Charging Futures

Reforming electricity charging together

Forum

Charging Futures Forum

19 September 2019

Welcome

Colm Murphy

Electricity Market Change Delivery Manager

National Grid ESO

nationalgridESO

Charging Futures

Overview of the day

Colm Murphy

Electricity Market Change Delivery Manager

National Grid ESO

Agenda

- 10:00 – 10:10 **Welcome** – Colm Murphy, National Grid ESO
- 10:10 – 10:30 **TCR Update –** Andrew Self, Ofgem
- 10:30 – 10:50 **Overview of Access SCR** – Andy Burgess, Ofgem
- 10:50 – 11:30 **Linkages between Access, Charges and the procurement of Flexibility** – Jon Parker, Ofgem
- **11:30 - 11:50 Break**
- 11:50 – 12:25 **Access Rights** – Stephen Perry, Ofgem
- 12:25 – 13:05 **Cost Models –** Patrick Cassels, Ofgem
- 13:05 – 13:15 **Pre-Lunch Reflection -** Colm Murphy, National Grid ESO
- **13:15 – 14:00 Lunch**

Charging Futures

Agenda

- 14:00 – 14:40 **Charge Design –** Beth Hanna, Ofgem
- 14:40 – 14:55 **Next Steps** – Andy Burgess, Ofgem
- 14:55 – 15:10 **Non SCR Industry Update** – Paul McGimpsey, Energy Network Association
- 15:10 – 15:50 **Q&A –** Various Panellists
- 15:50 – 16:00 **Closing Remarks –** Colm Murphy, National Grid ESO

Charging Futures

Mentimeter

- Please go to www.menti.com, using code on screen to access the presentation.

- Submit Q & A questions at any time

Charging Futures

Menti Warm Up

- Which team will go furthest in the Rugby World Cup?

- England
- Ireland
- Scotland
- Wales

Charging Futures

Targeted Charging Review

Andrew Self, Head of TCR

Ofgem

Objectives of TCR session

- **Provide an update on our recent TCR open letter**
  - We are seeking views on our refined non-domestic fixed charge proposals – how well they align with our principles, and how easy they would be to implement and update.

- **Summarise our refined version of non-domestic residual banding**
  - Recap of the minded to consultation and overview of refined non-domestic proposals
  - Developing non-domestic segmentation proposal
  - Setting and updating bands, considering customer characteristics
  - Practicalities and implications

- **Our sensitivity analysis on renewable build out**

The TCR team will be around to answer questions, so please find us at the break if you have questions or comments.

Charging Futures

Overview of the TCR

The **objectives** of the TCR SCR are to:

- Consider reform of residual charging arrangements for both generation and demand, to ensure it meets the interests of current and future consumers
- Keep the other 'embedded benefits' that may distort investment or dispatch decisions under review

The TCR principles - **reducing harmful distortions**, **fairness** and **proportionality** and **practical considerations –** guide our assessment of residual charging options.

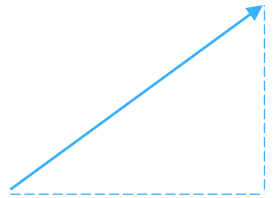
- We consulted on our minded-to proposals in November 2018. We proposed two leading options for residual charges - a **fixed charge** and an **agreed capacity charge** – and said **we preferred a fixed charge.**
- We received over **130 responses** to our minded-to consultation. Where a preference was stated, most respondents supported fixed residual charges, but some respondents raised concerns with particular aspects of the detailed design.
- Many respondents said greater granularity was needed in charging segments for non-domestic users. In view of these calls for greater equity, we have **reviewed and refined our proposed fixed charge option,** considering the TCR principles. We published an open letter to update stakeholders on these refined proposals, and provide the opportunity to comment on them before we make our final decision.

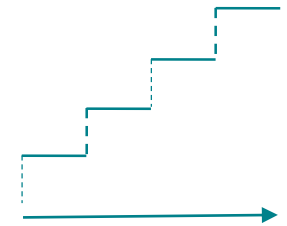
Charging Futures

Leading options

	ALLOCATION APPROACH	CHARGE BASIS
Minded-to option: Fixed charge A fixed charge is calculated for each user segment, defined by **Line Loss Factor Classes**. The allocation between segments is based on segment total net metered volume.	Allocated based on net volumes in segment.	Fixed charge
Minded-to option: Agreed capacity For those larger users which have **agreed capacity**, a charge is calculated directly. **Deemed capacities** are set for domestic and smaller non-domestic customers.	**Small users:** Allocated based on deemed capacities, with bands for domestic and small business customers.	Charge based on deemed capacity
	Large users: Allocated based on agreed capacities.	Agreed capacity charge
Refined proposal: Refined fixed charge A fixed charge is calculated for each user segment, defined by **agreed capacity thresholds** at higher voltages, and users' contribution to **net volumes** at LV.	Allocated based on net volumes in segment.	Fixed charge

Proposed segments were based on **line-loss factor class**





Fixed charging bands linked to increasing size

Charging Futures

TCR principles applied to customer segmentation criteria

We **proposed establishing criteria**, linked to our **principles**, to inform segment definition and updates over time.

Reducing harmful distortions	• Lowest number of segments needed to achieve objectives • Segments avoid splitting dense clusters of similar user types where possible • Potentially an appropriate minimum number of users per segment
Fairness	• Broadly consistent upper limit on range of user types facing the same charge across segments • Segments well balanced with a broadly consistent basis, aiming to distinguishing user groups with significantly distinct characteristics, or clear reasons for differences. • Tangible, justifiable link to energy usage in the basis for segment boundaries
Practicality and proportionality	• Lowest number of segments necessary to achieve objectives • Broadly consistent basis for segments for simplicity • Uses available data and any system changes are proportionate • Distributional effects and complexity are no greater than necessary to achieve objectives

Charging Futures

Illustrative process for setting and updating bands

We have proposed to apply these criteria as follows:

Firstly, we consider **whether segmentation** of customers at a given voltage level **is needed**

Where users span around an order of magnitude in size, we propose that they are likely to be sufficiently similar that further segmentation is not merited.

Secondly, we assess the **population characteristics** where additional segmentation is required

Applying this test to non-domestic voltage levels indicates five potential consumer groups: LV NHH, LV HH, HV and EHV-connected users.

Thirdly, we assess whether these users **can be segmented** in a way which reflects key characteristics, while minimising the number of bands

Segment boundaries are based on agreed capacity at HV and EHV, where data is widely available, or net volume at LV. In future, all users could move to a capacity basis.

Lastly, the resulting bands may be evaluated at DNO level to consider whether there **may be too few customers** per segment

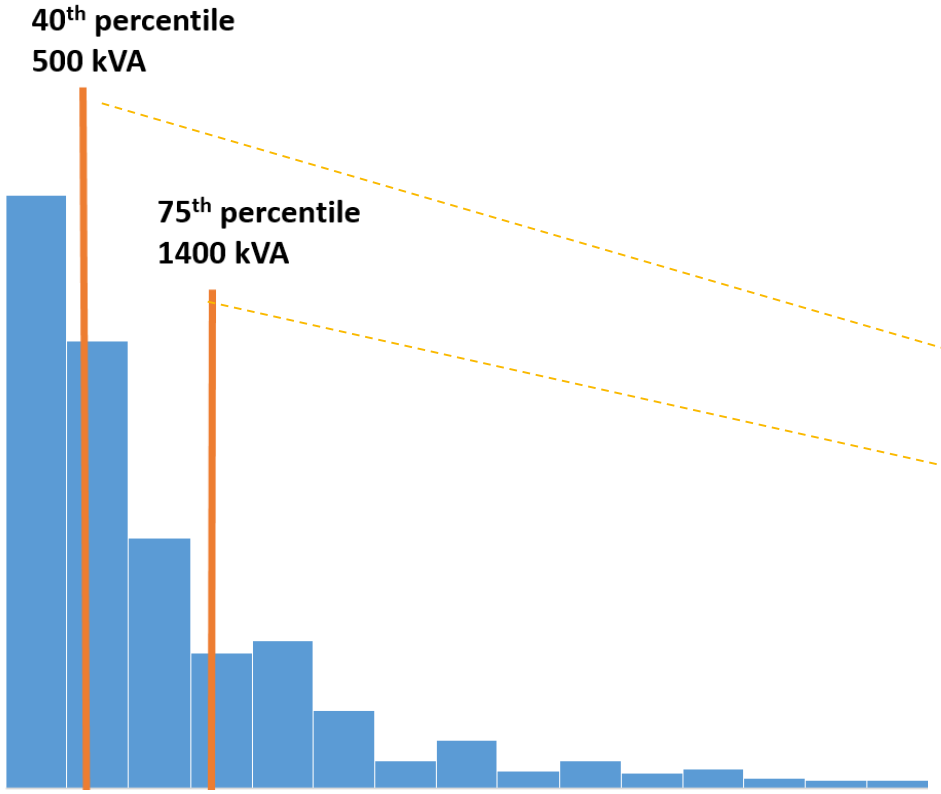
This may result in some bands being combined.

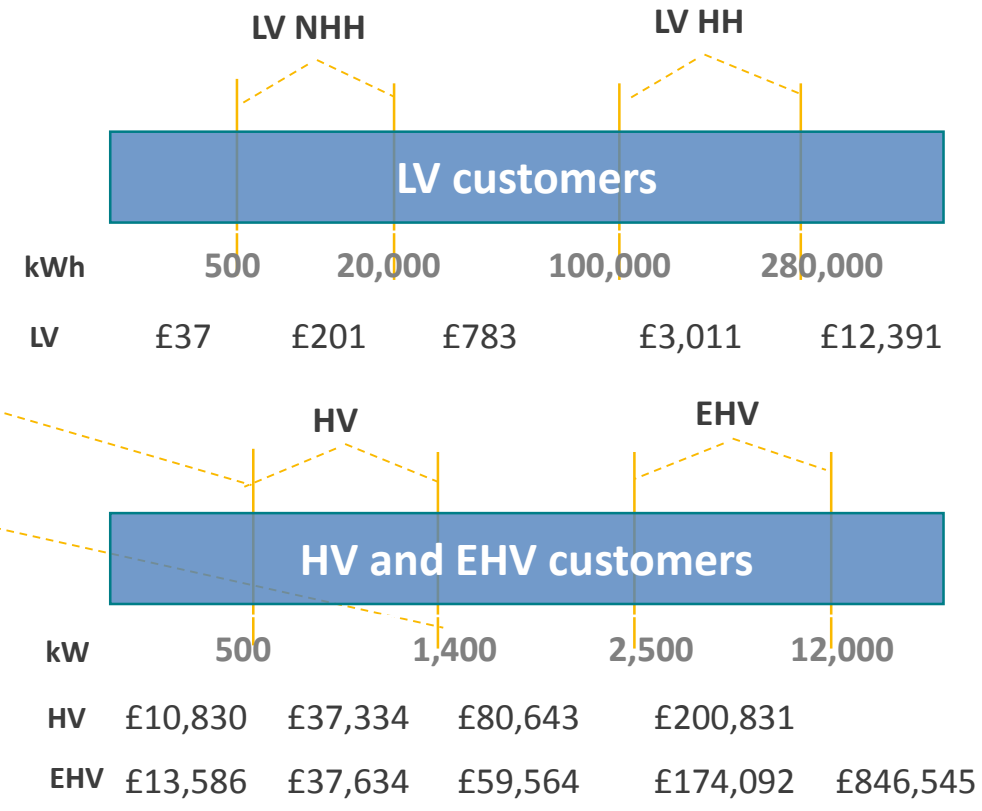
14

Customer characteristics

We want to **avoid undue discrimination** between similar customer groups, where practical. We have therefore **considered the distribution of customers** in key customer groups and derived thresholds based on their characteristics

Eg considering HV customers by way of illustration:





Charging Futures

Practicalities and implementation

Considering implementation of the refined fixed charge option, we outline specific proposals below.

