Charging Futures

Reforming electricity charging together

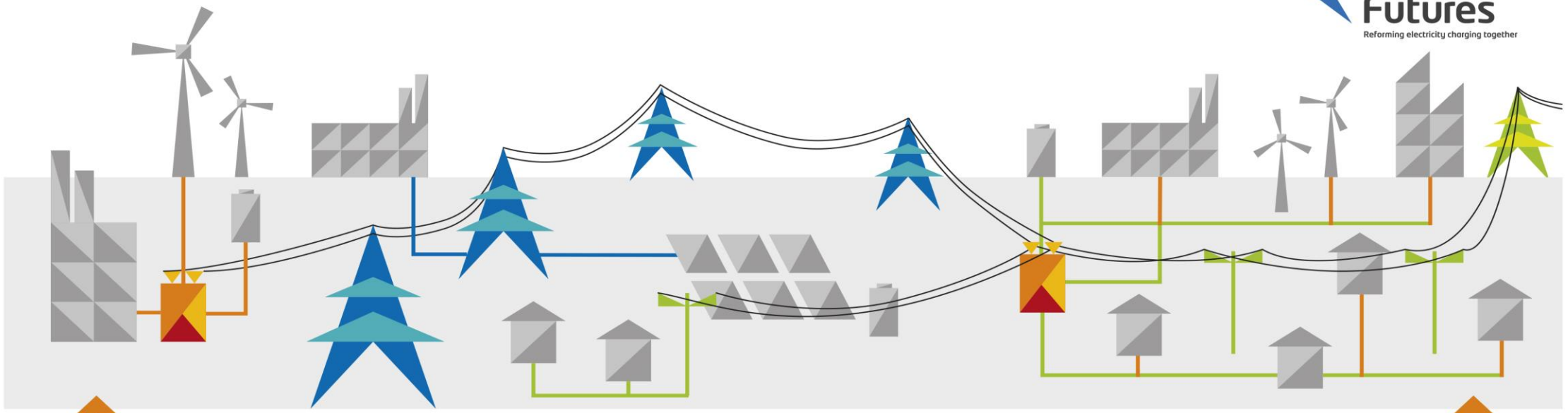
Forum

Charging Teach In

4 July 2019

Electricity network charges explained

Charging Futures
Reforming electricity charging together



Transmission Network Use of System charge (TNUoS)

This is paid to Transmission Owners (TOs) for the cost of building and maintaining the shared transmission network.

Your TNUoS charge may depend on:
> Where you are in GB
> When you use the network
> How much you consume

3-4% of average dual-fuel bill

Balancing Services Use of System charge (BSUoS)

This is paid to the System Operator for the cost of balancing the system.

It pays for the skills, tools and services the SO needs to balance supply and demand in real time.

1% of average dual-fuel bill

Distribution Use of System charge (DUoS)

This is paid to Distribution Network Operators (DNOs) for the cost of building and maintaining the local distribution network.

Your DUoS charge may depend on:
> Where on the local network you are
> What voltage connection you need
> When in the day you use the network
> How much you consume

8% of average dual-fuel bill

Connection charge

Connection charge

A charge for new assets or reinforcements needed to connect you to the network.

Each connection will have its own cost that is agreed with the TO or DNO you are connecting to.

Payment arranged with your network.

Introduction to Distribution

Tony McEntee

Electricity North West

Nigel Bessant

SSE Networks

Distribution Network Operators

1. Scottish & Southern Electricity Networks
2. SP ENERGY NETWORKS
4. electricity north west — Bringing energy to your door
5. NORTHERN POWERGRID
6. SP ENERGY NETWORKS
7. WESTERN POWER DISTRIBUTION
8. UK Power Networks — Delivering your electricity
9. Scottish & Southern Electricity Networks

6 DNO Ownership Groups

14 DNO Licensees

- A single Common Connection Charging Methodology
- A single Common Distribution Charging Methodology
- An EHV Charging Methodology with two variants
- Methodologies subject to open governance
- IDNOs tend to match the local DNO DUoS tariff

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DNO charges

16/17
£ 0.7bn

Connection charges

- Amended annually
- Levied on connecting customer
- One off charge
- Paid for building network connection
- Covers network extension to site and (if needed) a share of upstream reinforcement
- Based on ‘minimum scheme’ requirements
- Additional charges for enhanced design

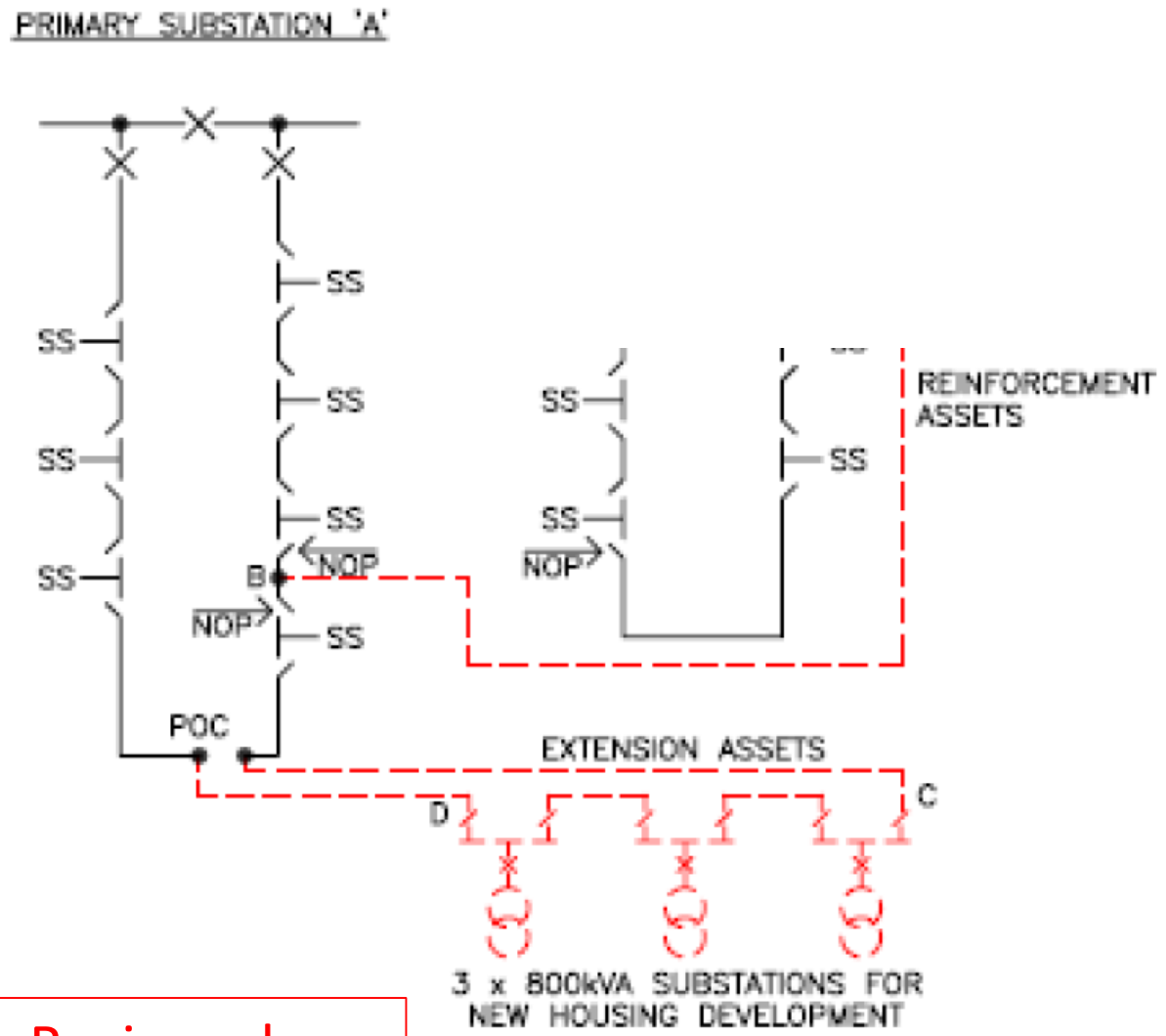
16/17
£ 5.6bn

Use of System charges

- Amended annually, 15 months notice
- Levied on supplier
- Ongoing charge
- Paid for ongoing use of the shared network
- Also covers operation, repair and maintenance of sole use assets
- Level of charge set to match ‘Allowed Revenue’

Connection Charge

Extension Assets	Reinforce-ment Assets	Previous Reinforce-ment	Trans-mission
100%	%		(if applicable)



- Costs can vary considerably depending on nature of connection
- Connections costs determined by Minimum Scheme
- Connection Charges cover the following categories
  - Paid in full (EXTENSION);
  - Apportioned with DNO (REINFORCEMENT);
  - Previous assets (PREVIOUS); and
  - Costs associated with transmission system works (TRANSMISSION)

Being Reviewed as part of Access and Charging Project

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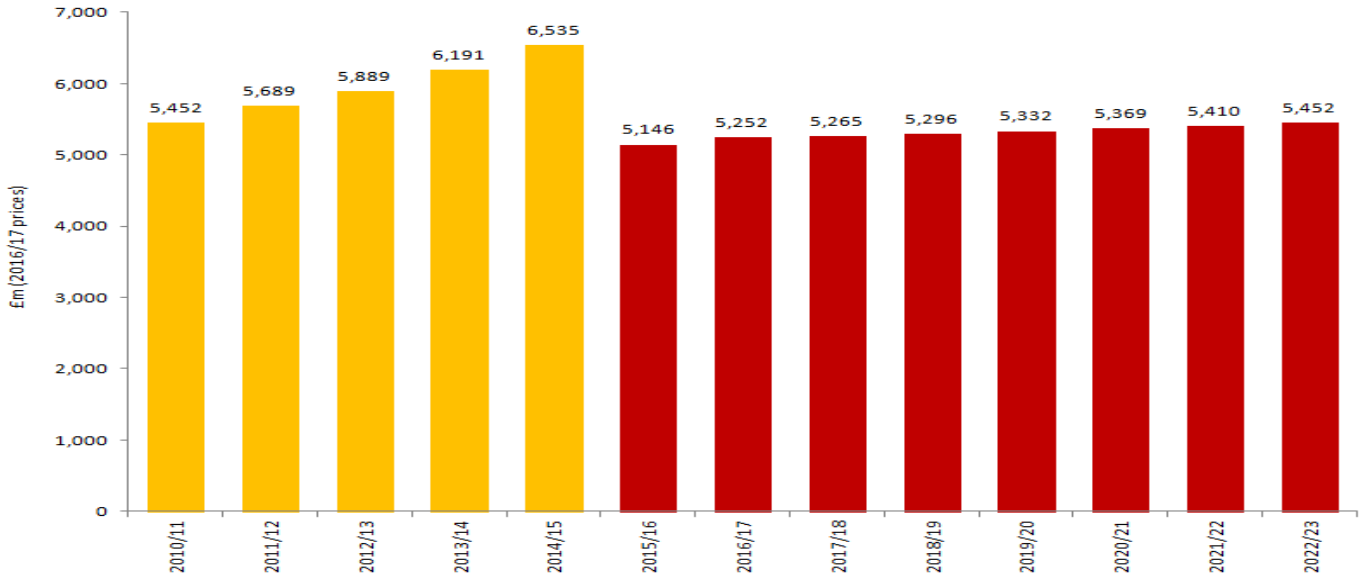
Establishing use of system income

DUoS income or 'Allowed Revenue' allowance is a separate amount for each of the 14 DNO Licensees and sets an annual 'target' revenue.

The target revenue includes:

- Base revenues
- Uncertainty mechanisms
  - MOD
  - RPI
  - Pass-through items
  - Incentive outcomes



'Scaling' process to align yardstick tariff values with forecast volumes to match target revenue

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Setting use of system prices

The target revenue (set by Ofgem through periodic

Price Review Process – RIIO-ED1) is recovered across all customers.

Setting prices is based on cost models

- Costs based on type and usage of customer
- Scale up or down based on target revenue. (Being reviewed as part of TCR)

Consequently, if somebody pays more then somebody else will pay less

Allocation methodology based on licence objectives, predominately:

- Cost reflectivity
- Facilitating competition
- Encouraging the development of an efficient

Use of system charging methodology

- There are two ‘common’ charging methodologies used by all DNOs
- CDCM – Generic tariff model used for HV & LV. Very long run: more stable.
- EDCM – Site specific model used for EHV (with two variants LRIC & FCP). Can be volatile and hard to respond to
- CDCM calculates 19 demand and 14 generation tariffs for ~30 million sites
- EDCM calculates ~2,300 individual site specific charges

Modelling inputs

- Target Revenue
- DNO specific to allow for topography and demographics
- Network costs
- Load profile data – tariff impact on network
- Network constraints
- Volume forecasts
- For EDCM, locational/ nodal costs reflecting power flow modelling and real ‘engineering’ outcomes for each location.

