



# Future Flex

Workshop Primer

**WESTERN POWER  
DISTRIBUTION**

*Serving the Midlands, South West and Wales*



# FUTURE FLEX WORKSHOPS



## Calling all domestic flexibility experts!

**We want your views on the barriers to participating in DSO services – and your creative solutions to trial.**

Future Flex is a participant-led trial of second generation DSO services. We will deploy step-change innovations for domestic scale assets.

Future Flex is an innovation project delivered by Western Power Distribution, Everoze and SGC, with National Grid ESO as observer. It is funded by the Network Innovation Allowance.

### WHAT YOU'LL GAIN FROM ATTENDING

1. **Insight** into your peers' latest views on domestic flex
2. **Influence** on how DSO services evolve
3. **Interaction** with other thought leaders in the field

### TOPICS WE'LL BE COVERING

We'll be addressing two questions:

1. What are the primary barriers to domestic flexibility (flex) providing DSO services?
2. What creative solutions should we trial under FutureFlex?

Sample topics might include:

- Commercial incentive and risk allocation
- New testing techniques
- Metering and baselining
- Dynamic allocation of assets within portfolios
- Bid windows for rapidly changing asset availability
- Communication, technology and methods for bidding, declaring, dispatching and metering

**...but we want YOUR challenge and ideas!**

### TARGET OUTPUTS

1. **Prioritised list of issues** with current DSO service provision
2. **Prioritised step-change solutions** to trial

### WORKSHOP LOGISTICS

#### WORKSHOP 1: BRISTOL

- Tues 28 Jan 2020
- Waterfront, Welsh Back, BSI 4SB [15 min walk from Bristol Temple Meads station]

#### WORKSHOP 2: LONDON

- 3 Feb 2020
- The Trampery, 239 Old Street, EC1V 9EY

9.30-3pm (register @ 9.30, KickOff @ 10)

Workshop 2 will be a rerun of Workshop 1 – please only plan to attend one!

Dress code: smart casual

Any issues on the day, or special access or dietary requirements beyond veggie/vegan, please contact Felicity: 07716 344 995.



# STRUCTURE OF THIS PACK

**This Primer Pack is provided to all participants in advance of our workshop.**

We do NOT want to bias your input. But we DO want to give some context and allow you the opportunity to chew through topics in advance, so we can hit the ground running in the workshop itself.

So in this pack, we present some background and pose some interesting questions – rather than offer up any answers. The pack is structured as follows:

## **I. ESSENTIAL BACKGROUND**

- A. Future Flex context
- B. Goal of workshop

## **2. THINKING CREATIVELY**

- A. How domestic flex is different
- B. Possible DSO approaches
- C. Other sectors

## **3. CHALLENGES WITH TODAY'S MODEL**

- A. Depiction of current model
- B. Example: contracting
- C. Example: data
- D. Example: baselining



## How do we incentivize the reduction of domestic consumption during times of peak network constraints?

### The DSO market today

**The transition to net zero carbon brings challenges for the operation of distribution networks.** Distribution System Operators (DSOs) are responding by procuring services such as constraint management and reactive power. Whilst smaller providers are emerging, DSO services tend to be provided by larger (>200kW) assets, e.g. batteries and generators.

**Meanwhile, aggregators and energy suppliers are innovating rapidly on domestic flexibility (flex).** New energy supply models such as time of use tariffs and energy-as-a-service are unlocking new flex potential. Low-carbon technologies such as electric vehicles, stationary batteries and heat pumps further augment what is possible.

**This raises the question: how do we leverage domestic flex to support DSOs?** We're aware that there may be unconscious biases in DSO service design that prevent the market from being fully accessible to domestic flex.

### How FutureFlex fits in

**Future Flex is a participant-led trial of second generation DSO services,** deploying step-change innovations for domestic scale assets. We are:

1. **Probing DSO services themselves,** not asking you to reshape to fit DSO services
2. **Asking YOU to lead the design,** not just review it.

**The Project is scoped into three phases:**

1. **Participant engagement:** This is a data-gathering phase, using workshops and interviews to secure YOUR input. It is where we are now.
2. **Solution definition:** This phase turns YOUR feedback into a concrete commercial design and system build.
3. **Trial:** This phase trials the new system with participants such as yourself.

# IB: GOAL OF WORKSHOP



Focused on the relationship between DSO and supplier/aggregator intermediary (rather than between intermediary and consumer)

WE SEEK TO ANSWER TWO QUESTIONS IN THE WORKSHOP:

What are the **primary barriers** to **domestic flex** supporting the DSO?

Flexibility provided by households – for instance via smart charging of EVs, smart electrified heating, home-based batteries, etc

What **creative solutions** should we **trial** under **FutureFlex**?

