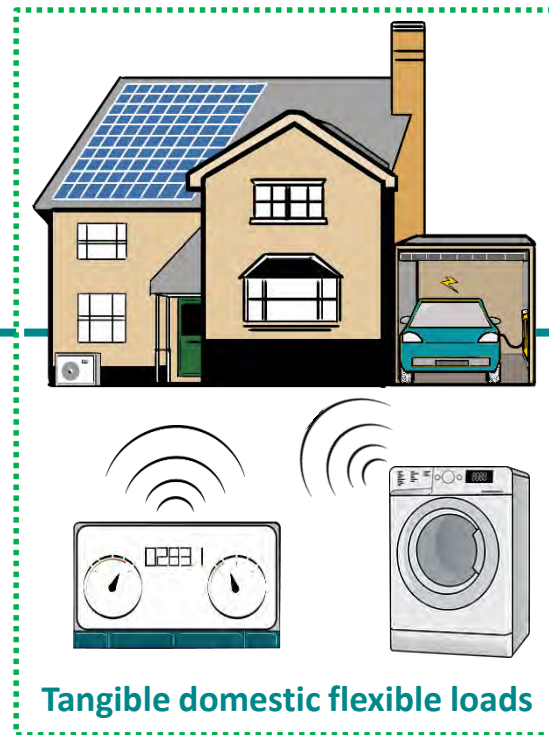
Intermittent generation with storage



Generation
Turn-Up



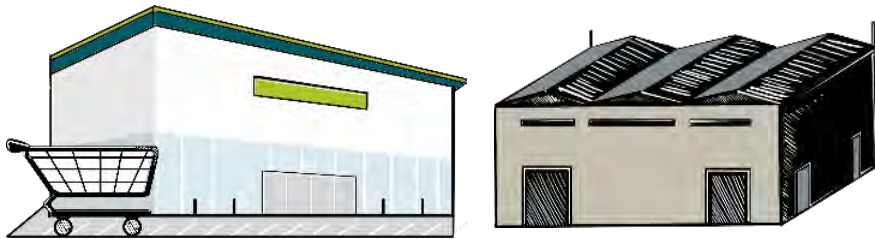
Quick response standalone storage (various techs)



Tangible domestic flexible loads



Storage
'discharge'



Commercial & industrial equipment switch
off or process ramp down



Demand
reduction

Opportunities

Brand new market, not yet 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

Barriers/Considerations

“You have to be in it to win it”