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Tariff structures

- Non-half hourly and aggregated HH metered (domestic and business)
  - Fixed charge – p/day
  - Unit charges – p/kWh
    - Time bands determined by meter configuration or set by DNO for aggregated HH
- Half hourly metered sites
  - Fixed charge – p/day
  - Capacity charge – p/kVA/day
  - Unit charges – p/kWh
    - Time bands set by DNO
    - CDCM – Three time bands – TOD
    - EDCM – One 'super red' time band – STOD
  - Reactive Power charges – p/kVArh

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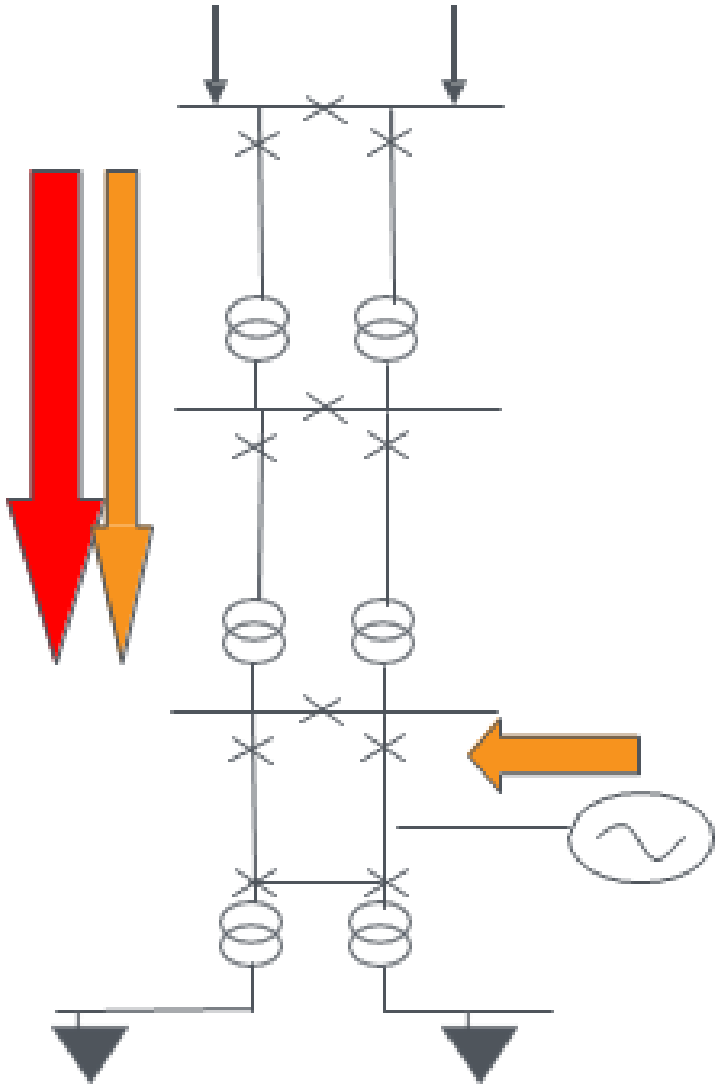
Generation ‘charges’

- Methodologies ‘reward’ distributed generation for the benefit they can bring to the network
- Conceptually, distributed generation reduces upstream demand
- LV & HV generation tariffs have a credit which is paid to suppliers
- EHV credits are dependant on location and generation type
- Currently no costs for generation in CDCM, may not be appropriate where driving reinforcement



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Introduction to Transmission

Nick Everitt

National Grid ESO

Contents

- Transmission Connection Charges
- TNUoS
- BSUoS

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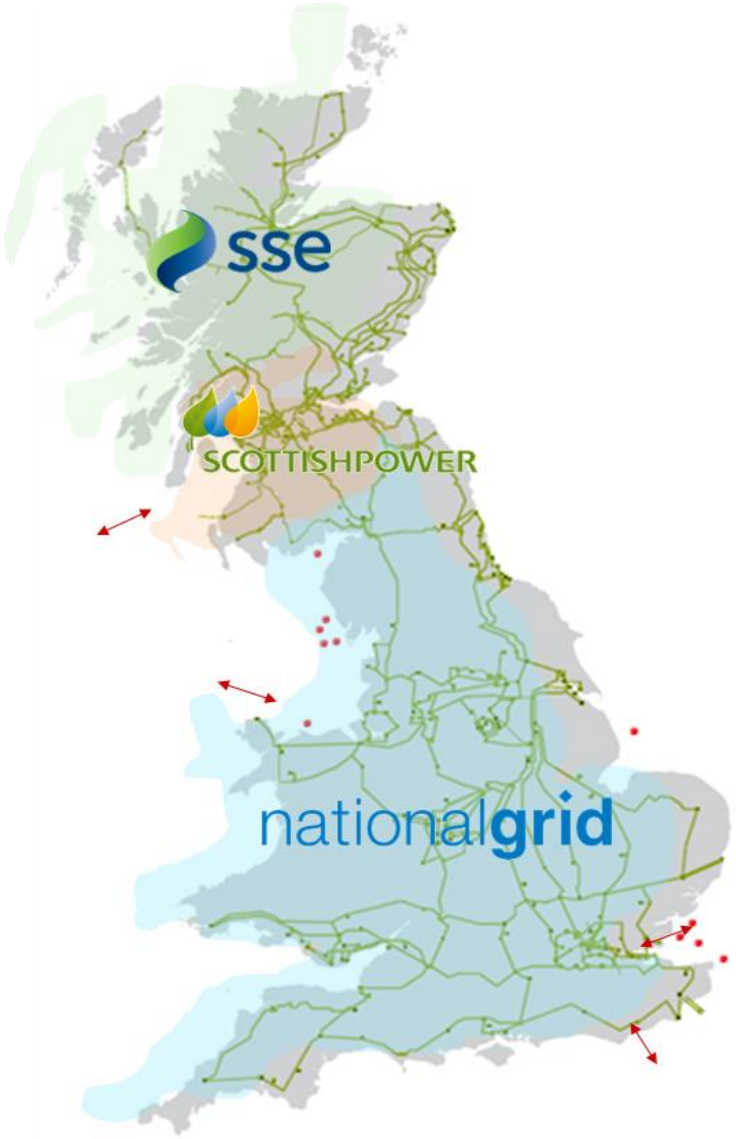
Transmission Network & System Operator



Multiple TOs

One TSO

SHET

SPT

NGET

Interconnectors/
OFTOs*

National Grid
Electricity System
Operator

***Offshore Transmission Owner – OFTO**

An independent licensed owner of transmission assets connecting offshore wind farms (generators) to the GB onshore transmission network

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Transmission Owner

Transmission Revenue

£2.8bn

- TNUoS
- Recovers the cost of all shared assets
- Tariffs include locational and non-locational elements
- Tariffs are set annually, in advance
- Charges split between G(14.2%) D(85.8%) – 2019/20
- Generation tariffs are capped by a €2.50/MW limit set by the EU
- Generations charges are charged against transmission entry capacity (TEC)
- Demand charges charged based on usage:
  - HH – Triad demand
  - NHH – Annual usage between 16:00 & 19:00

Connection Charges

£210m

- Recovers the cost of single user assets
- Charges are set directly from the cost of single user assets built for customers' connections

System Operator

System Balancing Costs

~£1bn

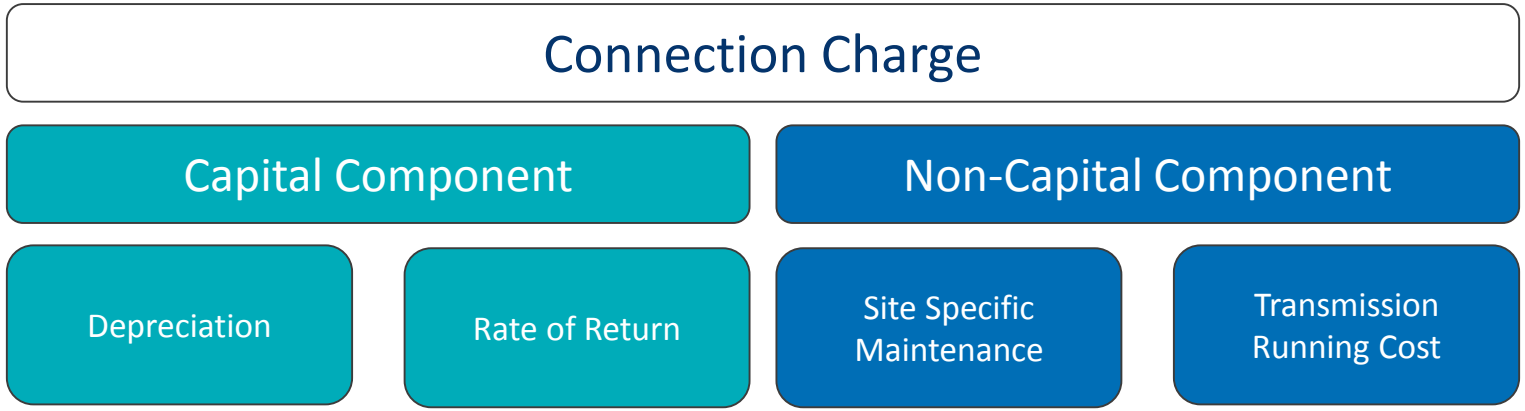
- BSUoS
- Recovers the cost of operating the system
- Tariffs are non-locational
- Charges are split between G(50%) D(50%)
- Tariffs are calculated and invoiced ex post
- Charges are based on MWh usage in each half hourly period

Connection Charges

- CUSC 14.2.5:

  "assets installed solely for and only capable of use by an individual User"

- Due to the location of the ownership boundary at the substation, generators do not generally pay connection charges
- Classed as a shallow connection charge regime



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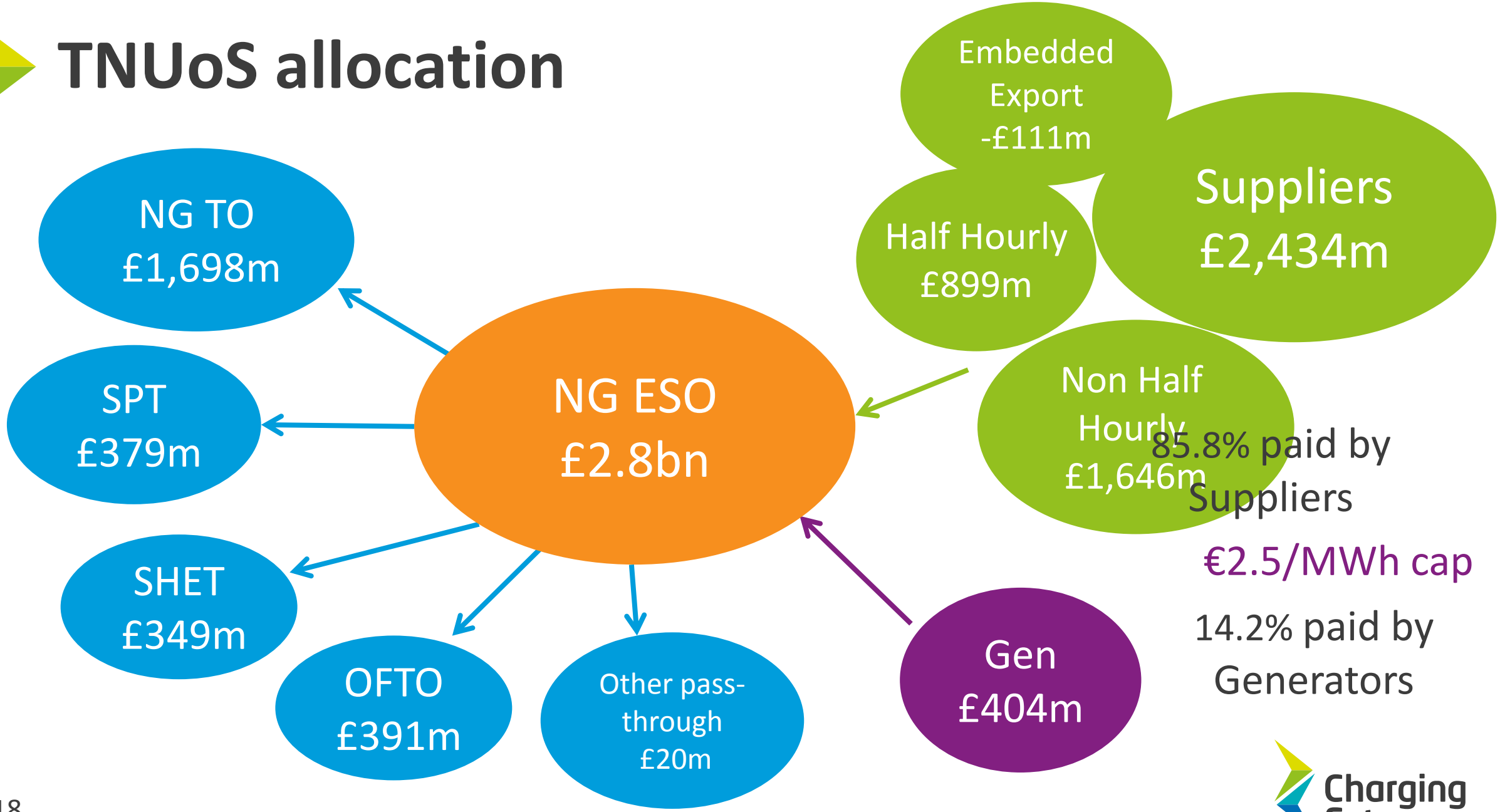
TNUoS allocation