Trial led by Western Power Distribution in 2020, involving >2 flex providers

Step-change innovations; not tweaks to business-as-usual. BUT achievable to demonstrate within FutureFlex budget and timeframe.

# 2A. HOW DOMESTIC FLEX IS DIFFERENT



## Domestic flex has different characteristics to traditional flex assets.

To date, DSO services have largely been provided by large dedicated assets; for instance, utility-scale batteries, or industrial/commercial response. Targeting these flex providers may have introduced unconscious biases in design.

Domestic flex has unique technological characteristics.

### What do these differences mean for how DSOs can best access domestic flex potential?

CHARACTERISATION	TODAY		TOMORROW?	Example implications of difference
	Dedicated flex asset (e.g. utility-scale battery; genset)	Behind-the-meter Industrial & commercial flex	Domestic flex	
<b>Scale (typical)</b>	1-50MW	100kW-2MW	<10kW per site On a portfolio level, scale changes dynamically as new customers onboard to and exit supplier portfolios	<b>Cost efficiency matters:</b> Instrumentation (e.g. metering) requirements per site must be lean. <b>Portfolio lens:</b> It becomes more important to adopt a portfolio lens rather than an asset lens. <b>Potentially high liquidity*:</b> due to quantity of households in market <b>Large data volumes:</b> due to number of homes
<b>Connectivity</b>	Robust	Robust (mostly)	Variable	<b>Dispatch and measurement challenges:</b> Due to unreliable connection.
<b>Location</b>	Single point	Single point	Highly distributed	<b>More location-targeted services are possible:</b> through geospatial clustering of homes – albeit there are multiple suppliers/providers.
<b>Availability</b>	High (but reduced by service stacking)	Mid (reduced by core business operations), but can be scheduled	Mid and variable (fundamentally linked to changing consumer profile – and tech-dependence)	<b>Granular service options may be beneficial:</b> E.g. targeted bid windows
<b>Predictability of availability</b>	High	Mid	Low-mid – but improves closer to real-time	<b>Closer-to-real-time procurement and/or options:</b> may help increase participation
<b>Direct people interface</b>	No	Yes (but small number).	Yes (large number). Low energy sector knowledge.	<b>Intermediary likely essential:</b> e.g. aggregator/supplier <b>Automation:</b> Likely some need for automation

\*Liquidity is a measure of the ability to buy or sell a product – such as electricity – without causing a major change in its price and without incurring significant transaction costs. Source: [Ofgem](#)

# 2B. POSSIBLE DSO APPROACHES

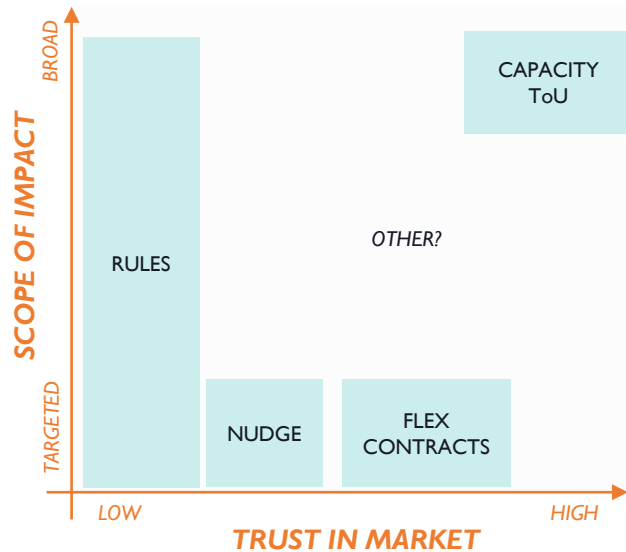
ACTIVE DSO  
PROCUREMENT

PASSIVE  
SIGNALS

To date, DSOs have used technical flex contracts to enable market participation

But this is not the only possible model. What is an appropriate approach for domestic flex? How might different approaches layer together?