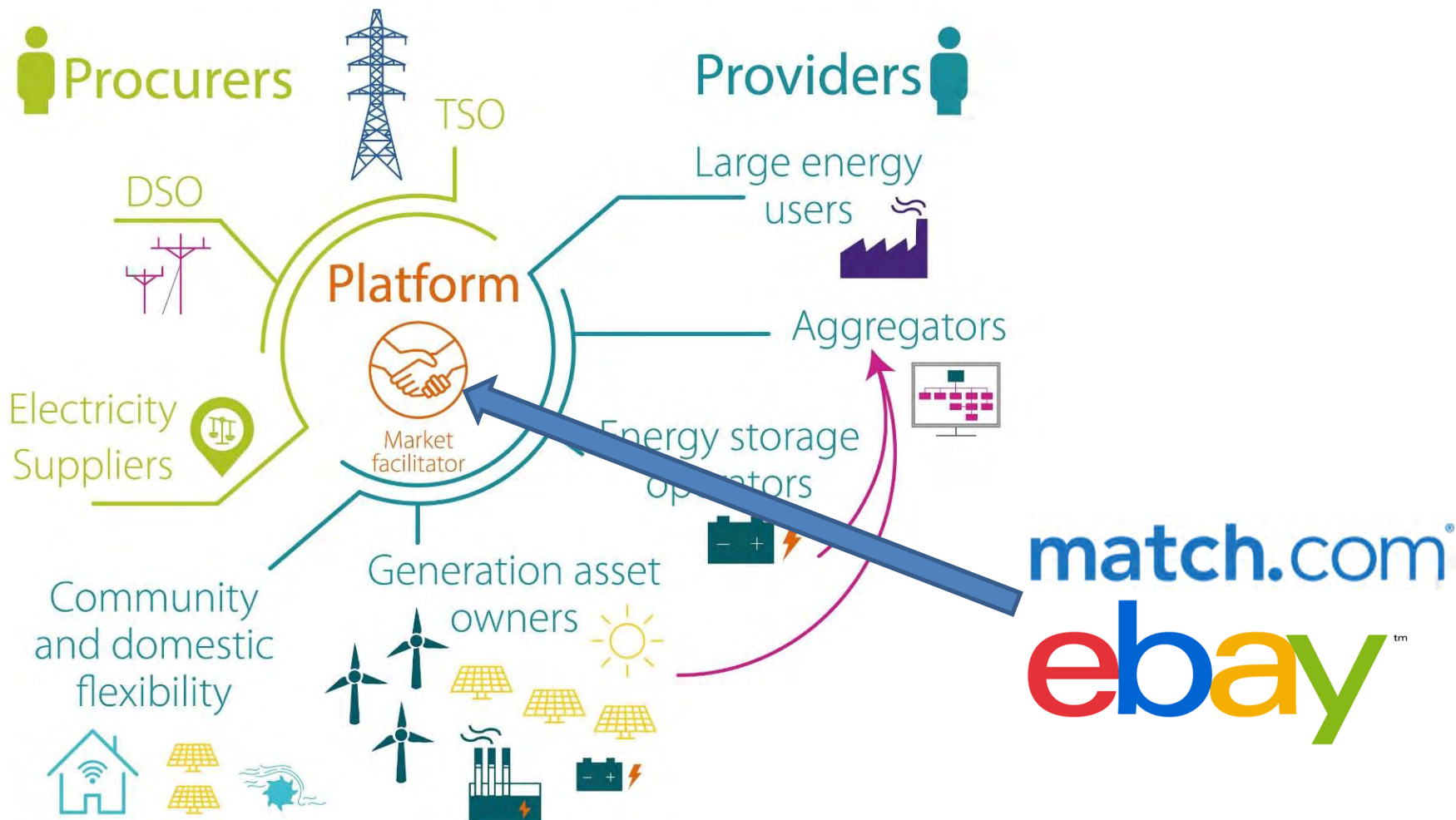
Technical conditions (i.e. metering) could make domestic flex difficult

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 - £20-30k/MW/year(?)

The role of a local flexibility market



Local flexibility market platforms



Open Utility
Pico Flex



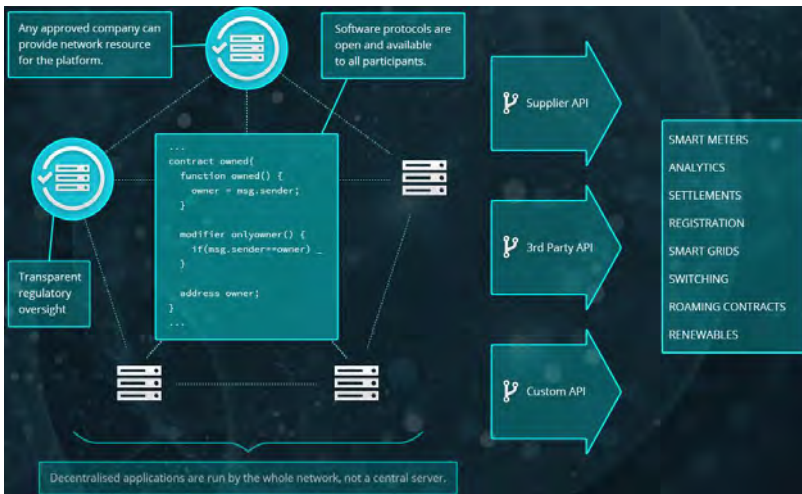
Credit and source: Open Utility Pico

centrica

Cornwall Local Energy Market



Credit and source: Centrica



ELECTRON

Credit and source: Electron

- **Decentralisation + decarbonisation drives the need for a more flexible/responsive energy system**
- **Local flexibility builds on national balancing, but is a different proposition, to address local constraints and potentially defer network reinforcement**
- **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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transforming energy