85.8% paid by Suppliers

€2.5/MWh cap

14.2% paid by Generators

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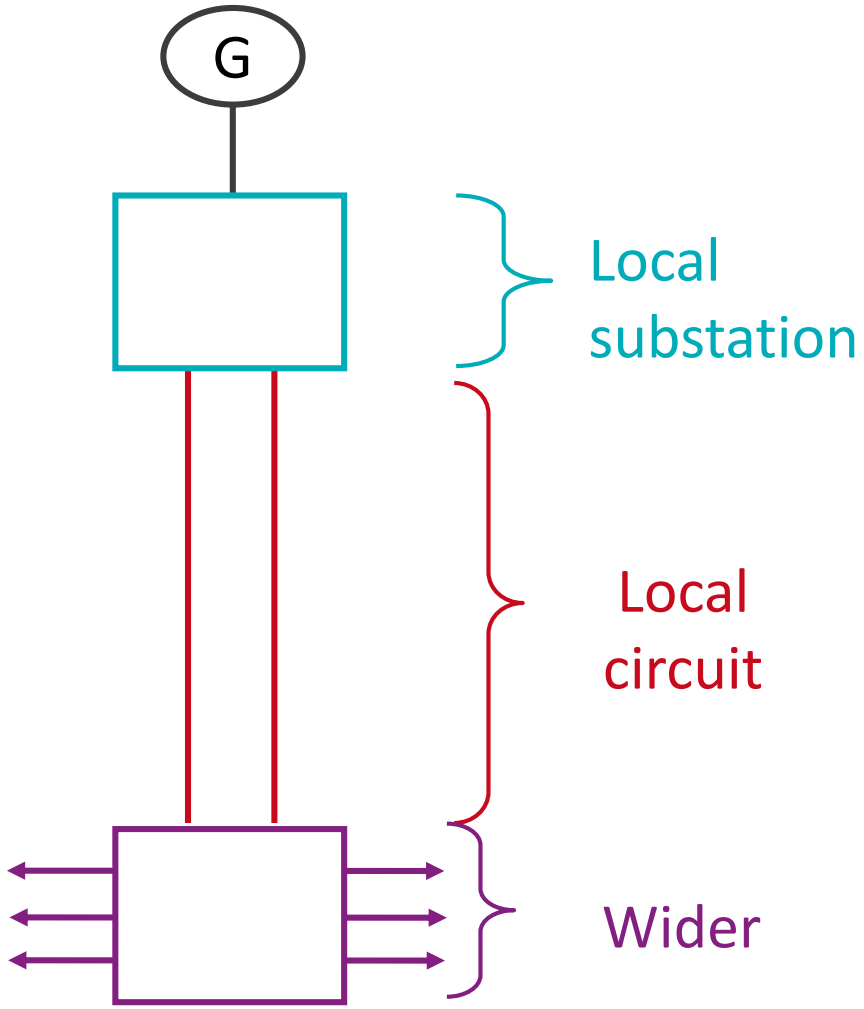
Structure of Directly Connected Generation TNUoS Charges



This charges covers the provision of shared use assets at the substation the generator connects into. Charge is dependent on the voltage, size and type of substation and is calculated at the start of each price control

This charge covers the cost of building and maintaining Tx circuits which connect the local substation to the wider transmission system. The charge is dependent on the length and type of circuit built and for Tee'd in connections the direction of flows along these circuits

This charge is a zonal tariff based on the effect of adding an incremental 1MW of generation at the connection point and seeing the effect this has on network flows

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TNUoS Wider Charges - Generation

- Reflect the incremental cost of facilitating generation on the transmission network:
  - Higher network requirement - higher charge
- Residual Element to aid correct revenue recovery
- Charged to all Directly Connected generation
- Zonal element also paid by certain embedded generation
  - i.e. BEGAs >100MW
- Charge is based on
  - Transmission Entry Capacity (TEC)
  - Annual Load Factor (ALF)

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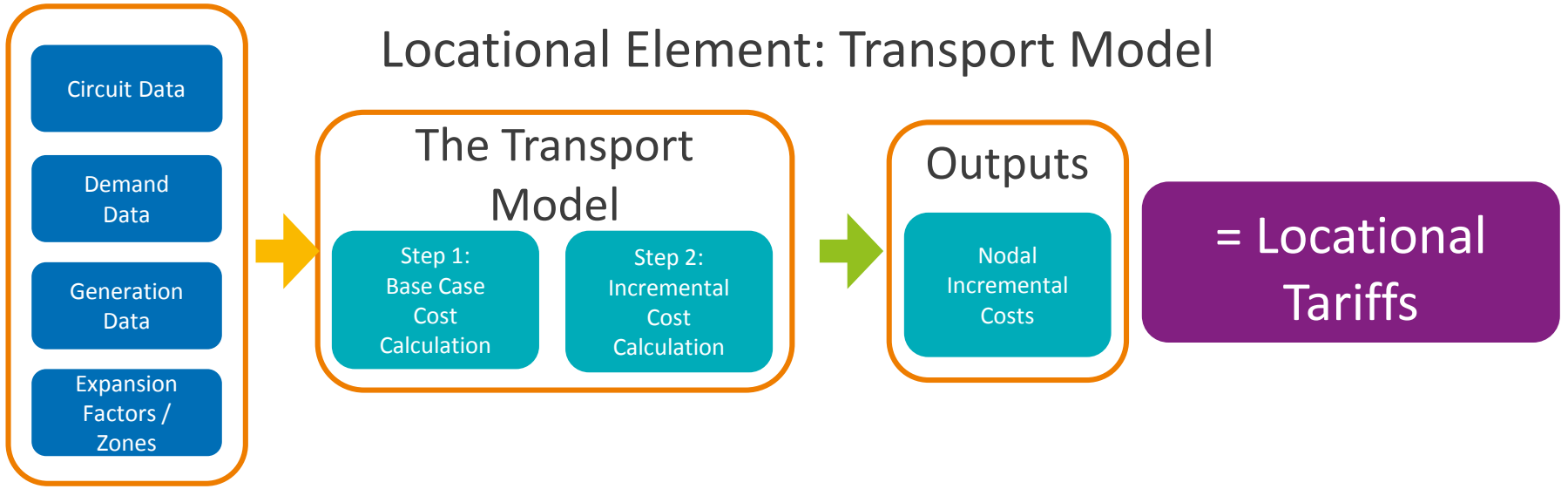
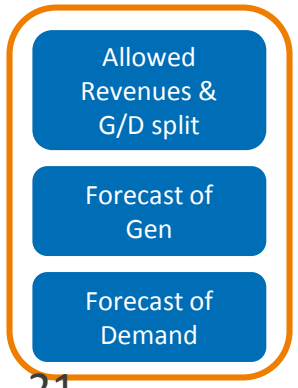
TNUoS Charges



Conventional with a load factor of 70%
= £-7 to £19
Intermittent with a load factor of 30%
= £-5 to £17

HH Demand
= £/kW -2 to 4



Generation Residual =- £3.5

HH Demand Residual = £50

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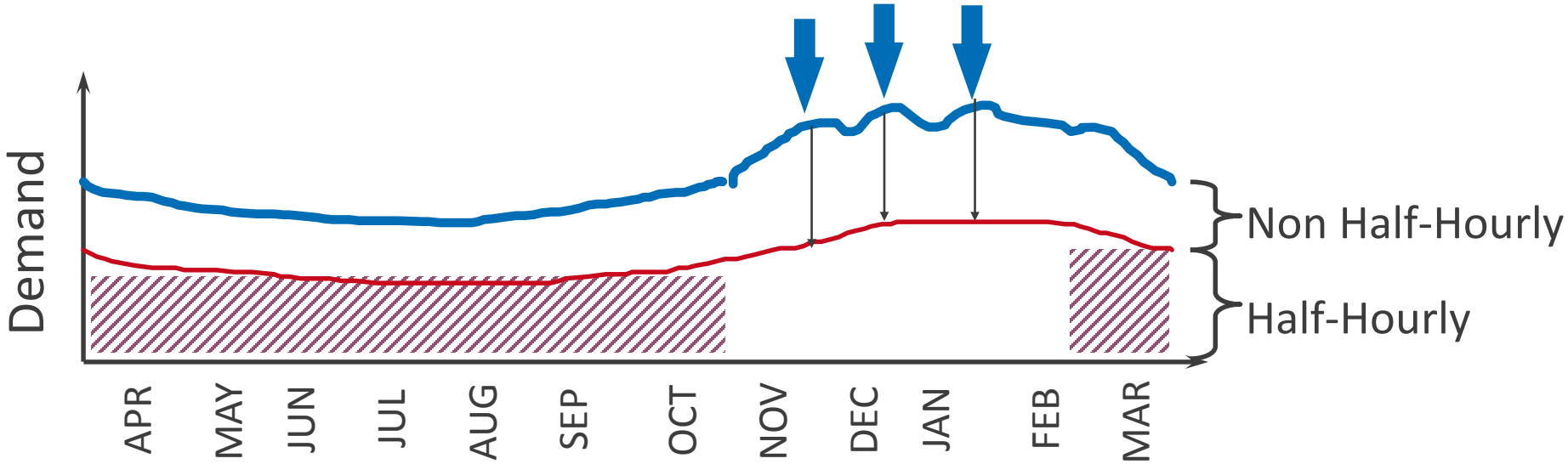
HH Demand Charges

Half-Hourly Metered Demand

Average Metered Demand over the Triad (kW)

X

Zonal Demand Tariff (£/kW)



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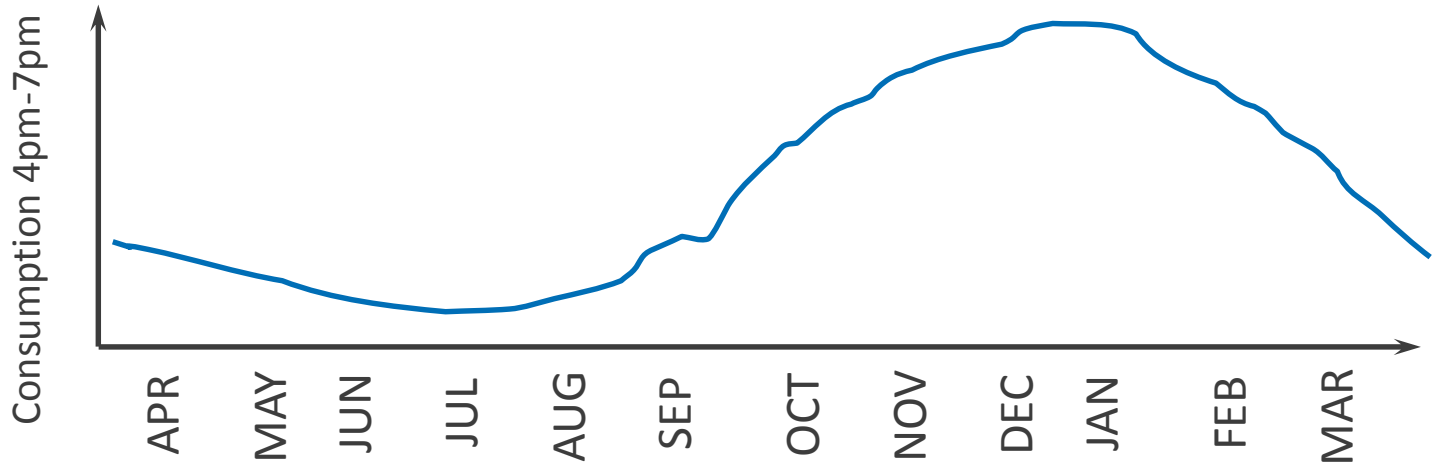
NHH Energy Charges

Non-Half-Hourly Metered Demand

[Energy Consumption between 4pm- 7pm each day (kWh)] X [Zonal Energy Tariff (p/kWh)] / 100



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Who do BSUoS charges go to?