Setting and updating the charge

- We have proposed to **set and allocate users to bands on a historic basis**, to be updated periodically, potentially in line with price controls.
- The proposed band thresholds should be applied on a **consistent basis across Britain**
- Where **more users get agreed capacity** or other **improved capacity data,** we currently think any banding at **those voltage levels should also transition to an agreed capacity** or more appropriate basis.
- As the distinction between half-hourly and non-half hourly customers diminishes, it may be also necessary to update the approach**.**

Implementation and design

- In practice, we expect **many other aspects of how the charge is set will be consistent with existing arrangements,** though we would expect industry to consider **any consequential changes needed through the mod process.**
- **Specifically, we would expect that**
  - Some form of **revenue reconciliation** is likely to be needed, and
  - Applying the fixed charge pro rata on a **daily rather than yearly** basis could help account for changes within year

We expect these matters to be developed further by industry in the most appropriate way through the modification process.

Charging Futures

Renewables sensitivity

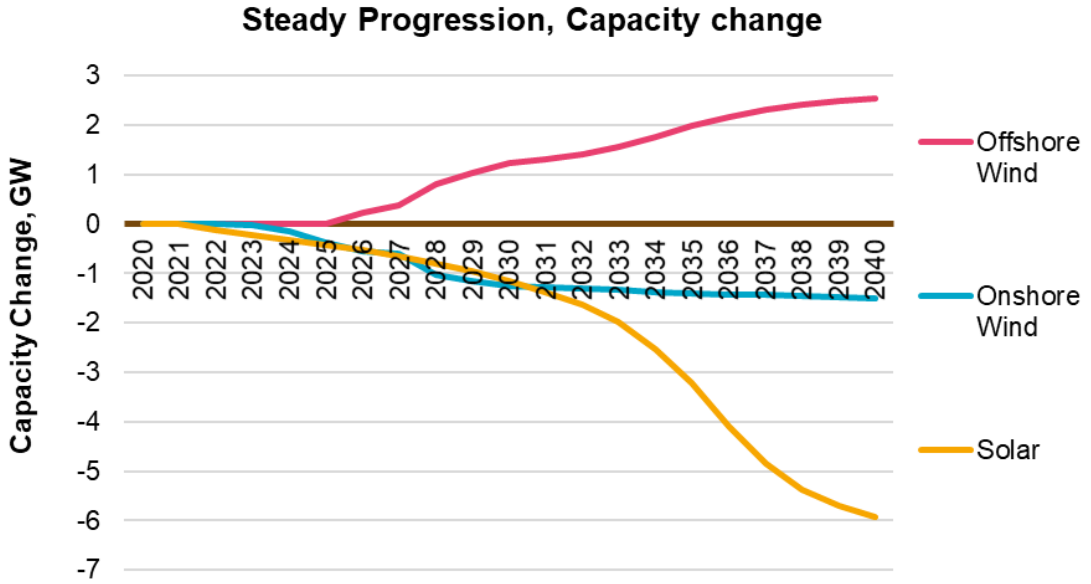
As with all aspects of the TCR, our decision in principle-based, supported by quantitative analysis

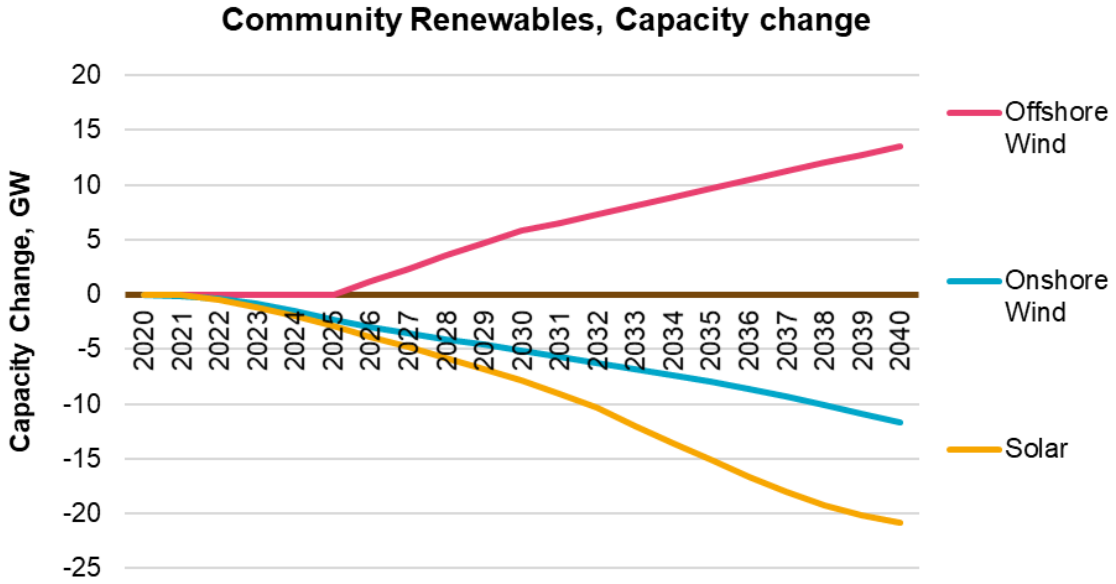
- Following requests from a number of stakeholders, we have published a further sensitivity to test our benefits case to relatively extreme assumptions around renewable build out
- For this new analysis we test the benefits case previously published against a relatively large reduction in onshore wind and solar PV investment.
- This should not be considered a prediction of the potential impact of the reforms on onshore wind and solar PV investment
- It is designed to illustrate how the benefits case changes in response to a relatively extreme assumption.
- For this purpose we have assumed a 50% drop-out of new onshore wind and solar build.
- For consistency with our previous analysis, this new modelling examines sensitivities with significantly reduced Onshore Wind and Solar deployment in the following factual scenarios:
  - TGR & Full BSUoS reforms (Steady Progression (SP) background)
  - Alternative FES18 background: TGR & Full BSUoS reforms (Community Renewables (CR) background)

The sensitivity

Renewable capacity change vs previous analysis

- The 50% reduction assumption for the purpose of this sensitivity implies a reduction of around 7.5GW of onshore wind and solar PV deployment by 2040 in the Steady Progression scenario. This is replaced by 2.5GW of offshore wind.
- In the Community Renewables scenario the 50% drop out assumption implies a reduction of around 33GW of onshore wind and solar PV. We assume this is replaced by 13.5GW of offshore window.





Charging Futures

The results

Quantitative results from new analysis

- Our results show that under the renewable sensitivities the reforms still reduce consumer costs by £3.5bn under Steady Progression background and £1.9bn under Community Renewables.
- There is an increase in the system cost which is driven by the higher levelised cost of offshore wind relative to onshore wind and solar PV.

Counterfactual	Factual	System Cost Impact (£bn) NPV to 2040	Consumer Cost Impact (£bn) NPV to 2040
Previous analysis*			
Baseline (Steady progression)	TGR & Full BSUoS Reform	-0.02	-4.52
Alt FES: Baseline (Community renewables)	Alt FES: TGR & Full BSUoS Reform	+0.33	-5.99
New analysis – Renewable sensitivities*			
Baseline (Steady progression)	Renewable sensitivity – TGR & Full BSUoS Reform	+1.04	-3.52
Alt FES: Baseline (Community renewables)	Renewable sensitivity – Alt FES: TGR & BSUoS	+4.06	-1.92

Charging Futures

Next steps

- The consultation window closes on 25 September, please send any responses to TCR@Ofgem.gov.uk
- We welcome any further feedback on the information published in the open letter, including on the proposed refined fixed charge approach and segmentation criteria, any impacts and practical considerations of the resulting bands and per site charging, considering our TCR principles.
- We plan to take a final decision in the next 2 months.

Charging Futures

Overview of Access SCR

Project update and summer working paper

Andy Burgess, Deputy Director,
Electricity Charging and Access,
Ofgem

What are access arrangements and forward-looking charges?

Access arrangements - the nature of users' access to the electricity networks (for example, when users can import/export electricity and how much) and how these rights are allocated

Forward-looking charges - the type of ongoing electricity network charges which signal to users how their actions can ether increase or decrease network costs in the future

Charging Futures

Background to the Access SCR

Objective of Access Significant Code Review (SCR): We want to ensure electricity networks are used efficiently and flexibly, reflecting users' needs and allowing consumers to benefit from new technologies and services while avoiding unnecessary costs on energy bills in general.

We launched the Access SCR in December 2018. The scope is

- Review of the definition and choice of transmission and distribution access rights
- Wide-ranging review of Distribution Use of System (DUoS) network charges
- Review of distribution connection charging boundary
- Focussed review of Transmission Network Use of System (TNUoS) charges

Charging Futures

Our approach

Our key focus this year is on developing and assessing a long-list of options. We are sharing our thinking through two working papers:

1st working paper - just been published

- An initial overview and assessment of options for access rights, better locational DUoS signals and charge design.
- The links between access, charging and procurement of flexibility.

