Charging Futures
Reforming electricity charging together
Forward Looking Charges Task Force

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Access Task Force

Access and Forward-Looking Charges Task Force

Interim Progress Report

Published 20 April 2018

Introduction and Background

This slide pack and referenced supporting documents constitute the Interim Progress Report of the Charging Futures Forum Access and Forward Looking Charges Task Forces. Information about the Charging Future Forum and the work of its Task Forces can be found at http://www.chargingfutures.com/

Background

In July 2017 Ofgem announced plans to establish the Charging Futures Forum (CFF) to provide direction to ongoing charging reviews and to develop an integrated work programme for these and other elements of Ofgem's work. In November 2017 Ofgem published a discussion paper *"Reform of electricity network access and forward-looking charges: a working paper" (available at* https://www.ofgem.gov.uk/publications-and-updates/reform-electricity-network-access-and-forward-looking-charges-working-paper*)* that highlights the need to review the current regulatory framework in response to the rapidly changing energy system, including the transition to a future smart flexible energy system.

Specifically, the working paper identified the need to ensure that as this transition progresses that the regulatory framework remains fit for purpose. This includes ensuring that network capacity is allocated and used in a way that minimises overall costs to consumers, part of which is providing network users with better signals about the costs and benefits they confer on the network at a given time or location. As a first step in delivering these objectives the discussion paper points to the need to identify issues and key regulatory 'gaps' in these areas that may need to be addressed.

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Introduction and Background

Interim Progress Report

This Interim Progress Report describes the work undertaken by the Task Forces to date and builds on their '*Initial Options for Change'* paper published in February (available at http://www.chargingfutures.com/media/1130/access-and-flc-options-paper-final-published-12022018.pdf).

The following slides and supporting documents summarise the work of the Task Forces for the period from January 2018 to date consistent with their terms of reference (available at http://www.chargingfutures.com/media/1108/final-cff-tf-tor_12jan18.pdf).

The Task Force membership is representative of a wide range of stakeholder including energy industry, communities and consumers. Their work includes a programme of ongoing engagement with wider stakeholder and interested parties, particularly through the Charging Futures Forum.

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Summary of Slide Content

The following provides a summary of the content within this slide pack. It should be read in conjunction with the referenced documents that have been published alongside this slide pack and form part of the Task Forces' Interim Progress Report.

Slide 6 Task Force Work Plan Level 1: Sets out the high level work plan for the Access and Forward Looking Charging Task Forces, including key dates and outputs.

Slides 7-9 Scenarios Summary of Assessment: Sets out the nine 'agreed assessment criteria' and read across to the transmission, distribution and EU codes objectives. The criteria have been used to evaluate options identified by the Task Forces. Slide 9 sets out a number of high level 'Framework Scenarios' that have been developed under which system users could access and use the electricity system and describes their defining characteristics.

Slides 10-12 describe advantages and disadvantages of the different Framework Scenarios identified though their assessment against the agreed assessment criteria. The detailed results of the evaluation of the three scenarios is available at http://chargingfutures.com/media/1186/initial-assessment-three-scenarios.pdf.

Slides 13-14 Clusters – User Investment: describe a number of combinations of 'building block options' (see Ofgem Access Discussion Paper, November 2017) that create varying conditions under which users connect to and access the electricity system, so likely to drive particular user behaviours and outcomes. These 'clusters' are described in more detail in slides 15-18. A detailed assessment of the clusters has been carried out against the agreed criteria, the results of which can be found at http://chargingfutures.com/media/1183/initial-assessment-clusters.pdf.

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Summary of Slide Content

Slides 19-20 Clusters – User Operation: describe a number of combinations of 'building block options' (see Ofgem Access Discussion Paper, November 2017) that create varying conditions under which users would utilise the electricity system, to drive particular user behaviours and outcomes. These 'clusters' are described in more detail in slides 21-25. A detailed assessment of the clusters has been carried out against the agreed criteria, the results of which can be found at http://chargingfutures.com/media/1183/initial-assessment-clusters.pdf. Work to assess these options and any subsequent findings and conclusions is ongoing.

Slides 26-27 Modelling and Tariff Design Options: describe a series of options for the structure of forward looking charges. These can be considered on a stand-alone basis, or where practical and feasible to do so, a combination of the options could be considered for future charges. A detailed assessment of these options s has been carried out against the agreed criteria, the results of which can be found at http://chargingfutures.com/media/1185/initial-assessment-modelling-and-tariff-design.pdf.