Charging:

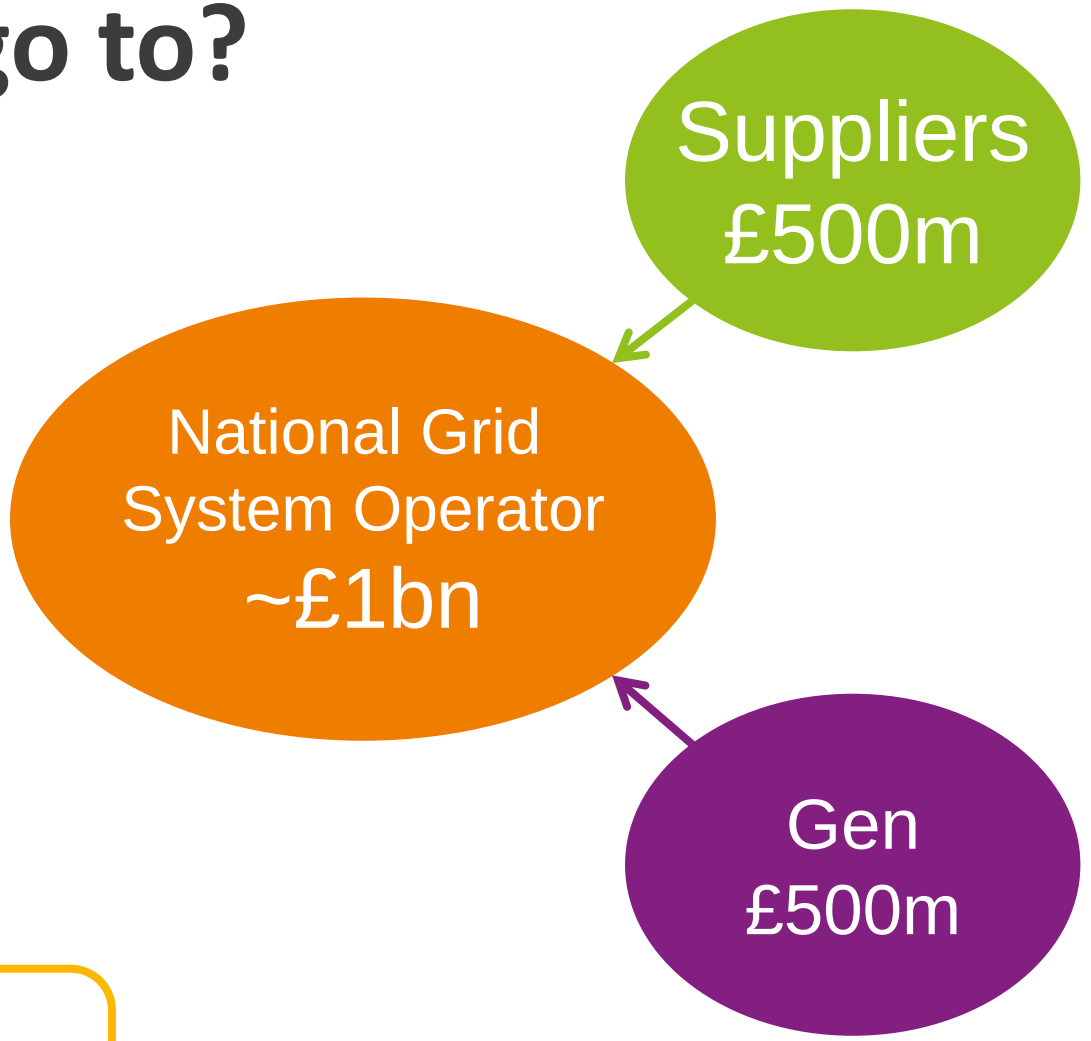
- Charges apportioned on a half hourly £/MWh basis
- Charged half hourly
- Billed Daily
- Two stage Financial Settlement: D+5, D+14m

Components:

- External – the monies National Grid pays providers for delivering balancing services
- Internal – the business costs of providing this function, e.g. staff, buildings, systems etc.

Calculation:

BSUoS Price £/MWh x BM Unit metered Energy Volume (MWh) x Transmission Loss Multiplier x Trading Unit Delivery Mode (+ or – 1)



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Access Significant Code Review Teach In

Stephen Perry

Senior Manager

Ofgem

Future Charging and Access

The energy system transformation will create challenges and opportunities for our electricity networks. We are considering how electricity network access and charging should be reformed to address these changes and existing issues:

Access and forward looking charging reform (Access reform). We want to get better value out of electricity networks by using them more efficiently and flexibly. If we do this, the system will be able to accommodate more electric vehicles and other new technology at lowest cost.

The **Targeted Charging Review (TCR).** This seeks to remove some of distortions which are sending the wrong signals and costing consumers money, and to allocate residual charges in a fairer way.

Ofgem - led

The **Balancing Services Charges Task Force.** The Electricity System Operator has led a review of balancing services charges in parallel with the Access reform and the TCR. It has concluded that these charges recover costs rather than send signals, and we will consider this in our final TCR decision.

NG ESO-led

Access SCR - background

- **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.

Case for change:

- Increasing constraints caused by both generation and demand at distribution level, yet also increasing opportunity to mitigate these though flexibility. Potential savings of up to £4-15bn cumulatively to 2050 from reducing electricity network reinforcement.
- Substantially different approach across transmission/distribution and generation/demand boundaries means increasing risk of distorting investment and operational decisions

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Background - Access

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.

An SCR is a tool for Ofgem to initiate wide ranging and holistic change and to implement reform to a code-based issue.

We launched Access SCR in December 18, 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

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Case study – local energy user

Our reforms should deliver benefits for all network users. For example, users that want to balance generation and demand locally:

1. Wide-ranging review of distribution network charges: This should more accurately reflect the value, or costs, of users' actions on the network. For local energy users, this could better signal the benefits of matching generation and demand locally.

2. Reviewing the proportion of network reinforcement costs that are paid by connection customers: The potential high upfront cost of getting connected to the network has been highlighted as barrier by local energy users.

3. Improving the choice and definition of connection options available for network users. This could allow local energy projects to choose the access that most suits their needs (E.g. shared access). It could also allow more local energy users to connect to the network quicker and cheaper.

Outside the SCR, we are exploring ways to allow local users to exchange capacity they hold. This will make better use of capacity and could help speed up connections

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Reforming electricity charging together

Forum

Charging Futures Forum

4 July 2019

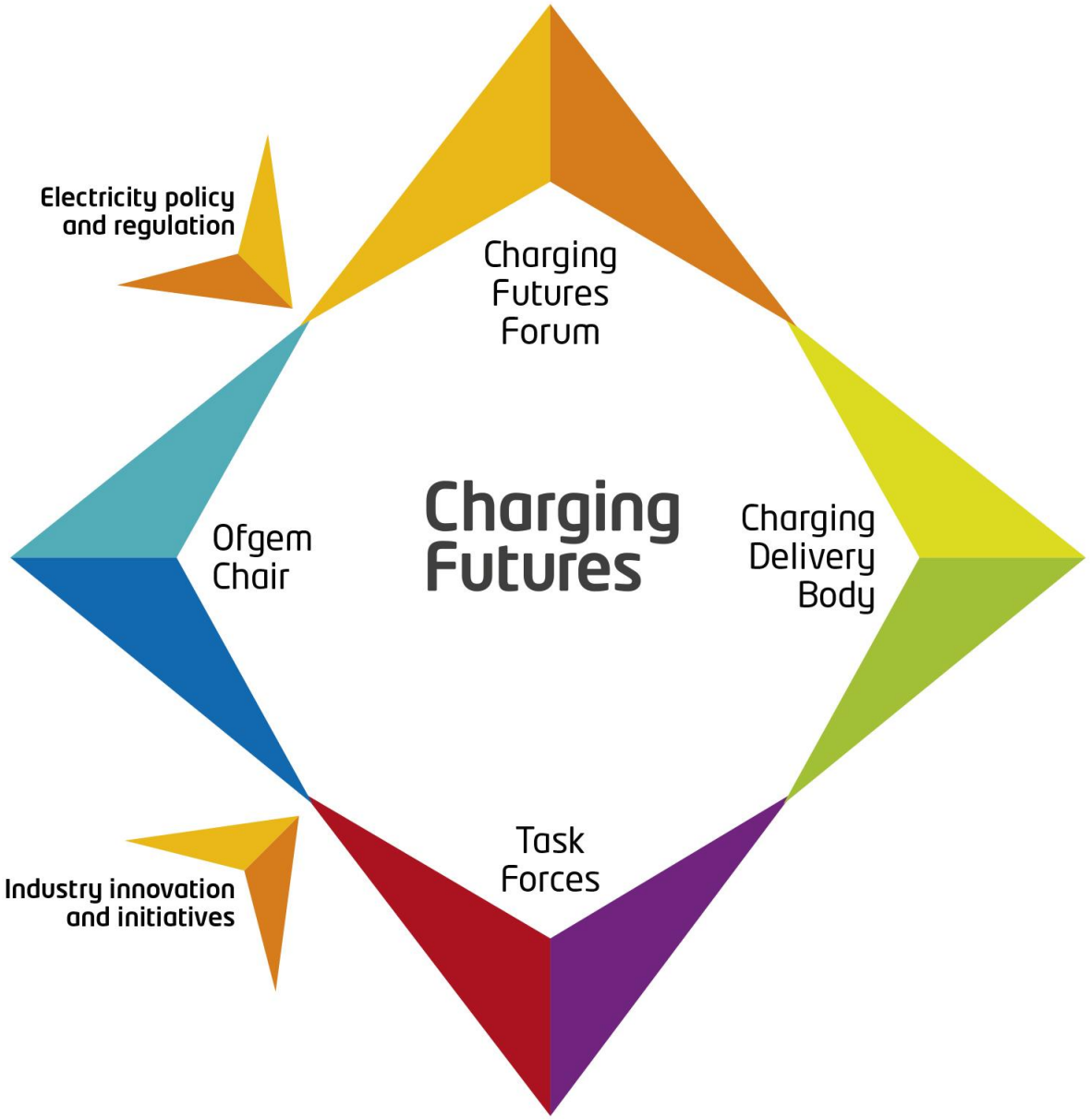
Welcome

Gareth Davies

Industry Codes Governance Manager

National Grid SO

The Charging Futures ecosystem



INDUSTRY CODE GOVERNANCE

CUSC
Connection and Use of System Code (for transmission)

Code admin > **National Grid**

DCUSA
Distribution Connection and Use of System Agreement

Code admin > **Electralink**

BSC
Balancing and Settlement Code

Code admin > **Elexon**

Charging futures during 2018/19

Listen on Apple Podcasts

4,321 podcast listens

358 attendees of webinars

1,581 on-demand webinar views

230 Forum attendees

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Overview of the day

Gareth Davies, Industry Codes Governance Manger, National Grid SO

Agenda, part 1

- 11:00 – 11:10 **Welcome** – Gareth Davies, National Grid SO
- 11:10 – 11:30 **Overview of reforms to the energy system –** Frances Warburton, Ofgem
- 11:30 – 11:40 **Introduction to Future Charging and Access programme** – Andy Burgess, Ofgem
- 11:40 – 12:10 **Access and Forward Looking Charges** – Jon Parker, Ofgem
- 12:10 – 12:35 **Targeted Charging Review** – Andrew Self, Ofgem
- 12:35 – 13:00 **Q & A with Ofgem**
- **13:00 – 13:50 Lunch**

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Agenda, part 2

- 13:50 – 14:25 **Balancing Services Charges –** Mike Oxenham, National Grid ESO
- 14:25 – 14:50 **Modifications Update** – Rob Marshall, National Grid ESO and Angelo Fitzhenry, Electralink
- 14:50 – 15:00 **Next Steps and Closing Remarks** – Gareth Davies, National Grid SO

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Mentimeter

- Please go to www.menti.com, using code 17 66 97 to access the presentation.

- Submit Q & A questions at any time

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Overview of Reforms to the Energy System

Frances Warburton
Director, Energy Systems Transition
Ofgem

Changes in the system means changes in regulation

Drivers

- **Decarbonisation**
- **Technological Change**
- **Digitisation and smart systems**
- **Decentralisation**

Impact on the energy system

Changes in the generation mix
- Intermittent
- Distributed
- Less flexibility
- More storage

More active networks and demand side

New large and uncertain loads
- Heating
- Electric vehicles

Smart technologies

Impact on Regulation

- **Right incentives on market participants**
- **Right incentives on network companies**
- **Right approach to monopoly cost recovery**
- **Right framework for system operators**

Ofgem projects

- **Retail reforms**
- **RIIO2**
- **Future Charging and Access**
- **System Operation reforms**

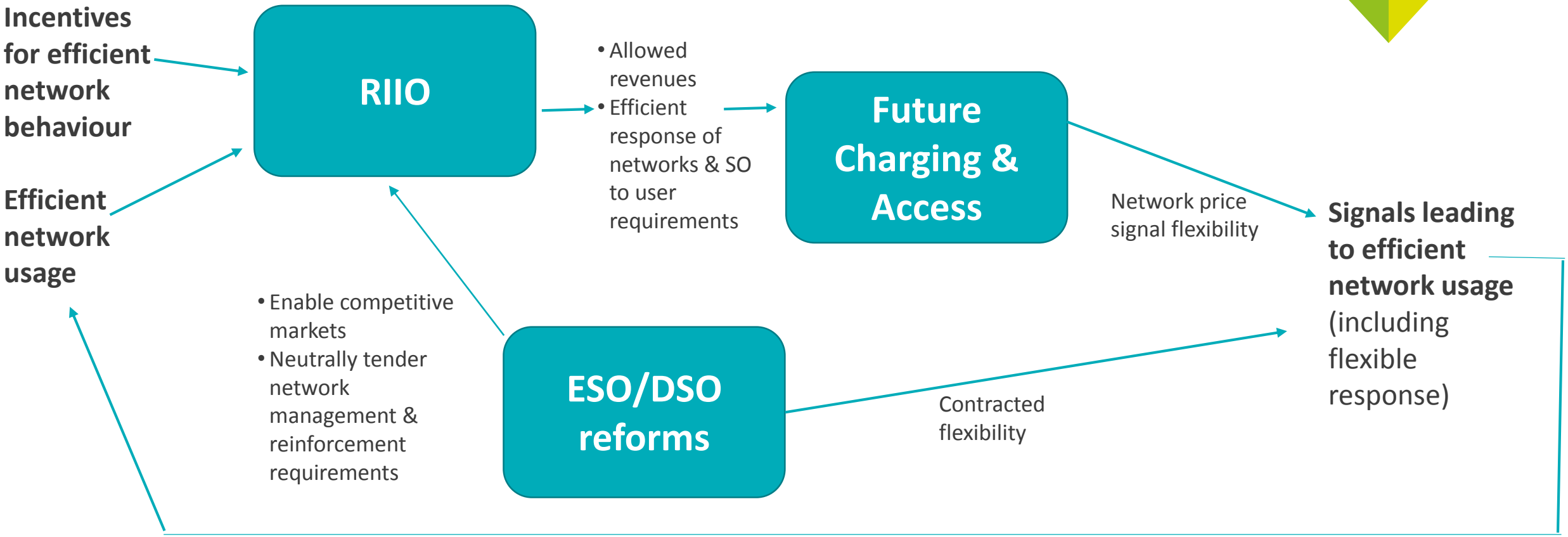
The range of reforms needed to deliver a smart, flexible energy system across Ofgem