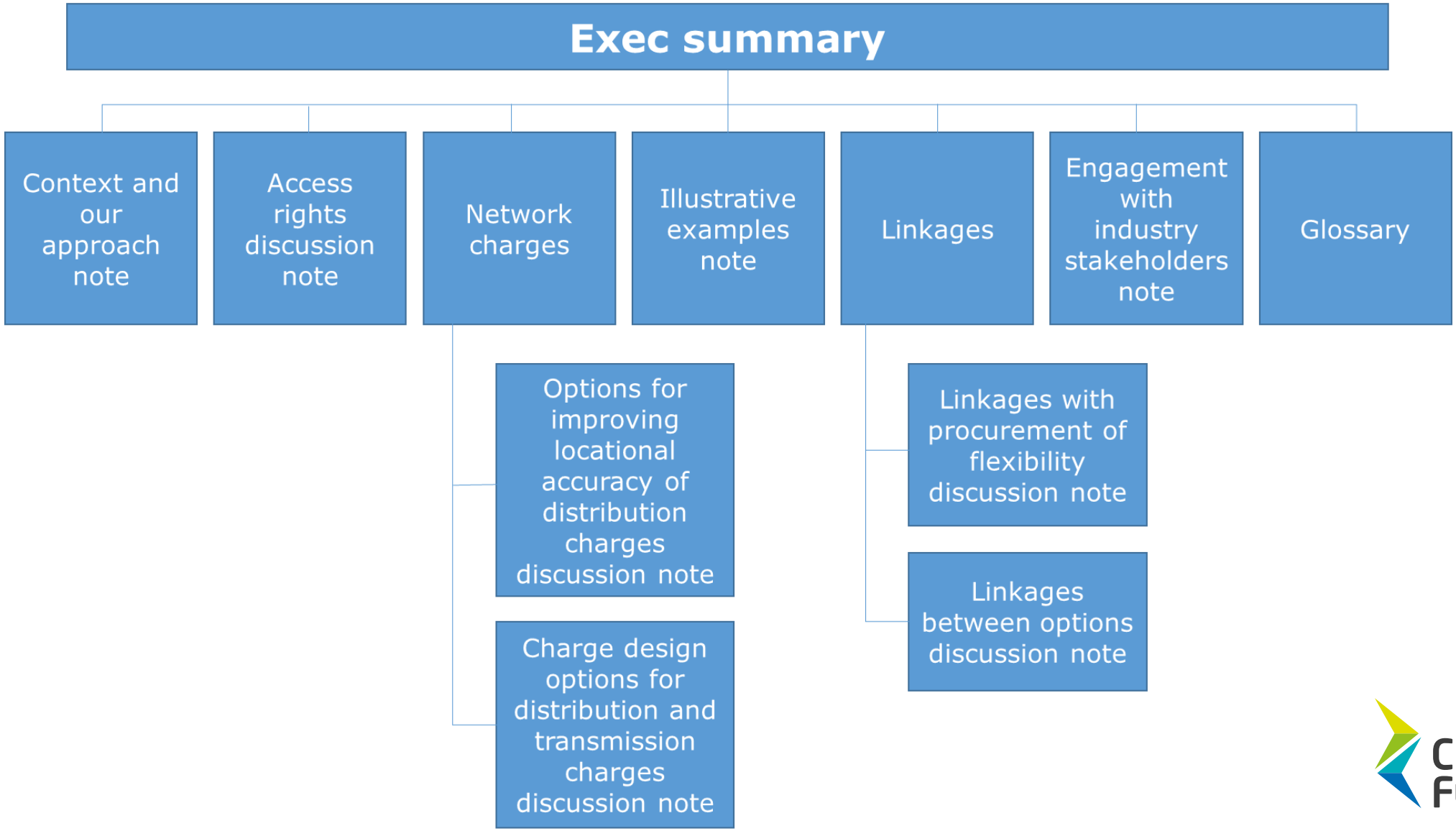
2nd working paper – to be published at the end of the year

- Small user treatment
- Distribution connection charging
- Focused transmission charging reforms

A shortlist of options will be assessed in further detail early next year, with consultation on our draft SCR conclusions in summer 2020

Charging Futures

Overview of our 1st working paper



Charging Futures

Linkages between access, charging and procurement of flexibility

Jon Parker, Head of Electricity Network Access,
Ofgem

Different approaches to valuing flexibility

Flexibility generally means **the ability of users of the electricity system to vary their generation or demand in response to signals at different times.** There are two different ways that this can be achieved. There are advantages and disadvantages of both approaches.

Network price signal flexibility

- **Access rights and forward-looking network charges/credits**
- **Embedded benefits**
- **Residual charge avoidance**

Being addressed by TCR

Contracted flexibility

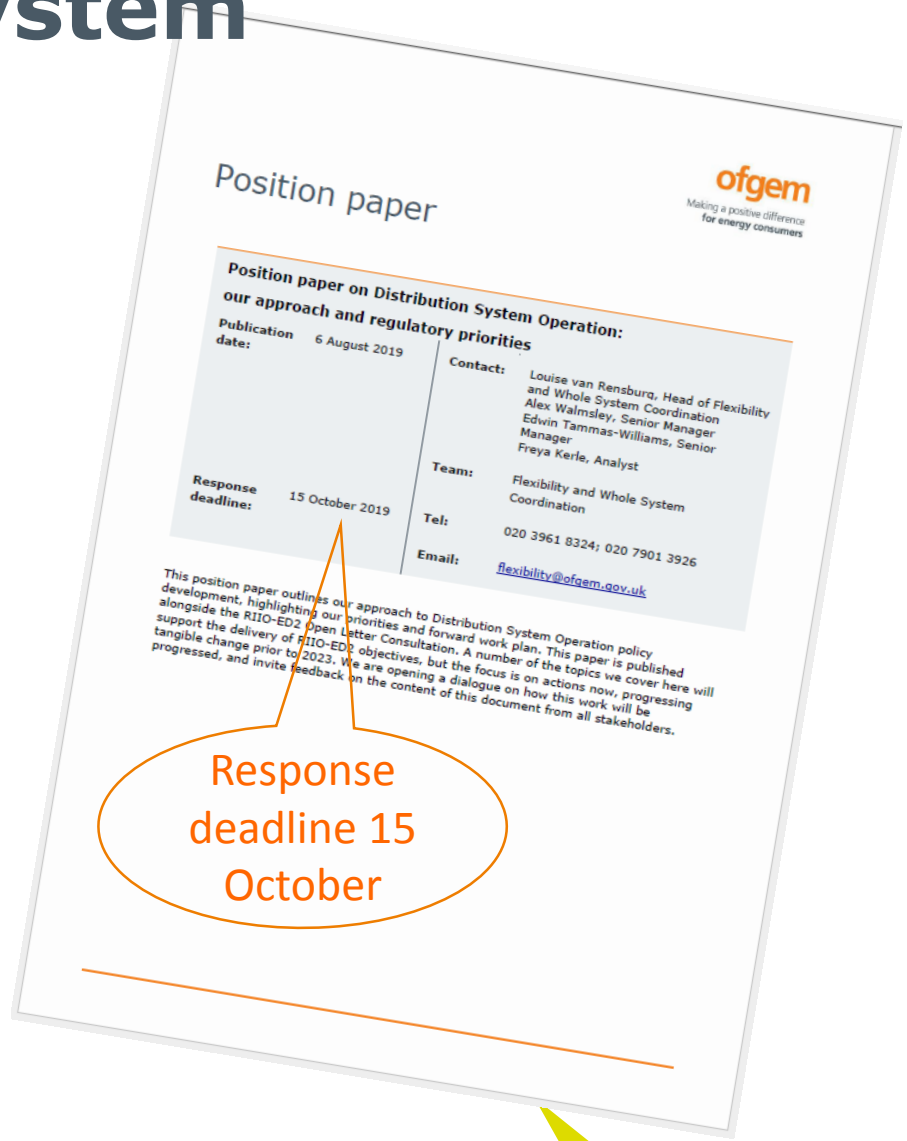
- **Trading of access rights/curtailment**
- **Procurement of shorter term network management services**
- **Procurement of longer term network reinforcement services**

Flexibility and Distribution System Operation

Our work programme focusses on:

- clarifying whether emerging services should be done by DNOs or the market, through considering risks, mitigations and benefits;
- increasing interoperability and transparency, which also keeps options open to deliver wider institutional change in future
- building and steering the development of coordinated flexibility markets.
- establishing whole electricity systems coordination

DSO work streams
1. DNOs and new contestable services
2. Key enablers for DSO functions
3. Development of coordinated flexibility markets
4. Whole electricity systems coordination



The above work enables more efficient system operation within the current integrated DNO-DSO structure. And, in helping to develop the DSO function, creates a base to consider whether or not to separate.

Charging Futures

Timelines: DSO Position Paper

Work	Outcome	H2 2019	H1 2020	H2 2020	2021	2022
RIIO-ED2		**Open Letter decision**	**Methodology consultation (June 2020)**	**Methodology Decision (December 2020)**	**Business plans**	**Stat con licence**
1. DNOs and new contestable services	Clarify boundary between monopoly and competitive services	• EV charging mod decision • Review feedback on DSO paper re DNO roles in contestable services	• CLASS consultation • Embed wider principles in CLASS consultation/ method con where appropriate	• Decision on CLASS • Wider principles embedded in method decision where appropriate • Appropriate role for DNOs in platforms consideration	Policy input into business plan assessment	
2. Key enablers for DSO functions	Interoperable systems and data	• LTDS/ enablers consultation	• Embed incentives for monitoring in methodology consult. • Working groups on data standards	• Working groups on data standards → • Standards for platforms work kick-off		
3. Development of coordinated flexibility markets	Flexibility a robust alternative and coordinated with other markets	• Workshop on flex procurement • Evaluation of progress (Open Networks and DNOs)	• Evaluate progress • Options to procure and value flex in method con	• Evaluation of progress (Open Networks and DNOs)		
4. Whole electricity system coordination	Effective sharing of information and solutions across boundaries	• Consultation and implementation of whole system licence changes	• Input into whole systems work for RIIO-ED2			

The value of flexibility

We want flexibility providers to realise the value that they can provide to the energy system in different markets.

Flexibility can help manage network constraints and reduce the need for potentially expensive network infrastructure. If network users (or intermediaries on their behalf) can offer flexibility, such as shifting demand away from peaks, network constraints may be relieved without upgrading the network. We consider that this may help reduce energy system costs.

We have developed criteria to assess the different approaches for valuing flexibility:

Charging Futures

Assessment of different approaches

Ability to signal local and real time conditions

From a feasibility perspective, we consider that network access rights, trading of access rights and flexibility procurement may be better able to provide highly targeted, local and real-time signals about the constraints that users can resolve.

Competitive price discovery and market power concerns

A framework that provides for the price of flexibility response to be discovered through a market based mechanism can support more efficient outcomes. We consider that, where there is adequate competition, flexibility procurement and trading of access rights best reveal efficient price through a competitive market.

Ease of engaging with wide range of users and user experience

Users will only be able to offer flexibility to the system if they can understand the mechanisms by which they can engage or via third parties. We consider that forward-looking charges are currently the simplest and most easily understood way of sending signals to a wide range of users.

Assessment of different approaches

Certainty of response

In order to realise the benefits, network and system operators need to be able to rely on the flexibility being provided when they need it. We consider that access rights, trading of access rights and procurement of flexibility provide more certainty about the level of user response than forward-looking charges.

Ease of implementation and operation

Ensuring the proper valuation of flexibility means that some systems, technology and regulations will need to change. Whilst some options are likely to be simple to implement, we consider that the introduction of more dynamic and localised forward-looking charging could require significant investment.

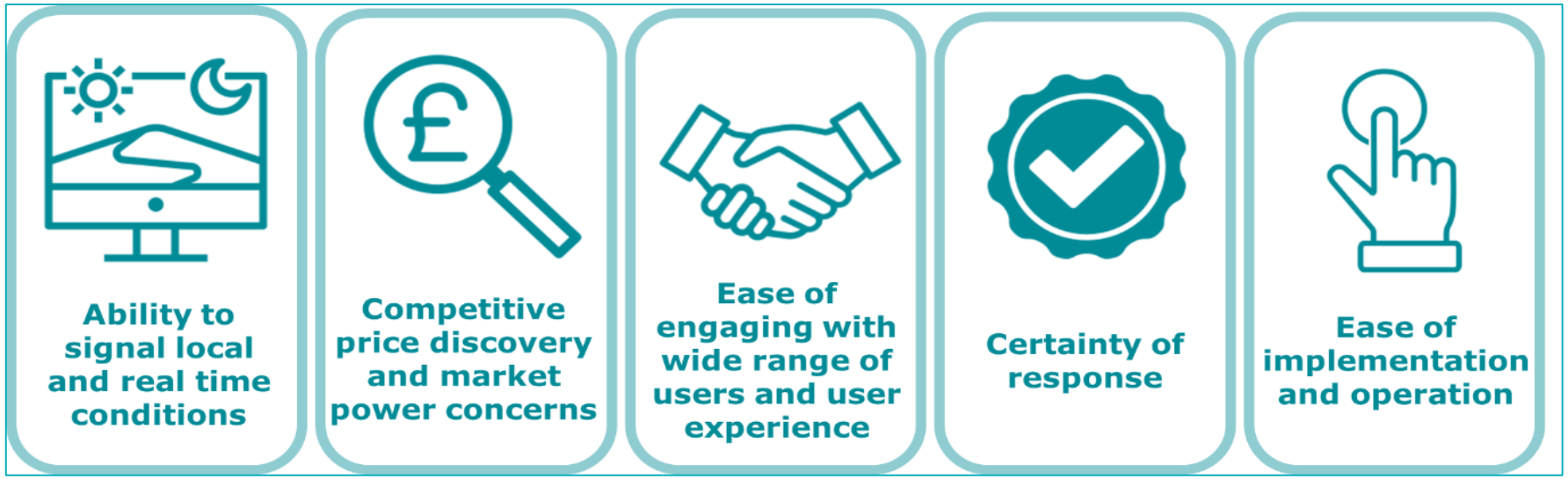
We consider that **a combination of approaches may work best**. If a combined approach was progressed, we would need to ensure that the signals worked together to drive an efficient outcome, and not over-reward flexibility.