EXAMPLE APPROACHES TO SECURING FLEX



APPROACH	Rules	Nudges	Technical flex contracts	Capacity time-of-use tariffs (ToU)	Other?
<b>Definition</b>	<b>Mandate</b> flex through legislation/rules.	<b>Encourage</b> domestic flex through making it the path of least resistance	<b>Contract</b> flex directly, isolating this from baseline consumption	<b>Reward/charge</b> consumers for network capacity usage based on time of day [some links to network charging model].	?
<b>Most associated with</b>	<b>Policymakers:</b> legislate and mandate	<b>Behavioural economists:</b> leverage psychological tendencies	<b>Engineers:</b> draft a technical spec, then contract for it	<b>Economists:</b> signal your demand curve, let rational actors respond	? Data scientists ?
<b>Origin of trust that domestic flex will deliver</b>	<b>The law:</b> Remedies/penalties for breaking rules	<b>Psychology:</b> Understanding of consumer psychology	<b>Penalties:</b> Enforceable contract with penalty mechanisms	<b>Markets:</b> Understanding of demand elasticity to price signals	?
<b>Pros</b>	<b>Straightforward:</b> to understand and operate	<b>Cheap:</b> Negligible cost	<b>Certainty</b> for flex provider and DSO for period of contract	<b>Holistic:</b> provides energy efficiency incentives as well as flex incentives <b>Easier, more dynamic revenue stacking:</b> No complex contractual interfaces <b>Greater DSO optionality</b>	?
<b>Cons</b>	<b>Blunt instrument:</b> unintended consequences; undynamic as market changes.	<b>Limited effect:</b> Can only achieve so much.	<b>Test &amp; measurement:</b> Difficulties isolating 'additional' behavior <b>Service stackability:</b> contractual interfaces	<b>Low certainty increases cost of capital:</b> unless good forecasts and/or historical data is provided. <b>Need to frame DSO demand curve:</b> non-trivial as location-specific and dynamic	?

## The energy sector tends to lag some other sectors in digital uptake.

Businesses in retail, media, communications and finance tend to adopt tech innovations more quickly\*. The energy sector might draw inspiration from these other sectors.

**How might DSO flex service provision look if it was led by Amazon? Or Uber? Or Facebook?**



Looking beyond energy...

\* **Source:**

[\*Which industries are the most digital \(and why\)?\*](#), Gandhi, Khanna and Ramaswamy, published in Harvard Business Review, April 2016.



# 3A. TODAY'S MODEL



**DSO service procurement today can be broken into a series of constituent phases.**

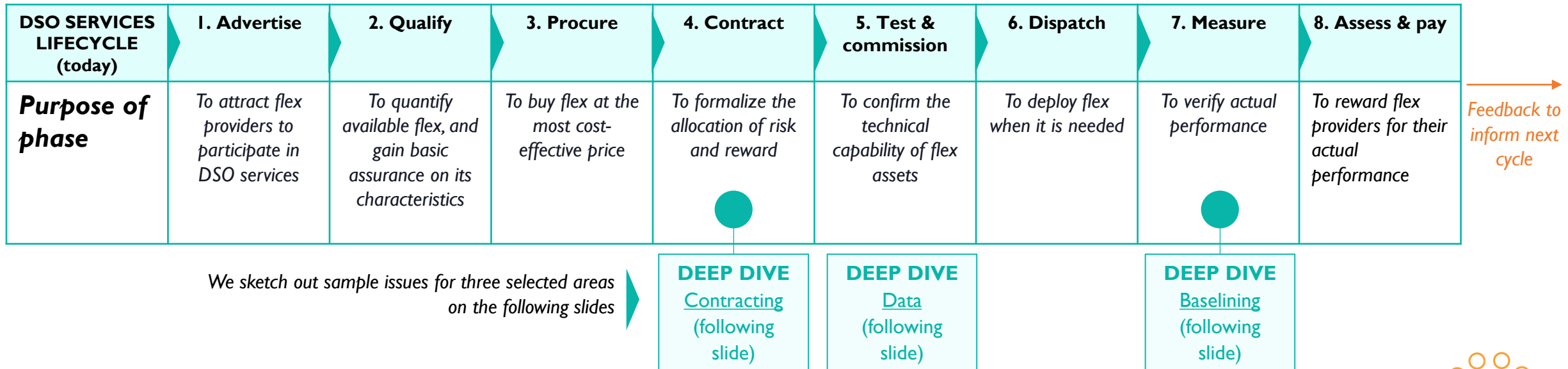
Unconscious barriers to domestic flex might occur in any phase.

**Where do you see the primary barriers?**

**Each phase has a distinct purpose for the DSO.**

We should be open to the possibility that this purpose might be met in alternative ways.

**What is the best way for each purpose to be met for domestic flex?**





## PROBLEM DEFINITION

**Static contract lock-in:** The current DSO contracting structure does not accommodate the flexibility to change portfolio make-up, maximum flexibility volume that can be offered by the portfolio and price offered close to the week-ahead declarations. Currently, these parameters and other details are fixed at time of the 6-monthly tenders.

## IMPACT

**Higher prices in tenders:** Longer term volume/price commitments means there is risk built into aggregators' offering.

## DISCUSSION

**Current DSO service procurement method is limiting:** Under the current procurement approach, potential service providers that have achieved pre-qualification participate in six-monthly tenders to be awarded contracts for flexibility services for the respective Constraint Managed Zone (CMZ). The portfolio make-up, maximum volume, price offered (should the CMZ go to auction clearing) for the six-months and other details are locked-in at time of contract award. Awarded service participants provide availability declarations for the various time blocks on a weekly basis, closer to time of provision of service.