Retail reforms	• Retail market reforms need to:
	  • Ensure the retail market works well and facilitates the access of benefits of flexibility to consumers
	  • Protect consumers, in particular those in vulnerable situations

RIIO	• RIIO incentivises overall efficiency through total expenditure ('totex') mechanism, which addresses bias toward capital over operating expenditure • In RIIO2, we will extend role of competition, ensure outputs include flexible options for meeting network needs and embed whole systems incentives
Future Charging & Access	• **Access reform** will deliver better access right choice and stronger network charging signals to incentivise efficient use of the system and minimise future costs (called "**network price signal flexibility**") • **Targeted Charging Review (TCR**) will address Embedded Benefits and reform residual charges

System Operation reforms	• We want the Electricity System Operator (ESO) and Distribution Network Operators (DNOs) to:
	  • Clarify boundaries & mitigate conflicts
	  • Enable competitive markets, including through making data accessible
	  • Neutrally tender network management and reinforcement requirements
	  • Embed whole systems coordination

Our RIIO, FCA and System Operation reforms work together to deliver efficient network outcomes



WE ALSO NEED:

- Key enablers are Smart Meter rollout and Settlement reform
- Future Retail reforms are key to ensuring appropriate signals are passed to consumers
- To ensure consumers are protected, especially those in vulnerable situations

New technologies offer services across the energy system – including reducing the need for new generation and network build

- Decarbonisation means the energy system needs to become more responsive to intermittent generation and changing demand patterns.
- We want all technologies and sources of flexibility to be used to the fullest extent these can help reduce system costs and better meet consumers' needs.
- To achieve these, we want all market participants to be able to access the full value they can bring to the system.
- The key sources of value are:
  1. **Carbon reduction –** the value in reducing the carbon intensity of electricity supply
  2. **Energy –** the cost of producing and balancing electricity, and capacity availability
  3. **Network management –** the costs of providing and managing the networks
  4. **Policy and supplier costs –** the costs of government policies and supply, which can also result in savings from some activities and business models

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Sources of value come from across the value chain

Sources of value			
Carbon reduction		Value in reducing the carbon intensity of electricity supply	
Energy		Wholesale market (including Peer to Peer and price arbitrage)	
		Capacity market revenues	
		Balancing service revenues	
Network management	**Network charging (Network price-signal flexibility)**	Forward-looking network charges/credits	Focus of Access reform
		Embedded benefits	Focus of Targeted Charging Review
		Residual charge avoidance	
	Contracted flexibility	Longer term network reinforcement tender revenues	Key aspect of System Operation reforms
		Shorter term network management tender revenues	
Policy and supplier costs		Policy costs/savings	
		Supplier costs/savings	

Introduction to Future Charging and Access Programme

Andy Burgess,
Deputy Director, Charging and Access
Ofgem

Outline of this session

- Industry led areas not covered by the Ofgem Significant Code Reviews –
  - Allocation of access rights, including queue management and trading
  - Storage charging
  - Balancing services task force

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Future Charging and Access programme

- **Access and forward looking charging reform (Access reform)**. We want to get better value out of electricity networks by using them more efficiently and flexibly. If we do this, the system will be able to accommodate more electric vehicles and other new technology at lowest cost. We have established an industry delivery group and a stakeholder challenge group.

Next steps – two working papers (this Summer and later this year). Draft directions in Summer 2020.

- The **Targeted Charging Review (TCR).** This seeks to remove some of distortions which are sending the wrong signals and costing consumers money and to allocate residual charges in a fairer way.

Next steps –responses to consultation on modelling by 12 July. Direction on reforms and timing later this year.

- The **Balancing Services Charges Task Force.** The ESO has led a review of balancing services charges in parallel with the Access reform and the TCR. The task force has produced its final report.

Next steps – responses to Ofgem consultation on task force report by 12 July. Ofgem to consider, including in TCR and access reform.

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Storage charging modifications

- Our work on storage is based on our view that storage is a key flexibility source and plays an important part in enabling the transition to the energy system of the future.
- We are committed to removing barriers to the competitive deployment of storage, while ensuring that the regulatory framework for storage is consistent with our approach to flexibility and takes into consideration the evolving nature of the energy system.
- We have identified several factors that could restrict the deployment of storage more generally, and we provided an update on these in the update to the Smart Systems Plan
- To address disproportionate network charges faced by storage, in our TCR we noted that changes to the residual network charges for storage could be progressed more quickly by industry to avoid the longer SCR process.
  - Industry has raised modifications (5 in total) to reform transmission, distribution and balancing charges for storage.
  - These are progressing through industry governance and we expect them to be finalised within the next few weeks and then submitted to us for consideration.
  - These mods look at ensuring storage does not pay the residual element of network charges for the electricity imported that is subsequently exported back to the energy system. All mods will remove the applicability of residual charges to intermediate demand for licenced storage.
  - This work complements the rest of the TCR.
  - Broadly speaking, we think that the TCR principles that apply to generation should apply to storage as well and we flagged this to industry earlier this year.

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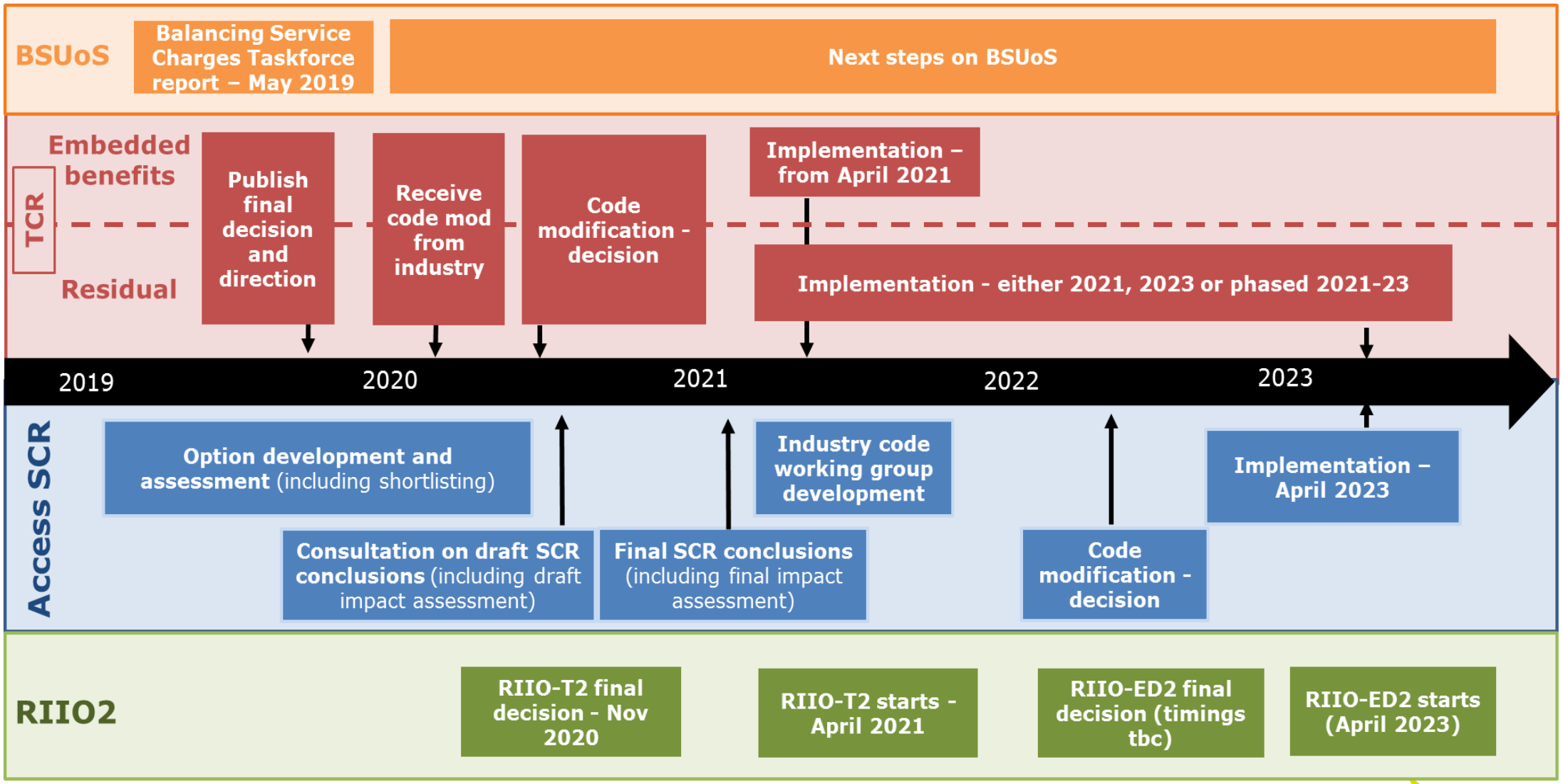
Our Future Charging & Access timelines



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Access and Forward Looking Charges

Jon Parker
Head of Electricity Network Access
Ofgem

Key background

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.

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- Focussed review of Transmission Network Use of System (TNUoS) charges

Our approach

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

Summer working paper

- 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.

End of year working paper

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

We then 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

Delivery Group and Challenge Group

Launched Delivery Group in Jan 19

- Comprises network companies, the System Operator and relevant code administrators.
- This group is **help us develop and assess options**, drawing on their expertise and knowledge of how the networks are planned and operated.
- Initial sub-groups (cost drivers, access rights, locational charging and cost models and charge design) **published reports in May.** Further sub-groups launched on connection boundary and small users.

Launched Challenge Group in Feb 19

- Provides ongoing wider stakeholder input into the SCR – includes representation from large users.
- This will provide a **challenge function** and ensure that policy development takes into account a **wide range of perspectives and is suitably ambitious**.
- Feedback taken into account as part of Delivery Group reports and Ofgem's own work.

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Focus of our work so far

Network cost Drivers	What are key drivers of future network costs? How does user contribution to these vary by time and location?

Key input for policy thinking

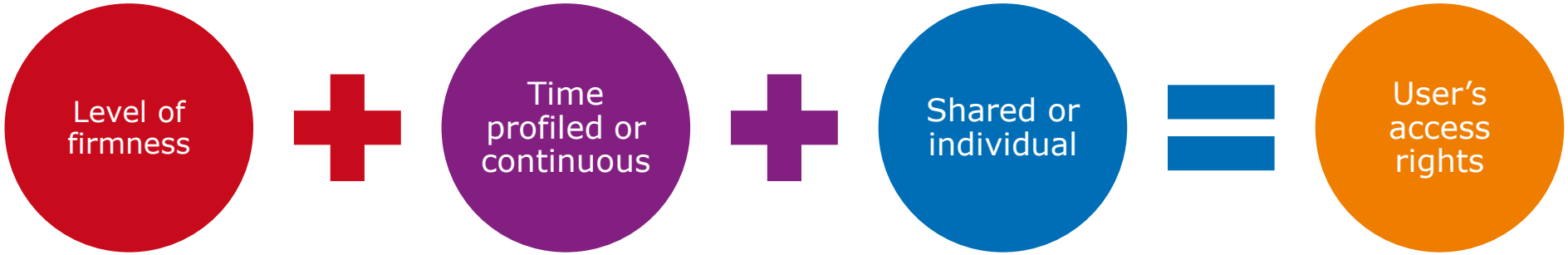
Access rights	What are the options for improving definition and choice of access rights to make better meet users' needs and support efficient use and development of the network? How feasible and desirable are these options?
Charge Design	What are the options for how charges for distribution and transmission demand charges are structured? How feasible and desirable are these options?
Distribution charging models and locational granularity	What are the options for a) how the different distribution charging models could be changed to provide better and more cost-reflective charges and b) how locationally granular distribution network charges should be? How feasible and desirable are these options?

Focus of first working paper

53

Access rights

A user's access rights could be a combination of their decisions across each access choice:



There are also some cross cutting issues, that are relevant to all access choices:

- The extent to which options are bespoke or standardised.
- The options to monitor compliance and arrangements that apply if a user exceeds their access rights.
- How users' access right choices should be reflected in network charges.

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Charge design

We have identified five basic options for charge design (there are variants of each).

1. **Volumetric Time-of-Use –** whereby users are charged in £/kWh, at different rates during different time bands.
2. **Actual capacity** – whereby users are charged on the basis of their actual maximum capacity, in £/kW.
3. **Agreed capacity –** whereby users agree a capacity limit ahead of time (or suppliers agree this on behalf of their customers), and pay a £/kW charge for the capacity.
4. **Dynamic charging** – whereby users are charged high prices during periods of actual network congestion, and very low prices the rest of the year. Examples of this include critical peak pricing and dynamic time-of-use
5. **Peak rebates** – whereby users are paid to reduce demand during times of actual network congestion.