Charging Futures

Breakout groups

We would be keen to better understand how your views. In your breakout groups discuss:

- What do you think is best way of valuing flexibility?
- If we progressed a combined approach, how can we ensure that the signals worked together to drive an efficient outcome?



Charging Futures

Break

Restaurant

11:30-11:50

Access Rights

Stephen Perry, Senior Manager,
Charging & Access,
Ofgem

Access rights – overview

Network access rights define the nature of users' access to the network and the capacity they can use (eg how much they can import or export, when and for how long, and whether their access is to be interrupted and what happens if it is).

It should benefit all network users if we can make better use of capacity and allocate it in a smarter way.

In this session we intend to:

- Provide an overview of our analysis of access rights options
- Have a discussion on our preliminary considerations

Charging Futures

Access rights – options

Firmness of rights	This is the extent to which a user's access to the network can be restricted (physical firmness) and their eligibility for compensation (financial firmness) if it is restricted.
Time-profiled rights	This would provide choices other than continuous, year-round access rights (eg 'peak' or 'off-peak' access).
Shared access rights	Users across multiple sites in the same broad area obtain access to the whole network, up to a jointly agreed level.
Other	• Short term rights - This would provide a choice for limited duration access (eg one year) where long term access is not immediately available or where the user does not want it. • New access conditions - This could involve introducing conditions on access, for example 'use-it-or-lose-it' or –use-it-or-sell-it'.

Access rights – firmness

Options: The level of firmness is the extent to which a user's access is restricted (ie curtailed) and their eligibility for compensation if they are. Additional choice could create access options are where a user agrees to be curtailed, up to certain parameters:

- The extent to which a user's access is restricted could be defined by the **physical assets** that connect them to the wider system and the design of the network.
- The extent to which a user's access to the network is restricted could also be defined by setting limits on the **user's experience of curtailment.**

Regardless of how much the user agrees to be curtailed, the user could have choice about whether it is financially compensated when it is curtailed or not.

Preliminary assessment

> "Physical drivers" may be less meaningful for users than consumer outcomes, but could be easier for network/system operators to provide.

> We consider that financially firm access could be valuable to users and could help improve transmission/distribution consistency.

> However, we are concerned that there may be insufficient time to develop and implement the necessary planning and security standards for financially firm access, in time for SCR implementation.

Access rights – time-profiled

Options

Time-profiled access would involve options other than continuous, year-round access rights. Access would be based on time-profiled capacity:

- Static time-profiled - Access limits vary over time (eg half-hourly, daily, weekly, monthly, seasonally). This could lead to the development of “on-peak” and “off-peak” access.
- Access limits vary over time depending on specific conditions (eg when the wind exceeds a threshold level).

Preliminary assessment

> Time-profiled access could support more efficient use of the network and appear feasible to offer.

> Stakeholders consider that time-profiled access would be valuable.

> However, network/system operators have concerns that dynamic time-profiled could be challenging to deliver.

Access rights – shared

Options:

Shared access would involve multiple users across multiple sites in the same broad area obtaining access to the network, up to a jointly agreed level, coordinating between themselves how they share access.

- Local shared access - where some users within the same specific location share access.
- Wider shared access - where multiple users within a broader location share access.

Preliminary assessment

> Some practical issues to resolve (eg monitoring and enforcement), but could lead to more efficient use of the network.

> Sharing access over wider area presents additional challenges (eg if access not equivalent).

> There are similarities between trading and sharing access, we need to consider respective roles.

Access rights – Menti questions

- **Which of the access options do you consider has the most potential?**

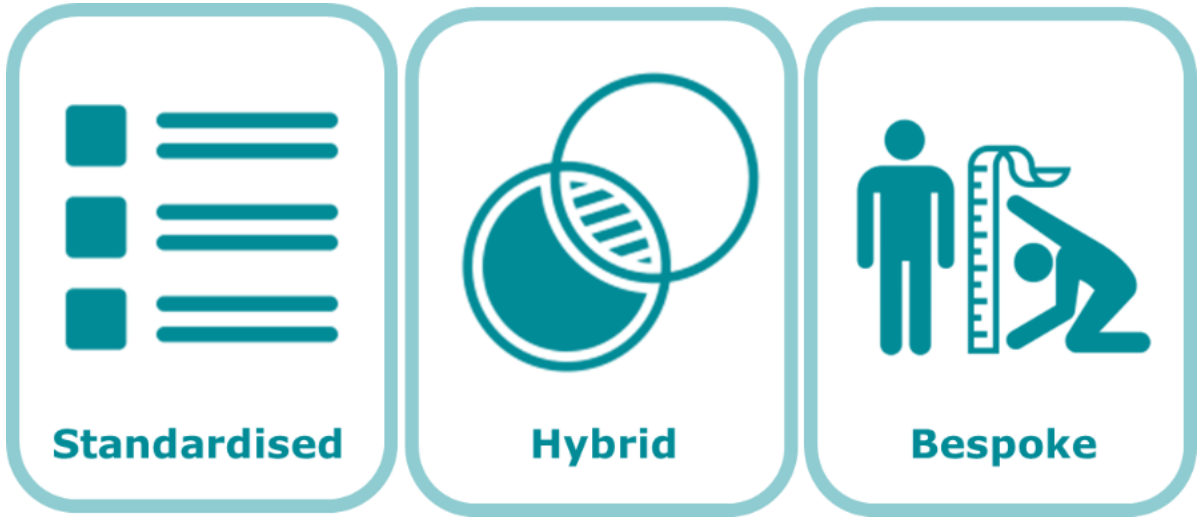
- **Firmness**
- **Time Profiled**
- **Shared**

Access rights – Menti questions

- **Rank how important the following factors are when deciding your access rights?**
  - **Generation/demand profile** – a user's expected generation of demand profile.
  - **Cost** - the cost of the different access choices may vary depending on the type of access required.
  - **Time to connect** – the time to connect to the network may vary depending on the type of access the user opts for.
  - **Ability to sell services to markets** – for some users, their ability to sell services to different markets may vary depending on their network access.

Charging Futures

Cross-cutting considerations – standardisation



- **The key trade-off is the balance between efficiency and complexity limitations** - bespoke arrangements could result in greater efficiency of network utilisation, but could be very complex to implement (how to charge for them).
- **Hybrid options may be a good compromise** - standardised access options that can be altered to meet individual network or user requirements may be a good compromise.

Cross-cutting considerations – monitoring and enforcement

- **Consequences of exceeding access rights should be visible, understandable and proportionate to the impact of overrunning access rights** - current approaches may require modification with the development of new access rights.
- **The approach to enforcing access rights may be another area where we can introduce greater choice of access** - introducing physical limitations on ability to exceed access rights, if this resulted in a cheaper connection.

Breakout session

Discussion

On each of your tables, please discuss:

- What are your thoughts on our analysis, and have we missed anything?
- Send any thoughts to www.menti.com, using code on screen.

Charging Futures

Better locational distribution network charges

Patrick Cassels, Senior Manager,
Network Charging and Access,
Ofgem

Better locational DUoS charges

Locational DUoS charges are underpinned by the cost models that determine how charging signals are calculated and applied.

1) Network cost models
Options for how forward-looking network costs are estimated.

2) Locational granularity
Options for how distribution network charges vary by location.

In this session we intend to:

- Provide an overview of this chapter of the 1st working paper
- Discuss anything that you disagree with or anything that you think is missing

Charging Futures

Better locational distribution network charges – key questions

Should charges be based on the Short Run Marginal Cost or Long Run Marginal Cost of the network?

Which costs should be modelled?

What is the extent of costs to be charged for?

Who should receive the signal?

How granularly should charges be calculated and applied?

Charging Futures

Network cost models – Short Run Marginal Cost

What is a Short Run Marginal Cost?

Incremental costs incurred by networks in the short term, such as constraint costs.

We identified two options how a SRMC-based network charge could be set:

- **SRMC charge set ex-ante**

  Attempting to forecast network conditions and the marginal cost of resolving any constraints. Used to set the charge ahead of each period.

- **SRMC charge set ex-post**

  Attempting to calculate the SRMC of each time period after it had finished. Based on constraints that occurred and any required curtailment actions.

Network cost models – Short Run Marginal Cost

Summary of preliminary view

We do not think that administratively set pricing would be the correct approach to SRMC due to challenges associated with accuracy, ability to respond, and feasibility of implementation.