Slides 28-33 Access Allocation Options – Targeted Auctions, Tenders or Market Based Approaches: describe a number of 'targeted' approaches for the allocation of access to and utilisation of the electricity system and the assessed strengths and weakness of the different approaches.

Slides 34-39 Access Choices – User Perspectives: describe an initial view of characteristics of access rights, for example, Lifespan, Firmness etc. and the preferred options/approaches from the perspectives of a number of different system users e.g. large generators, Community Energy, Large demand customers etc.

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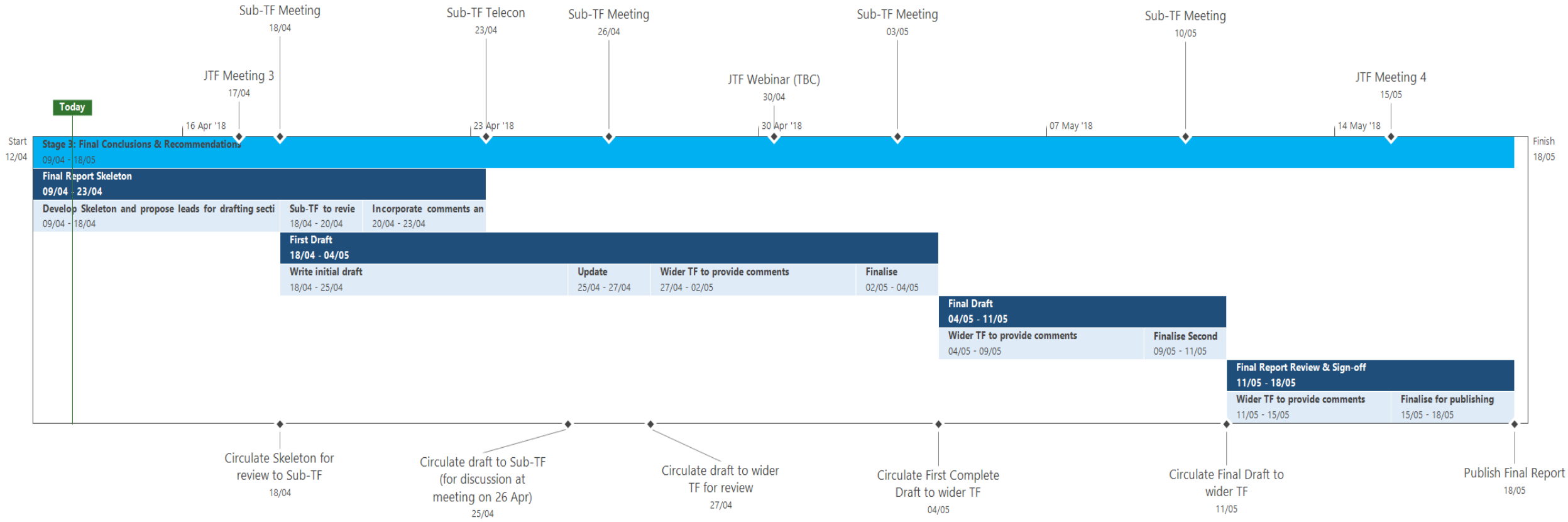
Task Force Work Plan – Level 1



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Three Scenarios - Summary of Assessment

Assessment Criteria

	Assessment Criteria		Primary Related Objective		Secondary Related Objectives
1	Efficiently meet the essential service requirements of network users		Developments in Network Businesses		Licence Compliance
2	Optimise capacity allocation		Effective Competition		
3	Ensure that price signals reflect the incremental future network costs and benefits that can be allocated to and influenced by the actions of network users		Cost Reflectivity		Effective Competition
4	Provide a level playing field for all network users		Effective Competition		
5	Provide effective network user price signals, i.e. price signals which can be reasonably anticipated by a user with sufficient confidence to allow them to take action		Effective Competition		Cost Reflectivity
6	Appropriately allocate risk between individual network users and the wider body of users		Effective Competition		
7	Support efficient network development		Developments in Network Businesses		
8	Be practical		Effeciency of Implementation		Compliance with European Regulation
9	Be proportionate		Effeciency of Implementation		

Scenarios

High emphasis on auctions/trading

Access choices are well-defined (including being financially firm)

They are purchased via auctions, with scope for re-sale.