Different options could apply to individual user groups. For example:

- Some options rely upon half hourly consumption data and therefore cannot be applied to non half-hourly users
- It may be administratively challenging to agree individual capacities with every small user
- We need to investigate further whether generation should be treated as equal and opposite to demand and have the same charging design applied to them.

Charge design (2)

We have been engaging with stakeholders to understand the feasibility and impact of some of our options:

- **DNOs and ESO** – we surveyed the network companies to identify the potential costs and timeframes required to implement changes to the charging design and any additional data or systems they might require.
- **Suppliers** – we interviewed our Challenge Group suppliers to understand the changes they might make to their systems and tariffs in response to certain elements of the charging design options (e.g. dynamic charging and curtailment).

We would like to take this opportunity to highlight that we will be carrying out **wider engagement with other suppliers**, which will include a webinar likely to take place in the summer, followed by a survey. We will also be seeking volunteers to participate in follow up interviews.

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Better locational distribution network signals

Locational charging signals are a product of:

- **Their locational granularity** - the extent to which charges are calculated separately for different location
- **The network cost model methodology used** – the approach to calculating future network costs at different locations

For both areas, we have identified the options and undertaken an initial assessment, primarily focused on their feasibility.

Ongoing and future work will continue this assessment with a greater focus on the desirability of the different options, for example considering:

- Which are the key future network cost drivers, to what extent can these be reduced and to what extent do they vary by location?
- To what extent are the different options likely to provide sufficiently simple, transparent and predictable signals that can engender behavioural response?

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Signalling the value of flexibility

- There are two ways in which the value of flexibility can be signalled:
  - **Price flexibility** - occurring when any party varies its demand or generation in response to the price of energy, and network use at a particular time and/or location. Focus of Access SCR.
  - **Contracted flexibility** - where parties trade and directly contract with one another to procure flexibility. Focus of system operation reforms.
- Different options we could take within the SCR will affect how flexibility receives value. We will carefully consider the relative pros and cons of these different approaches in reaching our decision.

	No access choice	Significant access right choice
Agreed capacity based charges	**Flexibility is mainly valued through flexibility procurement**. This is effectively the current approach for transmission generators (via the Balancing Mechanism). Overrun charges could also be used to value flex	Users are able to indicate they are **willing to offer flexibility in their choice of access right, in exchange for a lower capacity charge**. Additional flexibility procurement may be needed.
Charges based on usage at certain times	**Flexibility is valued through time of use charging**, though additional flexibility procurement may be needed to the extent that charges to do not reflect value in a particular location at different times	As left + above, flexibility may also be valued through access right choice. However, **users may have limited incentive to choose more flexible access rights if charges are solely time of use basis**.

Next steps

- We will publish our first working paper over the summer
- This and other resources from the Delivery and Challenge Groups will continue to be available from the Charging Futures website
- We expect that much of the agenda for the next Charging Futures Forum in September will focus on us sharing the detail of this working paper and giving you the chance to feedback your views

Charging Futures

Targeted Charging Review (TCR)

Andrew Self
Head of TCR
Ofgem

Objectives of TCR session at July Forum

- **Objectives:**
- A reminder of the key decisions we will take
- Get initial stakeholder views on the Capacity Market modelling
- Update on how we will take account of the Balancing Services Charges Taskforce findings
- Update on carbon appraisal figures

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Key decisions

The TCR is made up for two key elements:

- **Embedded Benefits**
  - Full or partial reform
  - Any further policy refinements following consultation
  - Implementation date

- **Residual reform**
  - Fixed or Agreed Capacity charges
  - Any further policy refinements following consultation
  - Implementation date

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Additional modelling with no Capacity Market (CM) in place

> Whilst we expect the reinstatement of the Capacity Market in due course, we think it is useful and prudent to model a scenario without the Capacity Market in place, to test the sensitivity of our projected impacts to this highly unlikely outcome.

Modelling with no CM in place

- CM was suspended Nov 19, reinstatement expected
- We have carried out additional modelling without the CM in place
- Residual and non-locational embedded benefits elements of the TCR combined in one modelling sensitivity
- Key assumption that market functions well

Results of this additional modelling sensitivity

- Positive consumer benefits from reforms, similar to the modelling with the CM in place
- System benefits are reduced because of higher levels of expected energy unserved, however results indicate positive system benefits from reforms
- Lower carbon emissions due to investment in more efficient generation

How this analysis feeds in to the TCR final decision

- Results indicate that benefits of the combined residual and non-locational embedded benefits TCR reforms are robust to the unlikely situation that the CM does not return
- We have made our consultants' report and backing data available for stakeholders to consider
- We welcome stakeholder feedback in the form of consultation responses and through this forum

Results

- The system and consumer cost impacts are summarised below. The results from the previous analysis are shown for comparison, though it should be noted that there have been updates to assumptions between the two sets of analysis so they are not directly comparable.
- Our results show the reforms reduce consumer costs by £4.8bn – a similar reduction to the previous analysis with the CM in place.
- System benefits are also reduced, but by a smaller magnitude. One reason for this is the increase in EEU (expected energy unserved) due to the reforms, which is valued at £17,000/MWh.

Counterfactual	Factual	System cost (£bn)	Consumer Cost (£bn)
Previous analysis with CM			
Baseline	TCR residual reform	-1.01	-0.54
TCR residual reform	Full Embedded Benefits reform	-0.03	-4.52
	Total, with CM	**-1.04**	**-5.06**
New analysis (no CM)			
Baseline (no CM)	TCR residual and full Embedded Benefits reform (no CM)	-0.23	-4.81

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Taking account of the Balancing Services Charges Task Force findings

- **Deliverable 1. Do Balancing Services charges currently provide a useful forward-looking signal?**
- **Deliverable 2. Potential options for charging Balancing Services differently, to be cost-reflective and provide a forward-looking signal.**
- **Deliverable 3. Potentially cost-reflective elements of Balancing Services charges to provide a forward-looking signal.**
  - *'It is not feasible to charge any of the components of BSUoS in a more cost-reflective and forward-looking manner that would effectively influence user behaviour. Therefore, the costs within BSUoS should all be treated on a cost-recovery basis'*
- We are considering our response to the conclusions of the Task Force, and the results of this report will be taken into account when the final decision is made on the TCR, including whether to proceed with partial or full reform to Embedded Benefits.
- We would welcome any feedback on the Task Force conclusions and views as to how they should be considered within the context of our proposed decision on the TCR or other aspects of our Future Charging and Access programme.

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Updated carbon values

		BEIS appraisal values (corrected results)		National Grid FES appraisal value (included in the minded-to decision document)	
		Net Present Value £billion		Net Present Value £billion	
Base scenario (counterfactual)	**Modelled scenario**	**System Cost**	**Consumer Cost**	**System Cost**	**Consumer Cost**
Baseline (steady Progression)	Transmission Generation Residual (TGR) & Full Balancing Services Charges (BSUoS) Reform	-0.02	-4.52	-0.11	-4.52
Alt Future Energy Scenario: Baseline (community renewables)	Alt FES: Transmission Generation Residual (TGR) & Full Balancing Services Charges (BSUoS) Reform	0.33	-5.99	0.1	-5.99
Baseline (steady Progression)	Phased Transmission Generation Residual (TGR) & Full Balancing Services Charges (BSUoS) Reform	-0.01	-3.51	-0.1	-3.51
Baseline (steady Progression)	Transmission Generation Residual (TGR) & Partial Balancing Services Charges (BSUoS) Reform	0	-3.33	-0.03	-3.33
Alt Future Energy Scenario: Baseline (community renewables)	Alt FES: Transmission Generation Residual (TGR) & Partial Balancing Services Charges (BSUoS) Reform	0.27	-4.11	0.16	-4.11

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Next steps

- We welcome the feedback we have received from stakeholders since we published our minded-to decision in November 2018. We have carefully considered the consultation responses we have received to date and will factor these in to our proposals, along with the responses to our June open letter and July technical consultation.
- In response to comments regarding the analysis which supported the draft decision, we will be undertaking further analysis to support our final decision and updated impact assessment.
- We intend to publish our final decision on the TCR and direction (including the final impact assessment) later this year. We welcome stakeholder feedback through this forum and to TCR@ofgem.gov.uk. If you which to respond to our technical consultation, please do so by 12 July 2019.

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Q & A Session

Q & A members

- **Andy Burgess,** Ofgem
- **Frances Warburton,** Ofgem
- **Andrew Self,** Ofgem
- **Jon Parker,** Ofgem
- **Facilitator - Gareth Davies –** National Grid SO

To ask questions
Go to: menti.com Code:176697

Charging Futures

Lunch 13:00-13:50

Balancing Services Charges

Mike Oxenham
National Grid ESO

Background and Task Force Overview

- In November 2018 Ofgem asked the ESO to lead a task force under the Charging Futures arrangements. The Task Force members were selected from industry volunteers to bring a wealth of experience and to represent a broad range of views.
- The Task Force first met in January 2019 and have since met several times to deliver their final report to industry and Ofgem at end May 2019.

- All the information regarding the Task Force (e.g. agendas, minutes, presentations, podcasts, contact details, etc) is available on the Charging Futures website here.

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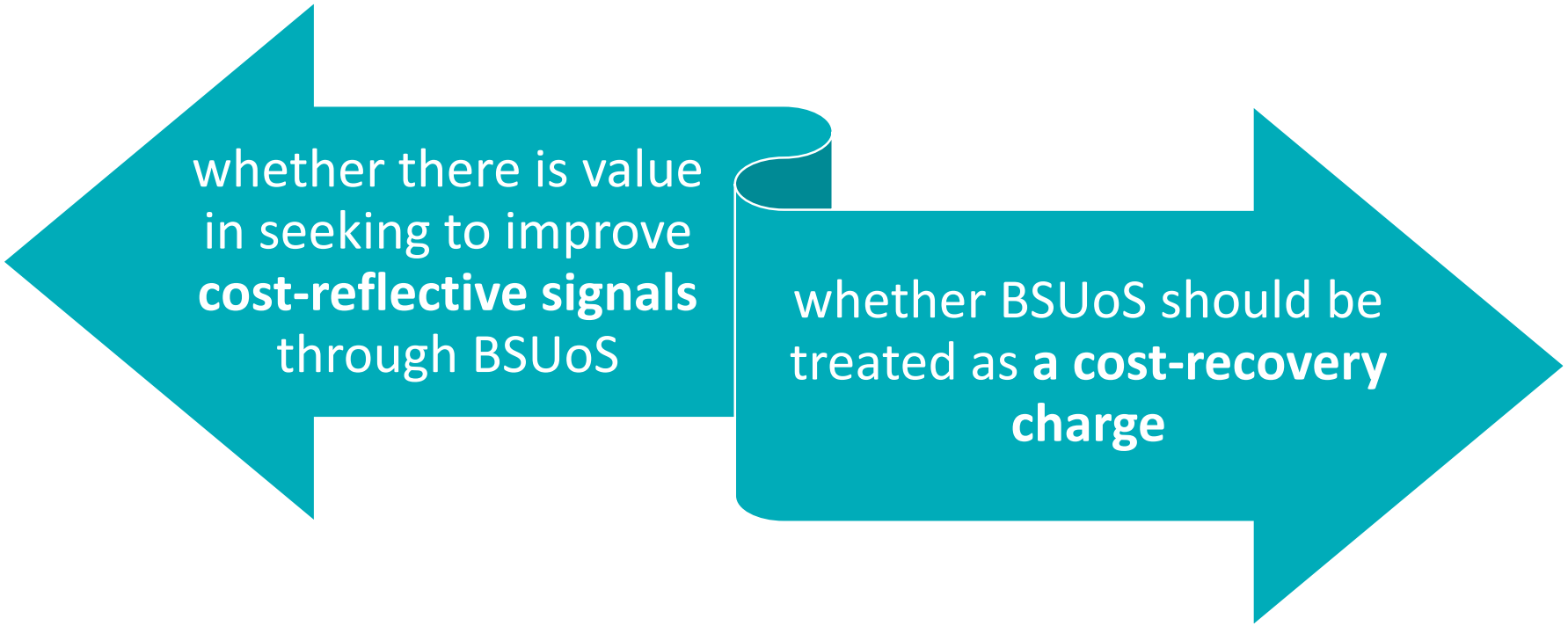
Task Force Objective

- The overall objective of the Task Force was to provide analysis to support decisions on the future direction of Balancing Services Charges.



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Task Force Deliverables

- The Task Force had three primary sequential deliverables as follows.

	Task Force Deliverables
1	Task Force document assessing the extent to which elements of balancing services charges **currently** provide a forward-looking signal that influences the behaviour of system users.
2	Task Force document assessing the **potential** for existing elements of balancing services charges to be charged more cost-reflectively and hence provide better forward-looking signals.
3	Task Force document assessing the **feasibility** of charging any identified potentially cost-reflective elements of balancing services charges on a forward-looking basis to influence user behaviour.

Deliverable 1 Key Points

The Task Force identified five main reasons why BSUoS does not **currently** provide a forward-looking signal that influences the behaviour of system users:

1. BSUoS charges are hard to forecast.
2. BSUoS charges are complex.
3. BSUoS charges are increasingly volatile.
4. Other market elements take precedence.
5. Applies to all chargeable users of the transmission system on an equal basis.