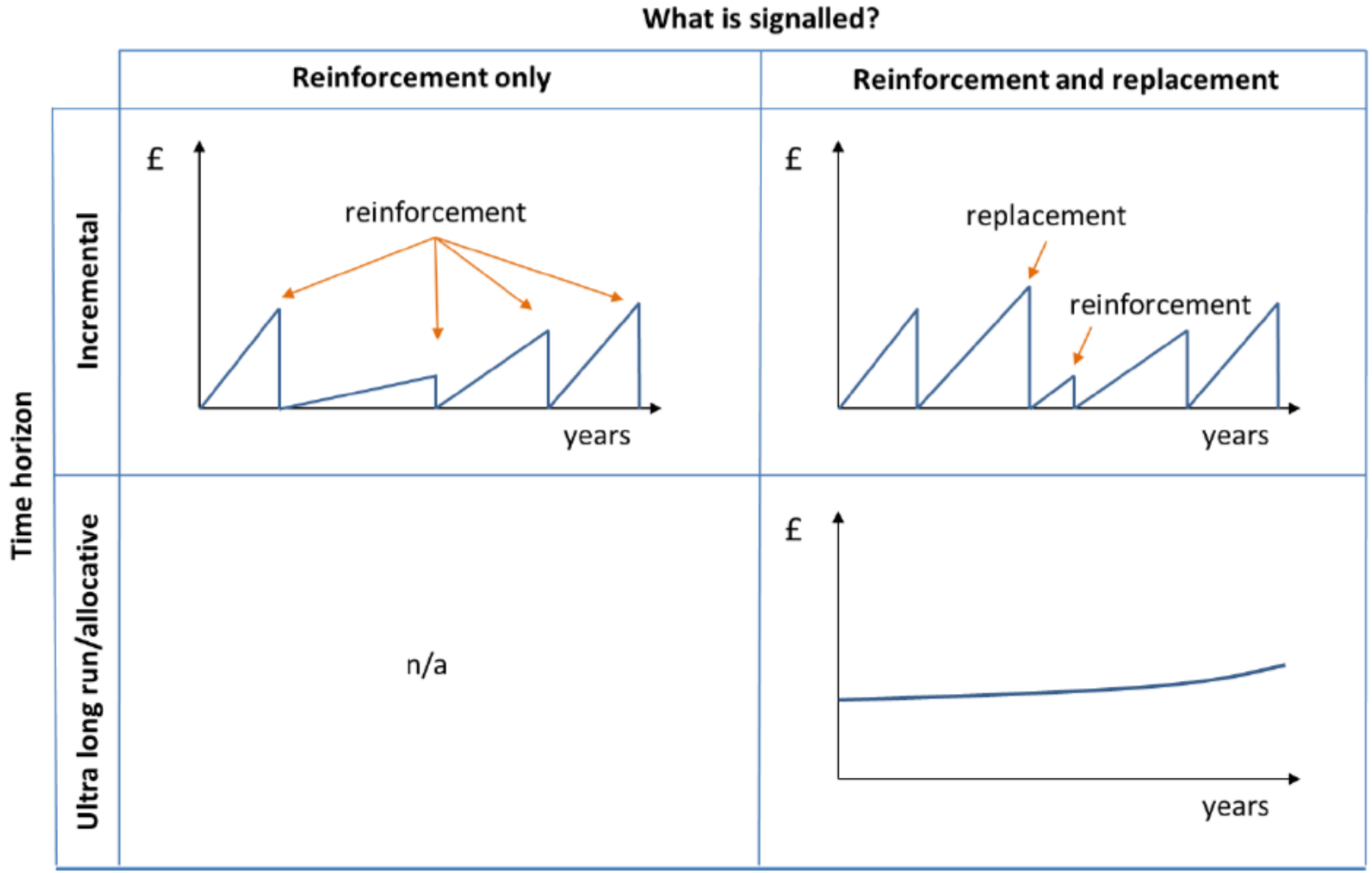
Charges based on the LRMC of the network are presently more feasible and can send a robust signal that parties can robust to in network planning and development timescales.

Charging Futures

50

Network cost models – Long Run Marginal Cost

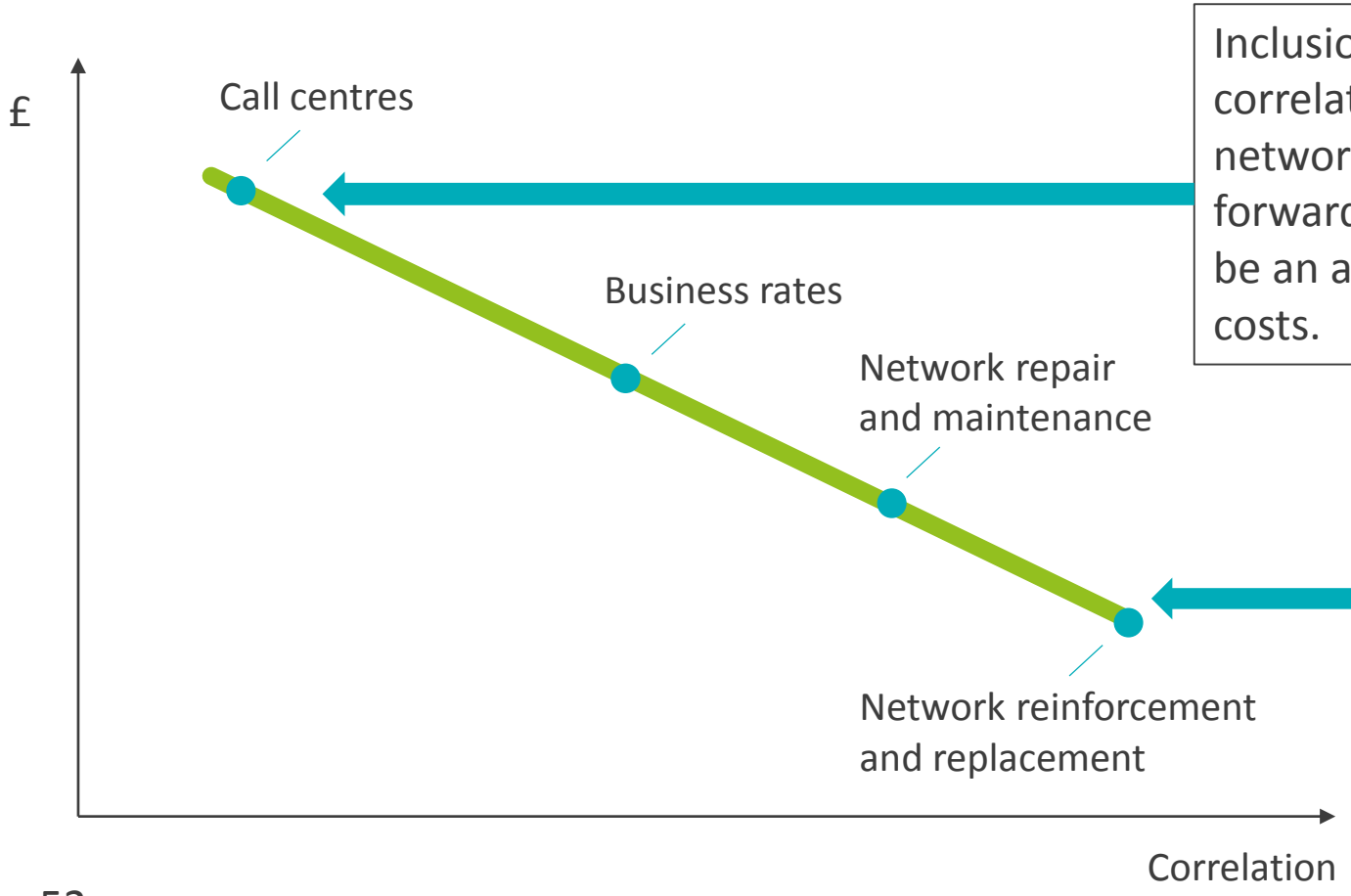
Which costs should be modelled?



Charging Futures

Network cost models – Long Run Marginal Cost

What is the extent of costs to be charged for?



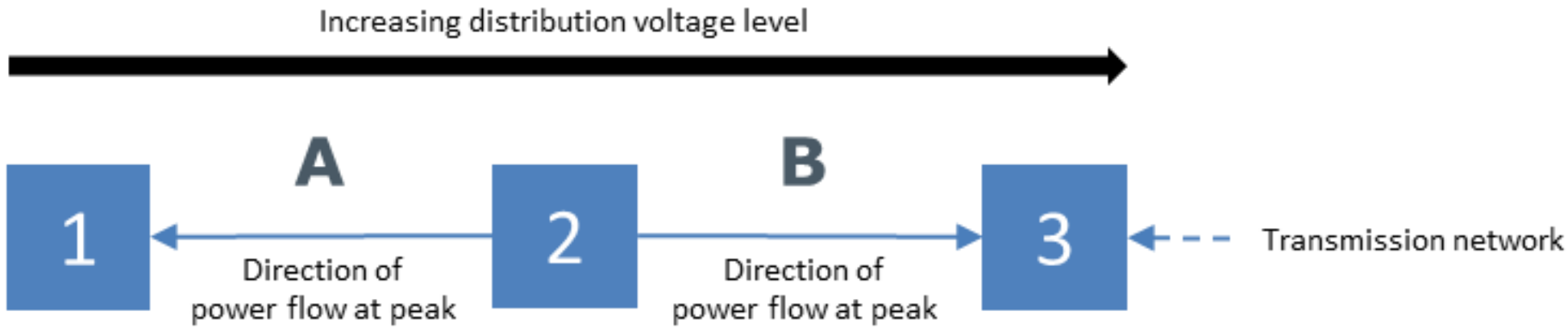
Inclusion of costs that are only loosely correlated to cost of developing network capacity would increase forward looking charge, but may not be an accurate way of allocating all costs.

Only including costs directly related to network capacity may lead to too low a forward-looking charge as it would miss other costs that are closely correlated to demand for network capacity.

Charging Futures

Network cost models – charges and credits

Who should receive the signal?



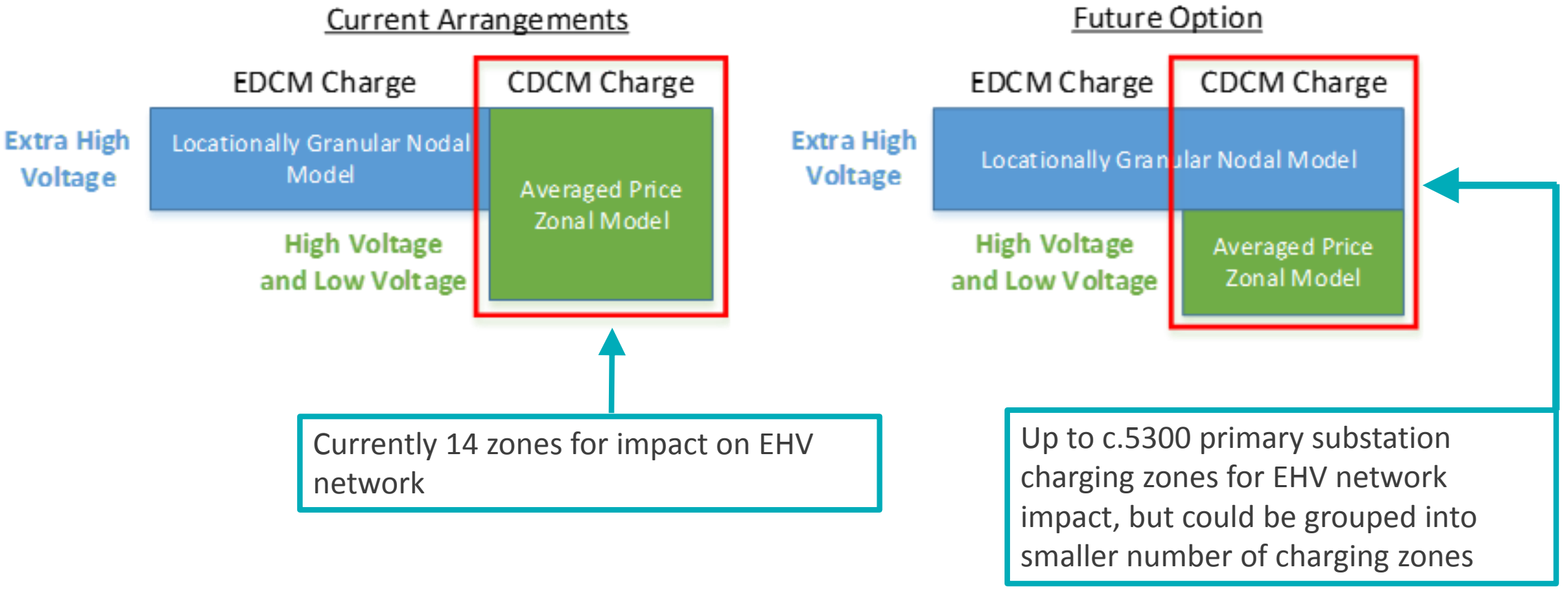
Under status quo arrangements:

Description	Circuit	Additional Increment	Node 1	Node 2	Node 3
- Upstream only - Both charges and credits - Demand assumed to drive costs	A	Demand	charge	-	-
		Generation	credit	-	-
	B	Demand	charge	charge	-
		Generation	credit	credit	-