Charging models still used to set robust reserve prices, with potential changes to **ensure they reflect differential value of access adequately.**

High emphasis on access right choices

Access rights are granted broadly on a **first come first served basis.**

There is a **range of choice** around type of access to maximise use of capacity.

Capacity charges reflect impact of different choices on network costs.

Non-firm holders can trade curtailment obligations through a market-based mechanism.

High emphasis on better usage charges

Limited changes to access, with **reliance on usage charges.**

Most charges focused on **usage at system peaks.** Could include more **locational charging** (eg for constraint costs.)

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High Emphasis on Auctions/Trading

- Advantages for:
  - Optimising capacity allocation
    - Could optimise allocation behind a constraint, e.g. targeted auctions for local constraints
    - May create market in which suppliers/aggregators compete to create portfolios which optimise allocation
  - Providing effective network user price signals
    - An auction taking place behind a constraint provides a strong locational cost signal
- Disadvantages for:
  - Creating a level playing field, and allocation of risk
    - Largely due to challenges in safeguarding smaller users creating potential for gaming across boundaries
    - If access for smaller users is protected, places disproportionate risk on larger users - potential parallel with current micro-generation assigned ‘rights’ compared to larger generation which is required to apply for ‘access’
  - Practicality and proportionality
    - Disadvantages for level playing field are mitigated if more users participate in an auction, but an auction for a large number of users will be difficult to administer

High Emphasis on Access Right Choices

- Advantages for:
  - Providing effective price signals, and appropriately allocating risk
    - Creates a clear, up front price signal to which users can respond (either by changing e.g. time of use if already connected, or connecting elsewhere if not)
    - Clearly designed products enable users to know what risk they are taking up front
  - Supporting efficient network development
    - DNOs have visibility (potentially many years in advance) of the access rights users have requested, and so can develop networks accordingly
- Disadvantages for:
  - Cost reflectivity
    - Risks over-valuing ‘access’ and under-valuing ongoing behavioural changes
  - Practicality
    - Potential for significantly more detailed connection agreements for larger users (detailing e.g. time of access at given levels)
    - The requirement to much more closely define access rights for smaller users could be challenging

High Emphasis on Usage Charges

- Advantages for:
  - Cost reflectivity
    - Assuming the calculation of charges is done on a sound basis, charges should accurately reflect costs and benefits which can be allocated to the behaviour of certain users
  - Creating a level playing field
    - Each user should face the same charges (for an equivalent unit of energy, i.e. at the same time and location)
- Disadvantages for:
  - Optimising capacity allocation
    - Potential for conflict between TOU signals and other cost signals (e.g. balancing mechanism)
    - No improvement on 'implicit' sharing of capacity which exists under the status quo (unless a greater emphasis were put on capacity charging applied to all customer types)
  - Providing effective price signals which can be predicted with confidence to take action
    - Essential that charges are highly cost-reflective to avoid inefficiencies, which could result in volatile signals

Clusters – User Investment

Influencing User Investment Combinations

C1-A Existing Transmission Arrangements

Shallow connection boundary, moderate locational signal, securitisation requirements barriers for smaller users.

C1-B Existing Distribution Arrangements

Shallowish connection boundary, most users have minor locational charges (not EHV), no forward looking signal.

C1-C Strong Connection Charging

Strong initial locational signal, minimal forward looking charge, no incentive to release unused capacity/reallocate between users.

C1-D Strong Usage Charging

Difficulty defining zones (both location and across voltages levels), forward looking signal very volatile/hard to predict which may lead to speculative applications.

Charging Futures

C1-A Existing Transmission

Connection Boundary	Shallow ★	Shallowish	Deep
Timing of connection charge	Annuitised without security	Annuitised and securitised ★	Paid up front
Granularity of locational signals	None	Some granularity (zonal?) ★	High level of granularity (Nodal?)
User commitment for wider network investment	None	Securitised until connected ★	Securitised beyond time of connection

Broadly similar to existing arrangement at Transmission level. Shallow connection boundary and locational signal allow user behaviour to be influenced as system costs change over time and better facilitates capacity trading/reallocation. Securitisation requirements can be a barrier for smaller users.

Charging Futures

C1-B Existing Distribution

Connection Boundary	Shallow	Shallowish	Deep
Timing of connection charge	Annuitised without security	Annuitised and securitised	Paid up front
Granularity of locational signals	None	Some granularity (zonal?)	High level of granularity (Nodal?)
User commitment for wider network investment	None	Securitised until connected	Securitised beyond time of connection

Broadly similar to existing arrangement at Distribution level. There is some granularity of locational charges due to there being 14 DNOs but this is not caused by design of the charging framework. A minority of customers (EHV) do have locational charges. Less volatility in locational charges but no forward looking locational signal to influence behaviour. More difficult to facilitate capacity trading/reallocation.