The Task Force also identified two resulting impacts on the market:

- Risk premia to manage forecasting risks.
- Overnight periods mainly when wind is high and demand is low.

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Deliverable 1 Conclusion

- The existing elements of BSUoS do not currently provide any useful forward-looking signal which influences user behaviour to improve the economic and efficient operation of the market.
- The signals some parties can forecast i.e. from demand and/or wind, do not result in behaviours that would lower costs to consumers, and the volatility and inability to forecast BSUoS is adding risk premia costs to all parties exposed to BSUoS.

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Deliverable 2 Key Points

Locational Transmission Constraints	Locational Reactive and Voltage Constraints	Response and Reserve Bands	Response and Reserve Utilisation
For example, if in 'Zone A' there are transmission constraint costs being incurred across a particular boundary then those costs could be allocated to those specific parties behind the constraint and generating (or not taking demand) at the time of the constraint.	For example, if in 'Zone B' there is a voltage issue and costs are incurred resolving that voltage issue due to reactive power absorption payments then those costs will be recovered from those in 'Zone B' who are contributing to the need for reactive power absorption.	For example, if analysis has shown that an extra 'X' MW worth of response has been procured to continue to protect system frequency due to the largest loss then the costs of this additional response could be paid by those connections in the new range, or by those who are exacerbating the issue.	For example, a frequency service is automatically utilised for frequency support due to the trip of a generator so the costs associated with service utilisation are paid for specifically by the generator which tripped and caused the frequency issue at that time, whereas those other related costs are then treated as a cost-recovery charge.

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Deliverable 2 Conclusion

Four potential options were identified by the Task Force which the task force considered could potentially be charged more cost-reflectively and provide better forward-looking signals:

(i) locational transmission constraints
(ii) locational reactive and voltage constraints
(iii) response and reserve bands
(iv) response and reserve utilisation

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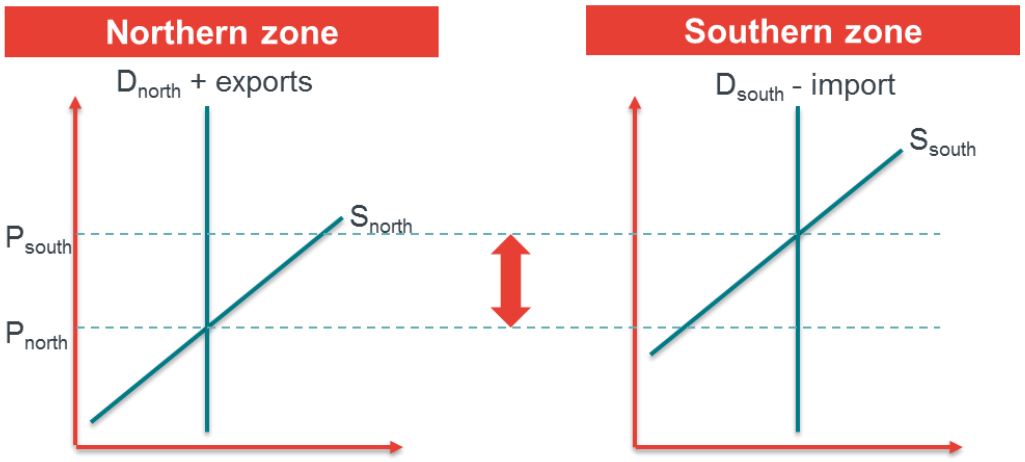
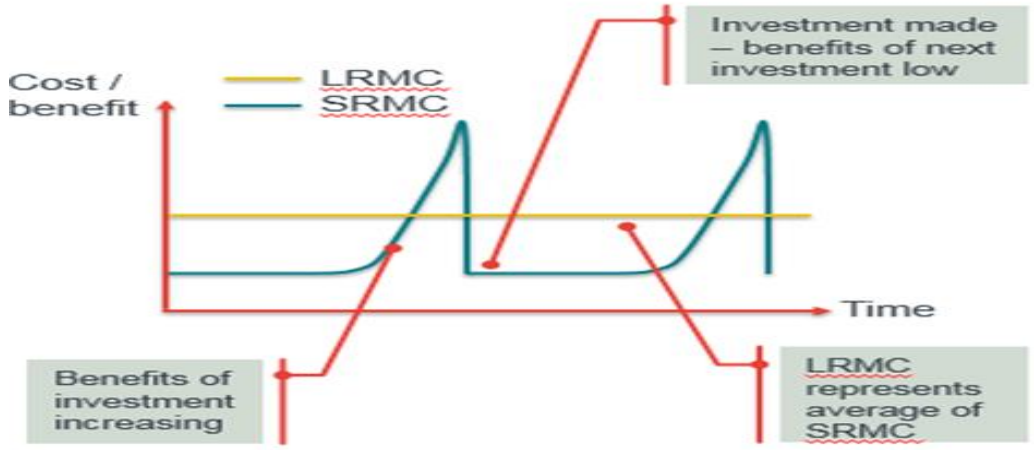
Deliverable 3 Key Points

1. Marginal Costs Versus Total Costs
2. Double Counting Issues
3. Existing issues will remain and might be exacerbated.



Frontier Economics



Frontier Economics

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Deliverable 3 Conclusion

Whilst in theory there are some advantages relating to the potential options identified, the draft conclusion of the Task Force is that none of the potential options could feasibly provide a cost-reflective and forward-looking signal that drives efficient market behaviour to the benefit of consumers.

Indeed, several limitations have been identified from the assessment of each of the potential options where no solution could be identified by the Task Force.

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Overall Conclusion

It is not feasible to charge any of the components of BSUoS in a more cost-reflective and forward-looking manner that would effectively influence user behaviour.

Therefore the costs within BSUoS should all be treated on a cost-recovery basis.

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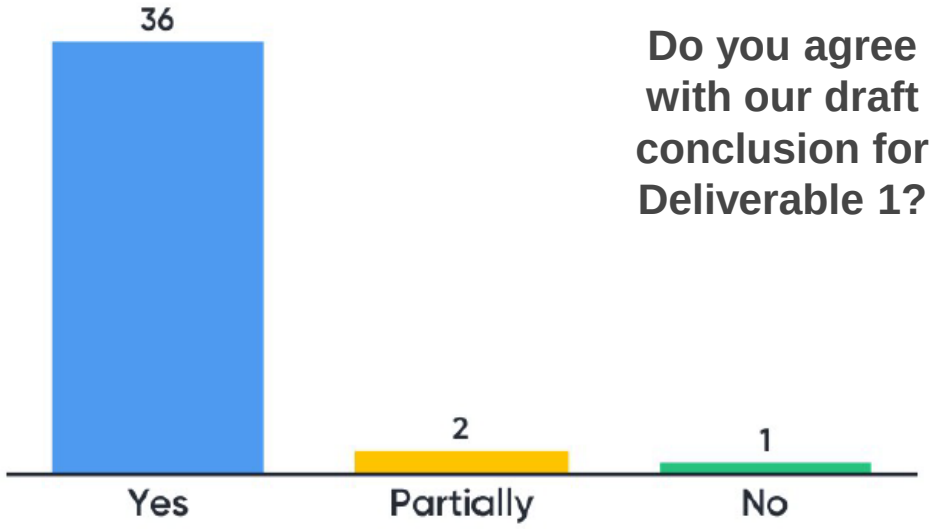
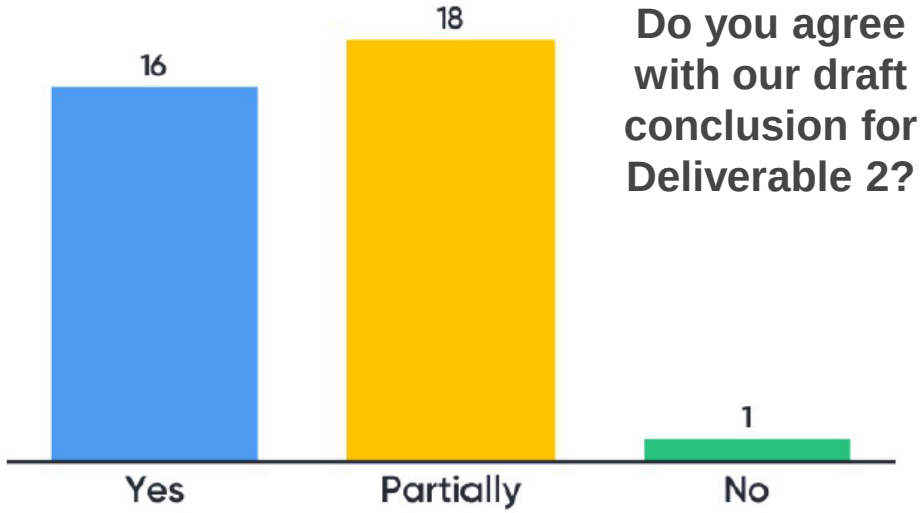
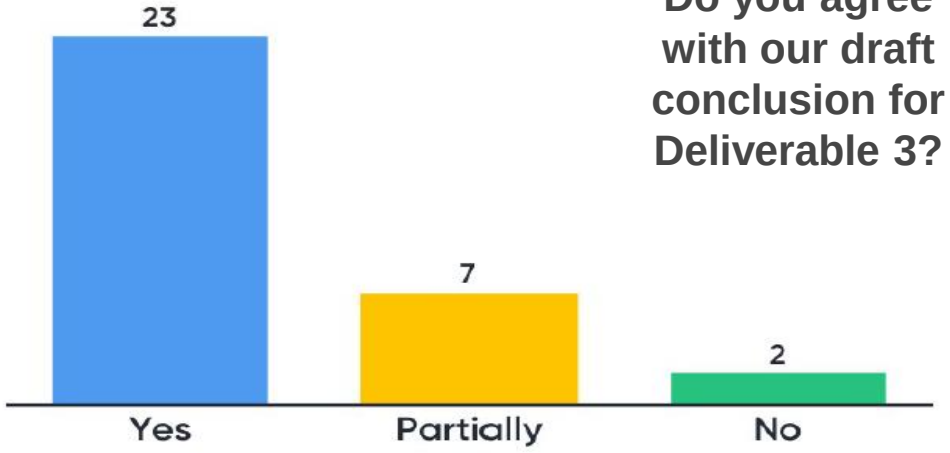
Draft Report Webinar Feedback



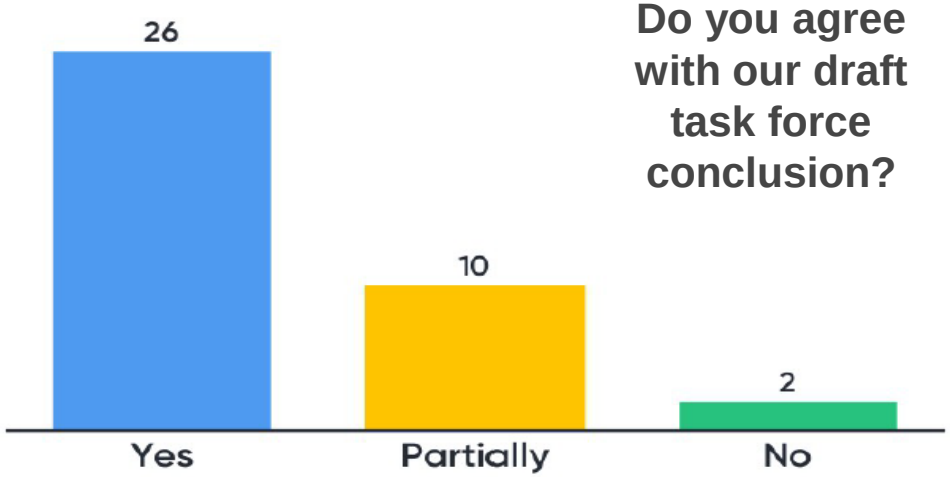
Do you agree with our draft conclusion for Deliverable 1?



Do you agree with our draft conclusion for Deliverable 2?