Charging Futures

Locational granularity – integrating across voltages

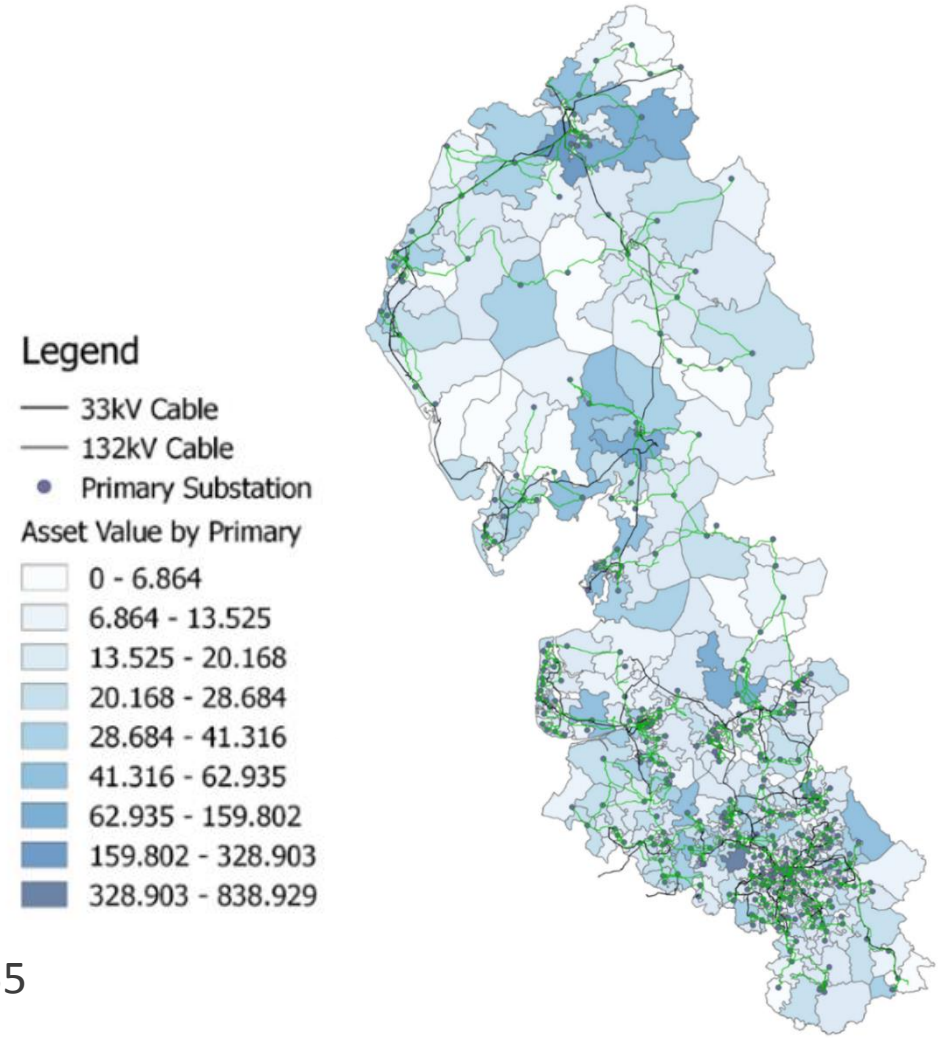
Exposing HV/LV connected users to locational impacts at EHV

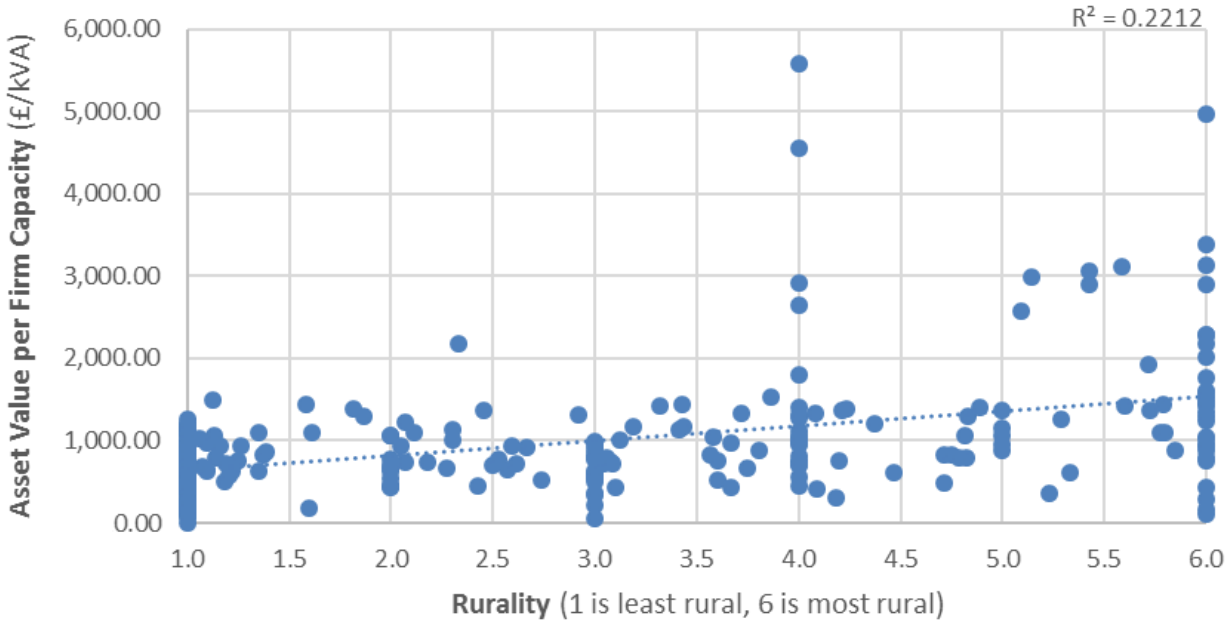


Charging Futures

Locational granularity – more granular charges

Extent to which greater locational granularity can be achieved





Source: Electricity North West Ltd network data and Ofgem cost data

Charging Futures

Summary of current views

Our current view

- Distribution charges should continue to be based on LRMC based approaches.
- SRMC approaches may be possible in the future, but we do not believe that an administratively set charge would be the correct approach, due to feasibility of implementation

We continue to

- Investigate the merits of different options for the estimation of LRMC.
- Note a reasonable case for including replacement costs and possibly other network costs closely correlated with development of charging signals.
- Note present inconsistencies in how costs are treated at different voltage levels
- Assess ways in which the network could be grouped, particularly at HV/LV, to reflect differences in network costs by primary substation

Charging Futures

Breakout session

Discussion

On each of your tables, please discuss:

- What are your thoughts on our initial assessment of distribution cost model options? (7 minutes)
- Please give your feedback on the locational charging issues identified (7 minutes)

- **Record your thoughts on www.menti.com, using code on screen.**

Charging Futures

Pre- Lunch Reflection

Colm Murphy, Electricity Market Change Delivery Manager,

National Grid ESO

Lunch

Restaurant

13:15-14:00

Charge Design

Beth Hanna, Senior Manager

Ofgem

Charge design – overview

Suppliers incur **Distribution Use of System (DUoS)** and **Transmission Network Use of System (TNUoS)** charges, reflecting customers' use of the networks to access or export electricity.

Charge design refers to the choices around the structure of tariffs, such as

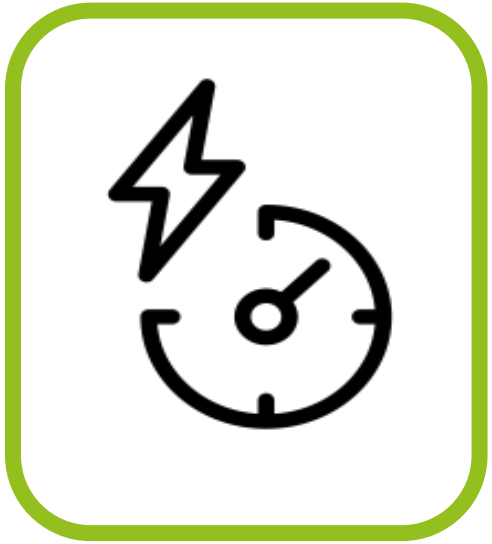
- between volumetric or capacity based charges
- whether charges should include seasonal differences
- whether the same design should apply to both transmission/distribution and generation/demand customers.

In this session we intend to

- Advise on five basic options we have identified for charge design
- Discuss our preliminary assessment

Charging Futures

DUoS charge design – Option 1: volumetric time-of-use



Description

- Different unit rates (in £/kWh) are assigned to set periods of the day called time bands, which reflect the probability that the network will be congested during that period.
- Customers are charged for the energy they consume during each time band

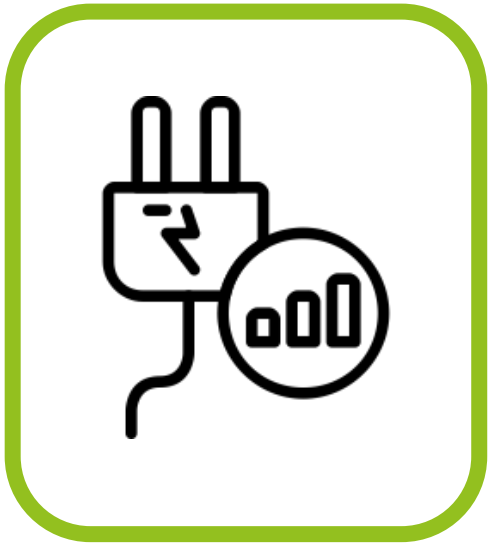
Preliminary assessment

- Energy consumed is not the key driver of costs so this may not be the most cost reflective option (compared with a capacity-based option)
- Volumetric time-of-use could still be an appropriate option – for example, it is familiar to small users and may be easier to understand
- We will consider the benefits of introducing seasonality for LV and HV connected customers and more locational granularity

DUoS charge design – Option 2: actual capacity

Description

- Customers are charged in £/kW (or other similar ways), based on their actual maximum capacity on the network measured ex-post
- Customers might only face a charge for their maximum actual capacity during a specified peak period that reflects times of congestion
- Alternatively, customers could face different rates for capacity measured during different time bands. The capacity measurement is reset at specific intervals (eg monthly, quarterly, annually).



Preliminary assessment

- May be more cost reflective, where costs are driven by peak usage, rather than consumption, but dependent on locational granularity of charges (i.e. a system level signal is not likely to coincide with all local asset peaks)
- Relative advantage of this compared to Option 1 is unclear, given potentially limited differences in customer response

DUoS charge design – Option 3: agreed capacity

Description

- Customers (or suppliers on their behalf) would need to agree with their DNO the maximum capacity they require on the network ex-ante
- Customers would pay a £/kW charge (or measured in other similar ways, such as £/kVA), based on the level of agreed capacity
- Where customers exceed their agreed capacity, they may need to pay an exceedance charge (or potentially choose to be curtailed, or be automatically upgraded to a higher capacity band in the next period)

Preliminary assessment

- May be more cost reflective, as costs are driven by peak usage, rather than consumption but depends on the degree that DNOs take agreed capacity into account when planning
- Need to consider the administrative burden to agree and maintain capacities with millions of domestic customers
- Consider whether deemed capacities would be appropriate for small users

DUoS charge design – Option 4: dynamic pricing

Description

- Under **Critical Peak Pricing**, customers would be charged a high charge during periods when the network is actually congested and a low or no forward-looking charge for the rest (and vast majority) of the year. The high price periods would be determined and notified in advance (e.g. day ahead). Typically the rate is known before the start of the year.
- Alternatively, under **Real Time Pricing**, the rate is dynamically determined and may change for each half hour period of the year and notified to customers a short period in advance.