Charging Futures

C1-C Strong Connection Charging

Connection Boundary	Shallow	Shallowish	★ Deep
Timing of connection charge	Annuitised without security	Annuitised and securitised	★ Paid up front
Granularity of locational signals	None ★	Some granularity (zonal?)	High level of granularity (Nodal?)
User commitment for wider network investment	None ★	Securitised until connected	Securitised beyond time of connection

Similar to the arrangement that existed at distribution level for DG connections prior to 2005. Whilst it gives a strong initial locational signal, up front costs can be so high that no connections take place. There is no incentive to release capacity that is not needed nor any ability to allocate risk between connetee and wider body of users.

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C1-D Strong Usage Charging

Connection Boundary	Shallow ★	Shallowish	Deep
Timing of connection charge	Annuitised without security	Annuitised and securitised ★	Paid up front
Granularity of locational signals	None	Some granularity (zonal?)	★ High level of granularity (Nodal?)
User commitment for wider network investment	None ★	Securitised until connected	Securitised beyond time of connection

'Nodal' type locational signal due to either difficulty of defining zones or this being impractical due to the multi voltage layers at distribution level. Annual payment to recover connection charge but no securitisation of wider works. Provides forward looking price signals but highly granular locational signals can be volatile and hard to predict and lack of user commitment can lead to speculative applications reducing the efficiency of capacity allocation.

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Clusters – User Operations

Influencing User Operations Combinations

C2-A Temporal Signals

Strong tariffs are central; dynamic to signal user operations

C2-B Balancing Mechanism

Access can be sold & bought with the network in the ST

C2-C Full Range of Operational Signals

Active market for access reallocation alongside dynamic tariffs

C2-D Bilateral Trading

Access traded between users bilaterally

C2-E Market Trading

Access traded between users via a market

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C2-A Temporal Signals

	Low influence		High influence
Re-allocation of capacity (short term)	None ★	Bilateral	Extended BM
Reallocation of capacity (medium / long term)	None ★	Bilateral	Market with exchange rate or shared
Temporal signals	None	Weak	★ Strong
Locational granularity of temporal signal	None	Zonal	★ Nodal

Temporal signals – Strong tariffs are central; dynamic to signal user operations
Pros: The cost and benefit of user behaviour can be directly reflected. All users are treated consistently
Cons: Tariffs could be complex and unpredictable and therefore users struggle to respond. Networks may struggle to manage users with firm access

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C2-B Balancing Mechanism

	Low influence		High influence
Re-allocation of capacity (short term)	None	Bilateral	★ Extended BM
Reallocation of capacity (medium / long term)	None ★	Bilateral	Market with exchange rate or shared
Temporal signals	None ★	Weak	Strong
Locational granularity of temporal signal	None ★	Zonal	Nodal

Balancing Mechanism – Access can be sold & bought with the network in the ST
Pros: Network can manage their network while providing firm access rights. Limited conflicts with tariffs
Cons: The benefits of user operations may only be reflected to a limited number of users, costs are reflected to none. All actions involve the network

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C2-C Full Range of Op. Signals

	Low influence		High influence
Re-allocation of capacity (short term)	None	Bilateral	★ Extended BM
Reallocation of capacity (medium / long term)	None	★ Bilateral	Market with exchange rate or shared
Temporal signals	None	★ Weak	Strong
Locational granularity of temporal signal	None	★ Zonal	Nodal

Full range of operational signals – Active market for access reallocation alongside dynamic tariffs

Pros: Allows multiple routes for users to value their access. Users without access have a route to enter the market

Cons: Complex markets, potential for conflicting signals between access trading and tariffs and between access trading with networks and other users. Could result in volatile and unpredictable signals

Charging Futures

C2-D Bilateral Trading

	Low influence		High influence
Re-allocation of capacity (short term)	None	★ Bilateral	Extended BM
Reallocation of capacity (medium / long term)	None	★ Bilateral	Market with exchange rate or shared
Temporal signals	None ★	Weak	Strong
Locational granularity of temporal signal	None ★	Zonal	Nodal

Bilateral trading – Access traded between users bilaterally
Pros: Price of access will reflect user value. Users with firm access can choses to not enter bilateral trades and avoid complexity
Cons: No operational signals between network and users – costs/benefits are not reflected