**National Grid is trialling weekly procurement of frequency response services:** National Grid as part of the Firm Frequency Response (FFR) auction trials has been trialling weekly tenders for procurement of FFR services. Phase 1 of the trial went live in June 2019, procuring a low-frequency static FFR service. Phase 2 of the trial is now underway from November 2019. Depending on results, this might be a possible model to replicate at DSO level.

**DNOs must work within procurement rules:** Specifically, the Utilities Contract Regulations.

## SOMETHING TO CHEW ON...

**What if domestic flex was a gig economy?**

How might the contracts look? What would be the benefits and risks for both parties (buyers and sellers)?

## SOMETHING TO CHEW ON...

**And what about other flex contracts?**

How does our perspective change when we consider interfaces with the wider revenue stacking environment? What ideas does this spark?

## SOMETHING TO CHEW ON...

**Do we even need a contract?**

What might be an alternative way to give DSOs comfort that domestic flex will deliver?



## PROBLEM DEFINITION

**Efficiently managing large data volumes – due to quantity of homes (and quantity of assets within homes).** The question is: what is the appropriate level of DSO scrutiny of data? For instance, what temporal and spatial granularity of data is required, and is this to be supplied at aggregate/portfolio or individual household level? How frequently should it be required, and how close to real-time? A core challenge is being able to secure sufficient data to be confident in portfolio performance, whilst also avoiding unduly onerous requirements on participants and DSOs.

## IMPACT

**Costs of data collection, storage and processing:** There is a risk that the costs are disproportionately high relative to the benefits.

## DISCUSSION

**Data is a multi-faceted topic that spans the whole DSO services lifecycle.** Wider challenges include:

- Cybersecurity
- Standardisation – including alignment across grid services
- Onsite instrumentation requirements
- Onsite connectivity
- GDPR regulation
- Commercial confidentiality.

**The Energy Data Taskforce** has a mandate to probe how the use of data could be transformed across our energy system – setting the wider context for the DSO data challenge.

## SOMETHING TO CHEW ON...

### What would Google do?

How would one of the tech giants approach the data challenge? (And what have been the benefits and challenges of this Big Tech approach in other sectors?)

## SOMETHING TO CHEW ON...

### What are the governance implications of data?

Data innovations are rarely just technical in scope: instead, they often have the potential to fundamentally challenge where control and influence lies.

What are the more radical implications of a data-led approach to DSO service procurement?

## SOMETHING TO CHEW ON...

### What might 'open source' mean in the DSO service context?

How would this look? And how might this be balanced with commercial confidentiality?

# 3D. BASELINING



## PROBLEM DEFINITION

**Proving ‘additional’ action:** When measuring the response that a household has provided, what do we measure it relative to? There is a need to distinguish between what households consume when providing flex (the contracted action) versus what they would have consumed otherwise (the baseline).

## IMPACT

**Complications in performance measurement:** challenges in verifying actual performance.

## DISCUSSION

Domestic consumers have small-scale, unpredictable and highly variable energy demand of domestic consumers. Issues to consider when defining a baselining approach include:

- **Individual or composite:** Domestic flexibility will be delivered by large portfolios made up of hundreds of individual properties. Can baselining be done on a statistical, portfolio level basis, or are individual consumer baselines required?
- **Voluntary or calculated:** Customers have the best understanding of their own baseline energy consumption. Should we trust them to provide their own baseline, or calculate it independently?
- **Level of granularity:** More granularity means more accuracy, but makes data capture and storage more difficult.
- **Verification method:** How do you verify that the approach you are taking is accurate?
- **Effort vs reward:** Accurate baselining may be costly and difficult. The amount of effort made to develop and implement an accurate solution should be proportional to the reward.
- **Asset type:** Do participants respond just by changing their demand, or do they have the capability to respond by providing export to the grid? Baselining methods must be flexible to all options.

## SOMETHING TO CHEW ON...

**How might an online marketing company do baselining?**

Marketing companies have to demonstrate that their marketing media has brought about a change in consumer behaviour – namely motivating consumer purchases. How do marketing companies prove they’ve had an impact? What might we learn?

## SOMETHING TO CHEW ON...

**Can we leverage existing methods?**

Such as FPNs declared to Exelon; energy supplier forecasts etc. Or do we need to reinvent the wheel?

## SOMETHING TO CHEW ON...

**Do we even need a baseline?**

One might argue that what matters is what domestic customers are *currently doing*, not what they would have otherwise be doing. What is the alternative to defining a baseline?



**WE LOOK FORWARD TO SEEING  
YOU AT THE WORKSHOP**

**...and ultimately to trialing your ideas!**

# FutureFlex

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This document has been prepared and is issued by Everoze Partners Limited (“Everoze”) to Western Power Distribution in accordance with the contract agreement dated 9 December 2019, which governs how and by whom this report should be read and used.

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