Preliminary assessment

- Real time pricing may not be feasible by 2023, due to the changes required to support it. In addition, as outlined for SRMC, it may not be appropriate to administratively set charges
- It may also not be feasible to introduce Critical Peak Pricing by 2023. However, we will need to do further work to better understand if a form of it would be possible
- If 2023 is not feasible, we could still build dynamic pricing into the design to go live later

DUoS charge design – Option 5: critical peak rebates

Description

- This is similar to a Critical Peak Pricing option, except that, instead of being charged high prices during a critical peak day, customers would receive rebates for reducing their consumption or capacity during the peak periods
- In order to determine when a customer is entitled to a rebate, A baseline level of usage would need to be agreed with customers

Preliminary assessment

- As for Critical Peak Pricing, we will need to consider whether there is a form that could be possible and the benefits
- We will explore whether it is possible to implement a hybrid approach, which combines agreed capacity (providing a baseline) with Critical Peak Rebates

TNUoS demand charge design – Option 1: ex-ante Critical Peak Pricing

Description

- The current charging arrangements for half hourly demand customers is a form of ex-post Critical Peak Pricing (known as Triads)
- We could consider making changes to address industry concerns:
  1. Move to an ex-ante approach, to give customers greater certainty
  2. Increase locational granularity to better align peaks with local network conditions
  3. Increase the number of critical peak periods to smooth charges

Preliminary assessment

- We will need to undertake further assessment with the ESO of the options and whether there are others that reflect that network planning is based on year round considerations
- Further work is required to determine if the same approach can be applied to small users

TNUoS demand charge design – additional options

Option 2: agreed capacity

Preliminary assessment

- Applying agreed capacity to TNUoS charges would increase consistency with DUoS charges, if the agreed capacity option is also implemented at distribution Simplest approach would be for the ESO to charge on the basis of capacities agreed with DNOs
- Emphasis would be on access right choices, trading and flexibility procurement to send operational signals

Option 3: static charging

Preliminary assessment

- If a volumetric time-of-use approach is applied to DUoS charges, would increase alignment with distribution
- A volumetric time-of-use approach may be easier for small users to understand and respond to

Charge design – Menti questions

Please answer the following questions on Menti:

- Rank the five charge design options on the basis of preference
- Rank the five charge design options on how easy they would be to implement
- Provide any clarification or commentary on your rankings, which are specific to your organisation. Please identify which category of user you are (e.g. “large demand user: our preference is for X because…”)

Charging Futures

Charge design – table discussion

Please discuss the following questions on your table:

- What are your thoughts on our preliminary assessment of the charge design options? (6 mins)
- Which options do you think would be most likely to result in behaviour changes, which could reduce the need for future network investment? (6 mins)
- Do you think we have missed anything? (3 mins)

Charging Futures

Way forward and next steps

Andy Burgess, Deputy Director,
Electricity Charging and Access,
Ofgem

Next steps

- Any comments on our first working paper are welcome. Contact us on FutureChargingandAccess@ofgem.gov.uk
- We will continue to
  - develop our thinking on links with related work such as flexibility, RIIO price controls, and of course the outcome of the Targeted Charging Review.
  - work with our Delivery Group and Challenge Group.
- We intend to publish our second working paper by the end of the year. This will be discussed at the next Charging Futures Forum in December.
- We intend to determine a shortlist of options which we will assess in further detail early next year, with consultation on our draft SCR conclusions in summer 2020.

To keep up to date with all our work on Future Charging and Access - get added to the Charging Futures distribution list.

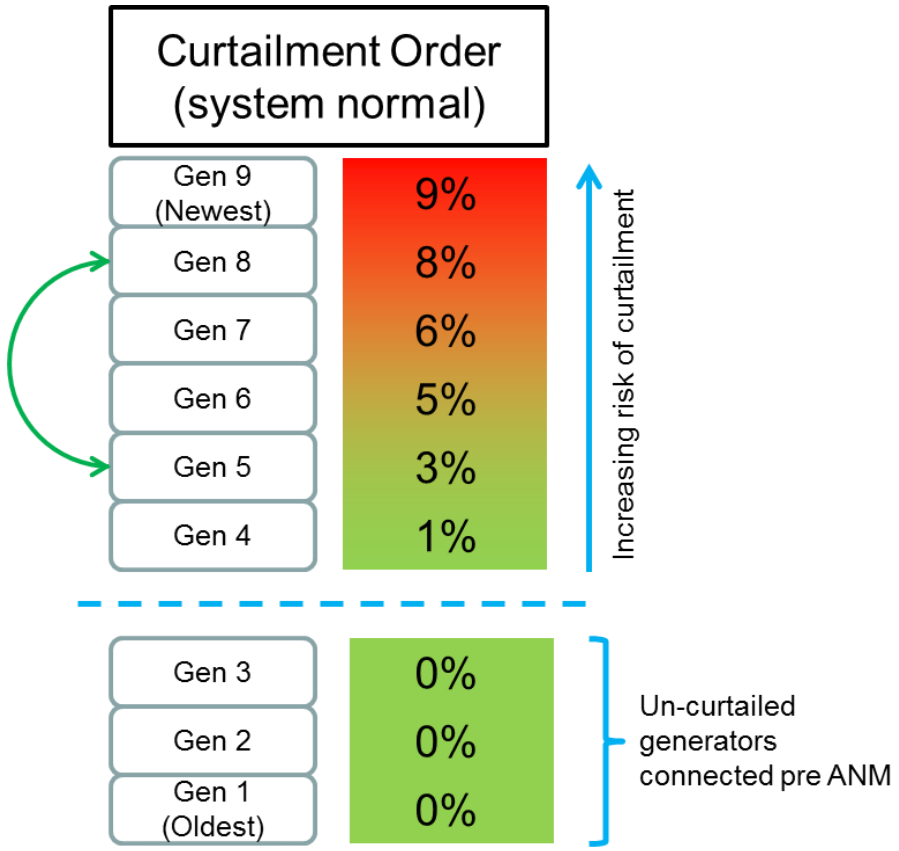
Non SCR Industry update

Paul McGimpsey, Energy Networks Association

Product 1: Trading of Non-firm DG Curtailment Obligations

Example 1

Trading between generators that are at risk of being curtailed

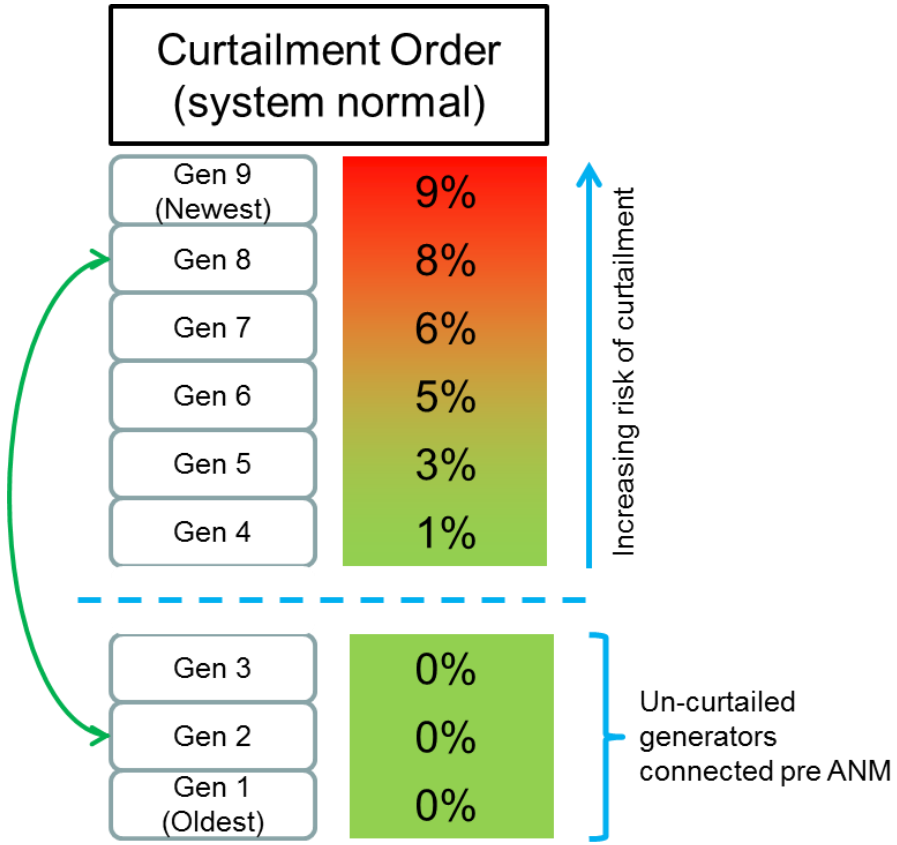


- Generator 8 seeks to reduce the likelihood that it will be curtailed by trading with generator 5.
- The new curtailment 'stack' will go in the sequence generator 9, 5, 7, 6, 8 then 4.
- Depending on the extent of the constraint, there may now be circumstances in which generator 5 is curtailed but generator 8 is not.

Charging Futures

Example 2

Trading between a generator at risk of being curtailed and a non-curtailable generator



- Generator 8 has traded away its curtailment obligation entirely by trading with generator 2.
- The new curtailment ‘stack’ will go in the sequence generator 9, 2, 7, 6, 5 then 4.

Charging Futures

Principles and Rules for Trading

PRINCIPLE 1: Transparent information sharing

Sufficient information must be made available to enable generators to undertake trades, and to enable network operators to determine the new 'stack' post-trade.

Potential rules:

1. The network operator must make information available about a constraint to the network users impacted by that constraint.
2. The network operator must publish the process it will follow to determine which generators to curtail to alleviate the constraint under each plausible scenario
3. Parties who have traded must provide the network operator with details of the trade.

PRINCIPLE 2: Ability to maintain network continuity

Trading of curtailment obligations must not undermine the ability of the network operator to maintain the continuity of its network in the constrained area.

Potential rules:

1. The network operator must pre-authorise any generator wishing to trade, by confirming that generator has the ability to comply should it become liable for a curtailment obligation.
2. The MW reduction agreed by the generator must have an equivalent impact on the constraint as the MW reduction already required by the generator with the curtailment obligation.

Principles and Rules for Trading

PRINCIPLE 3: Visibility of other potential trading parties

Those generators which have 'opted in' to trading must be aware of other potential trading parties and understand other trading parties' capability for flexibility.

Potential rules:

1. Generators wishing to trade must opt in to potential trading.
2. A list of generators connected to the network that have the potential to alleviate the constraint and which have opted in to trading must be made available, including:
   a) their existing curtailment obligation (if applicable);
   b) their current curtailment obligation;
   c) their flexibility or curtailment granularity; and
   d) their effectiveness in alleviating the constraint (i.e. their sensitivity factor).

PRINCIPLE 4: Transparent trading arrangements:

The parameters within which trading can take place must be well-defined and available to all trading parties.