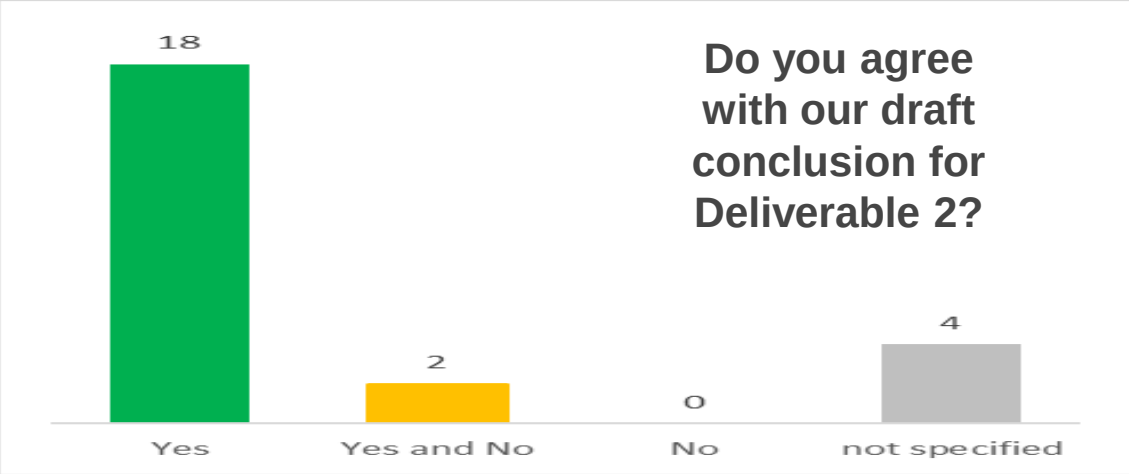


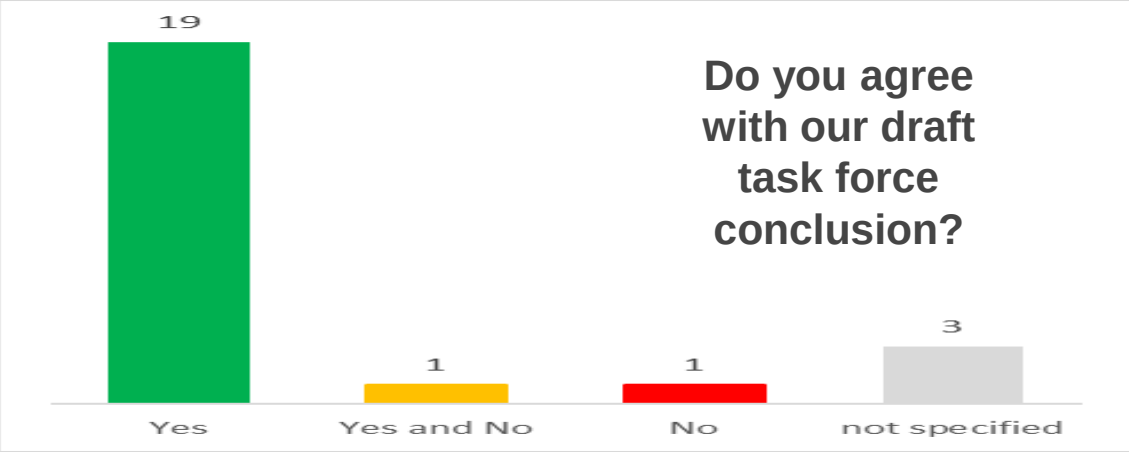
Do you agree with our draft conclusion for Deliverable 3?



Do you agree with our draft task force conclusion?

Draft Report Consultation Feedback





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Task Force Report Q&A

Do you have any questions on the final report and the conclusions of the task force?

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Group Debate and MENTI Feedback

- Do you agree with the conclusions of the task force and what do you think the next steps should be?

- What do you think the impact of the task force conclusions could be on Balancing Services Charges?

[85] Go to www.menti.com and use the code **17 66 97**

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Thank you

- All All task force information is available on the charging futures website: www.chargingfutures.com

- Ofgem is currently consulting on elements of the Targeted Charging Review including the conclusions of the Balancing Services Charges Task Force.

- This consultation closes 12th July and is available on the Ofgem website as follows. https://www.ofgem.gov.uk/publications-and-updates/future-charging-and-access-programme-consultation-supplementary-analysis-november-2018-minded-decision-targeted-charging-review

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Modifications and Change Proposals Update

Rob Marshall
National Grid ESO

Angelo Fitzhenry
Electralink

Aim of this session

What is the code modification process?

How can I engage with the modifications?

What are the key modifications that relate to charging reform?

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Electricity network charges explained

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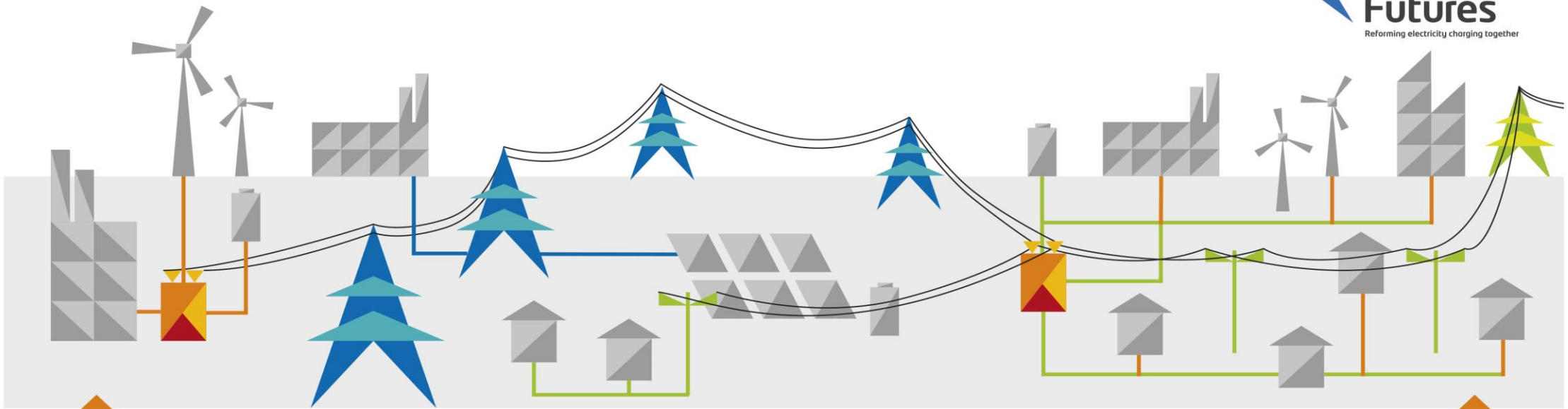
Reforming electricity charging together



Connection charge

Transmission Network Use of System charge (TNUoS)

This is paid to Transmission Owners (TOs) for the cost of building and maintaining the shared transmission network.

Your TNUoS charge may depend on:
> Where you are in GB
> When you use the network
> How much you consume

3–4% of average dual-fuel bill

Balancing Services Use of System charge (BSUoS)

This is paid to the System Operator for the cost of balancing the system.

It pays for the skills, tools and services the SO needs to balance supply and demand in real time.

1% of average dual-fuel bill

Distribution Use of System charge (DUoS)

This is paid to Distribution Network Operators (DNOs) for the cost of building and maintaining the local distribution network.

Your DUoS charge may depend on:
> Where on the local network you are
> What voltage connection you need
> When in the day you use the network
> How much you consume

8% of average dual-fuel bill

Connection charge

A charge for new assets or reinforcements needed to connect you to the network.

Each connection will have its own cost that is agreed with the TO or DNO you are connecting to.

Payment arranged with your network.

The codes

Electricity network charging is set out in two industry codes

Distribution charging

DCUSA

Distribution Connection and Use of System Agreement

Transmission charging

CUSC

Connection and Use of System Code

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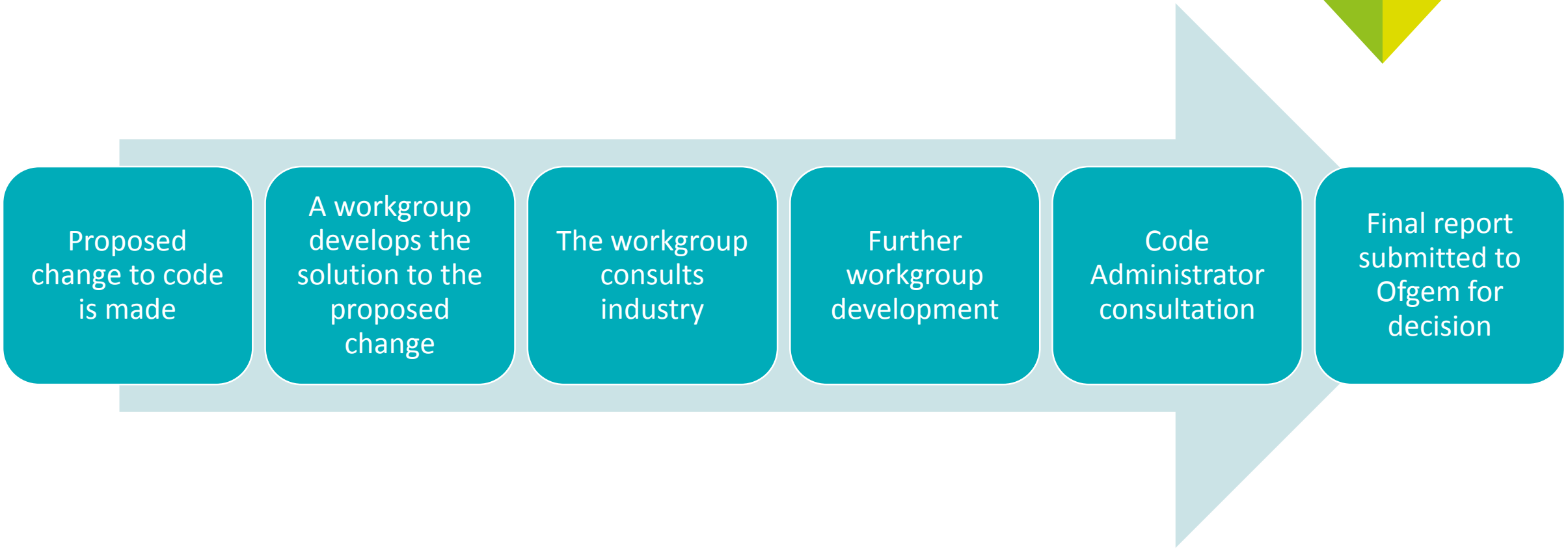
The modification process



More details can be found here:

DCUSA: www.dcusa.co.uk **CUSC**: www.nationalgrideso.com/codes

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How to engage with code change

- Join **discussions at industry forums** before a formal change is submitted
  - Distribution Charging Methodology Development Group - DCMDG
  - Transmission Charging Methodologies Forum - TCMF
- **Propose a change** to the charging methodologies
- Be a **workgroup member** to develop solutions
- Be **informed of progress** through website and email updates
- **Respond to consultations** to feed in your views

More details can be found here:

DCUSA: www.dcusa.co.uk **CUSC**: www.nationalgrideso.com/codes

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Distribution Change Proposals Update

Angelo Fitzhenry

Electralink

DCUSA (Distribution) Change Proposals Summary

11 Charging Related Change Proposals in process

3 CPs approved and scheduled for implementation - 2 in April 2020 and 1 in April 2021.

2 CPs are with Ofgem awaiting Authority Consent – 1 which Parties voted to accept and 1 which Parties voted to reject

Of the 6 remaining CPs:

- 4 are scheduled for Change Reports to be submitted to the DCUSA Panel in July
- 1 is still in the definition stage and will require charging methodology impact assessments
- 1 whilst largely concluded now has a potential issue with respect to margin squeeze and Competition Law of which legal advice is being reviewed.

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DCUSA (Distribution) Change Proposals

DCP	Purpose	Implementation or Target Date
DCP 266	The calculation and application of IDNO discounts	April 2023
DCP 268	DUoS Charging Using HH settlement data	April 2021
DCP 306	Treatment of Ofgem Licence Fees within the PCDM	April 2020
DCP 311	Clarification of NUF cap and collar calculations	April 2020
DCP 313	Eligibility Criteria for EDCM Generation Credits	Awaiting Authority Consent (April 2021)
DCP 314	Appropriate treatment of Bad Debt following appointment of Supplier of Last Resort	Awaiting Authority Consent (Next scheduled release following approval)

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DCUSA (Distribution) Change Proposals

DCP	Purpose	Implementation or Target Date
DCP 328	Use of system charging for private networks with competition in supply	April 2022
DCP 332	Appropriate treatment and allocation of Last Resort Supply Payment claim costs	April 2021
DCP 333	Appropriate treatment and allocation of eligible use of system bad debt costs	April 2021
DCP 341	Removal of residual charging for storage facilities in the CDCM	April 2021
DCP 342	Removal of residual charging for storage facilities in the EDCM	April 2021

Transmission Modifications Update

Rob Marshall

National Grid ESO

CUSC Charging modifications

Mod Number	Purpose	Est. to take effect (if approved)
CMP 280/281	Remove the TNUoS demand residual (280) and BSUoS (281) charge from storage operators	April 2021
CMP 286	Improve the predictability of TNUoS demand charges by fixing the targeted revenue earlier	April 2020
CMP 287	Improve the predictability of TNUoS demand charges by fixing elements such as demand forecasts earlier	April 2020
CMP 288	Introduce explicit charges for generators or demand users delaying connections	April 2020
CMP 292	Set a cut off date for changes to the CUSC affecting charges in the following year	April 2020
CMP 300	Changes the calculation of the response energy payment	April 2020

CUSC Charging modifications

Mod Number	Purpose	Est. to take effect (if approved)
CMP 303	Removes some costs from the calculation of local circuit charges for generators	April 2020
CMP 306	Changes the rate of return within the calculation of connection charges	April 2020
CMP 307	Charges BSUoS to the exports from embedded generators	TBC – On hold
CMP 308	Removes BSUoS charge from generators	April 2022
CMP 311	Changes the assessment criteria for user allowed credit	April 2020
CMP 315	Changes the assets included within the calculation of the expansion constant	TBC

CUSC Charging modifications

Mod Number	Purpose	Est. to take effect (if approved)
CMP 316	Introduces a methodology for charging co-located generation	April 2020
CMP 317	Defines assets required for connection and establishes a post event reconciliation process	April 2021
CMP 318	To extend the period in which meters in Measurement Classes F and G are treated as NHH	April 2020

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Final Thoughts and Next Steps

Gareth Davies
National Grid SO

Your feedback

Go to menti.com

Code: 176697

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Reforming electricity charging together

Forum

Thank you, and have a safe journey home