Potential rules

1. Trades must be defined in time periods of [minimum trade duration]; and
2. Trades can take place at any point between [time period] and [time period] before the time at which the trade will take effect.

Product 2: Exchange of Non-curtailable Capacity

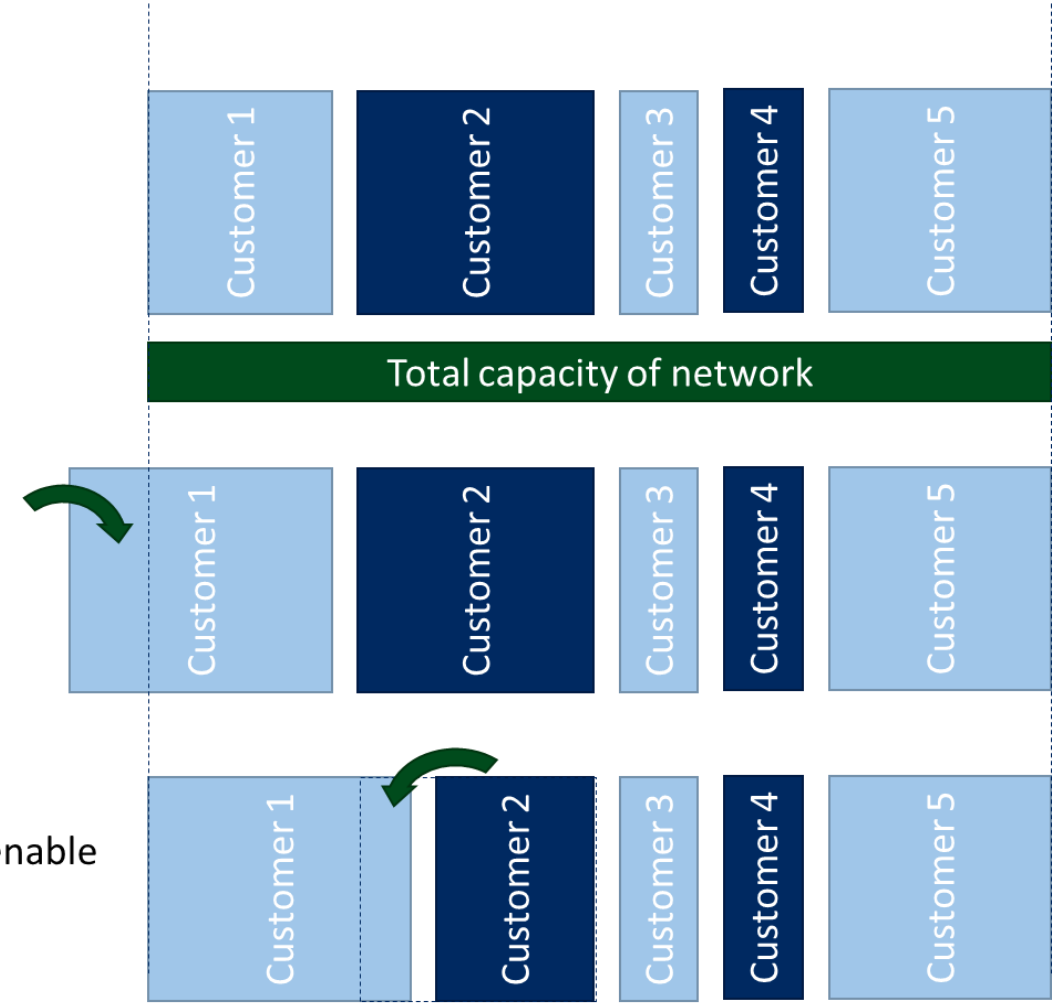
Product 2 – exchange of non-curtailable Capacity

Exchange means a user reducing their maximum capacity rights and another user increasing their maximum capacity rights.

An existing network is built to meet the capacity requirements of five customers. Customer 1 wishes to increase their allocated capacity.

Option 1
Reinforcement is completed to enable Customer 1 to increase their allocated capacity.

Option 2
Customer 2 releases some of their allocated capacity to enable customer 1 to increase their allocation.



Principles and Rules for Trading

PRINCIPLE 1: Transparent information sharing

Sufficient information must be made available to enable users to undertake the exchange of rights.

Potential rules

1. The network operator must make information available about head room capacity to the network users impacted by a potential constraint.
2. Parties who have agreed to exchange capacity must provide the network operator with details of the exchange, including which parties have exchanged, the magnitude of the exchange and the time periods for which the exchange will be applicable to ensure connection agreements can be updated.

PRINCIPLE 2: Ability to maintain network continuity

Exchange of capacities must not undermine the ability of the network operator to maintain the continuity of its network.

Potential rules

1. The exchange of maximum capacity will be assessed on a case by case basis to ensure it is technically feasible. The cumulative impact of the exchange on the network must have the same or less impact on the potential constraint.

Charging Futures

Principles and Rules for Trading

PRINCIPLE 3: Visibility of other potential trading parties

Those users which have 'opted in' to exchanging capacity must be aware of other potential parties with whom they can exchange.

Potential rules

1. Users wishing to exchange capacity must opt in.
2. A list of users connected to the network behind the potential capacity restriction that have the potential to exchange capacity and which have opted in to exchange must be made available.

PRINCIPLE 4: Transparent trading arrangements

The parameters within which exchanges can take place must be well-defined and available to all parties.

Potential rules

1. Exchanges must be defined in time periods of [minimum trade duration]; and
2. Exchanges can take place at any point, however[time period] is required before the time at which the exchange will take effect.
3. Exchanges must be approved with the network company before they come into effect and connection agreements updated.

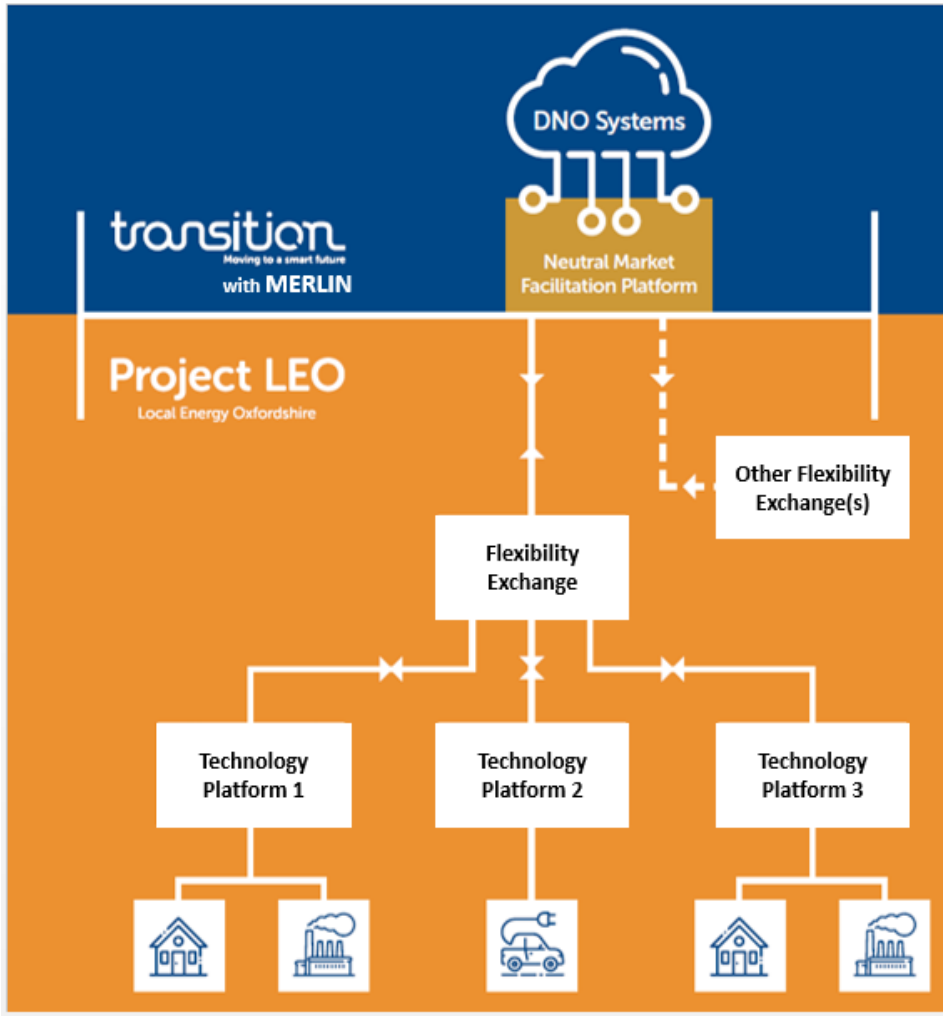
Testing the Theory

1. SSEN Oxfordshire Projects – wide project scope, opportunity to test these concepts as part of the wider programme

2. Use ‘wargames’ or ‘roleplay’ to test the natural responses to market rules – what works well, what would make them better, what is irrelevant

3. War games use real DER operators and developers to give real insights

4. Noting that the Oxfordshire Programme is much wider and focused slightly further into the future than the scope of P1/P2; want to deliver solutions sooner



Charging Futures

Next Steps

Testing the Appetite

1. Feedback from you

2. Future WebEx, post ‘War Game Outcomes’ – Late Oct/Early Nov

3. Other Engagement

Delivering solutions

Having established the concepts and tested them…

…we will use the Open Networks Project to draft specific changes in 2020 ready for implementation

Charging Futures

Our other work

Product 3

Application Interactivity and Connection Queue Management

- Live consultation (under Open Networks) closes on 25th September 2019.

Product 4

The development of a common methodology for the recovery of costs associated with flexible connection schemes

- Change proposal passed into DCUSA governance (DCP348)

Charging Futures

Any questions?

Paul.McGimpsey@energynetworks.org

Charging Futures

Q&A Session

Closing Remarks

Colm Murphy, Electricity Market Change Delivery Manager,

National Grid ESO

Next Steps

- All Forum material to be published onto www.chargingfutures.com shortly
- There will be slides and a podcast available – please share with colleagues
- We value your feedback – please use Menti to answer some short questions which help us improve your experience

- The next forum will be in early-mid December

Charging Futures

Feedback - Menti

Please answer these two short questions in order to help us make this Forum as engaging and useful as possible!

- **On a Scale of 1-10, how likely are you to recommend this Forum to a Colleague or Friend?**
- **On a scale of 1-10, how likely are you to recommend the Secretariat of this Forum?**
- **What user category defines you best?**

Charging Futures

Charging Futures
Reforming electricity charging together

Forum

Safe Journey Home!

Thanks for Attending

Resources

Email: chargingfutures@nationalgrideso.com

Website: www.chargingfutures.com

Charging Futures

The images in this presentation are sourced from the Noun Project and are "dynamic wallpaper" by Andi Nur Abdillah, "Pound" by Rockicon, "handshake"by popcornarts, "badge" by Andrew Doane and "easy" by Tomi Triyana "Options" by Deemak Daksina (slide 11-14); "Combine" by Stephen Plaster, "tailor" by Luis Prado (slide 22); "coins" by Vectors market, "contract" by tnadet jeejumpa and "light switch" by Jeremy Loyd (slide 23); and "Electricity stats" by Creaticca Creative Agency, "Consumption" by Christian Baptist, "Agreement" by Phansan Ubalee, "Descending pound" by B Farias, and "Peak" by Jai (slide 38-43)

Charging Futures