Charging Futures

C2-E Market Trading

	Low influence		High influence
Re-allocation of capacity (short term)	None	Bilateral	Extended BM
Reallocation of capacity (medium / long term)	None	Bilateral	Market with exchange rate or shared
Temporal signals	None	Weak	Strong
Locational granularity of temporal signal	None	Zonal	Nodal

Market trading – Access traded between users via a market

Pros: Price of access will reflect user value. Users with firm access can choses to not enter market and avoid complexity

Cons: No operational signals between network and users – costs/benefits are not reflected

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Modelling and Tariff Design Options

Assessment of Modelling and Tariff Design

- The following have been assessed against the nine agreed assessment criteria:
  - **Charging model**: Transport Model, Expansion Model, Remaining Headroom
  - **Locational signals**: 500MW Model/Probabilistic Model, DC Load Flow Investment Cost Related/Long Run Incremental Cost (incremental models), Forward Cost Pricing (contingency model)
  - **Number of models**: Single model across all voltage levels, T&D charging model different but with common assumptions, Different charging models across T&D
  - **Tariff elements**: Fixed Charges (£/year), Unit Rates (£/kWh), Agreed Capacity Charges (£/agreed kVA), Peak Demand Charges/Excess Capacity Charges (£/peak kW or £/peak kVA), Reactive Power Charges (£/kVArh)
  - **Time of use elements**: Unrestricted Unit Rates, Static Time of Day Unit Rates, Critical Peak Pricing (CPP), Variable Time of Day, Inclining Block Rates.
- Models have a trade-off between cost reflectivity and transparency/predictability.
- Some tariff elements might signal forward looking aspects better than other – but the greatest factor seems to be alignment of element with the nature of cost.
- Time of use elements may/not enable customers response – choice of elements must align with building block choices defining influence on 'customer operations'

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Access Allocation Options - Targeted Auctions, Tenders, or Market-based Approaches

Situations where targeted auctions may apply

Initial Allocation of New Capacity	Re-Allocation of "Spare" Capacity	Trading of Curtailment Obligations
• **Impacts User Investment** • Auction/Tender for new capacity released onto the network traditional/non-traditional reinforcement	• **Impacts User Investment/Operation** • Identify current users' "spare" capacity and re-allocate this through an auction-style process	• **Impacts User Operation** • Market-based approach to trading curtailment obligations of flexible connections customers

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Initial allocation of new capacity

Influences customer investment

Potential mechanism

- Volume of capacity available determined 12 months ahead (existing and planned)
- Auction assigns “firm” access to successful bidders but all users get access (non-firm)
- Revenue generated from auction is used to invest in network allowing more non-firm to convert to firm

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Re-allocation of “spare” capacity
Influences User Investment/Operation

- Potential mechanism
- “Spare” capacity either determined through
  - Identifying capacity beyond core requirements (CM/CfD for generators)
  - Customers committing to changing their use compared to a (historic) baseline
- The aggregate of this spare capacity determines the volume for auction/tender

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Trading of curtailment obligations

Influences user operation

Potential mechanism

- Users exposed to curtailment obligations under flexible connections can bid to have this obligation fulfilled by another user
- Other users can offer to fulfil the obligation. This could be:
  - Other users on flexible connections behind the same constraint
  - Other local users (on firm connections) willing to curtail can also submit offers including demand turn-up
- If value of bids matches/exceeds offers, obligations are traded

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Strengths and weaknesses of Auctions/Tenders

- Weaknesses
  - Charges based on outcome of auctions will be value-reflective rather than cost-reflective
  - Auctions will naturally favour those with “deep pockets”
  - The different business models of businesses participating may put them at an advantage/disadvantage
  - Complex to implement with a potentially high administration burden on participants
  - High uncertainty of allocation of access
- Strengths
  - Allocation based on users’ perceived value rather than potentially arbitrary factors such as timing of access request and location
  - These mechanisms can reveal the value of access to users providing a signal to network operators where investment would be justified/where genuine demand is high
  - Depending on financial arrangements, use of revenue generated in auctions to reinforce network could ultimately lead to efficient levels of investment

Access Choices – User Perspectives

Access - Generator Perspective

Definition of access rights	Design Features
Depth	Access to Notional Balancing Point (GB wholesale market and price); Wide access to networks to supply all GB customers
Lifespan	User choice; availability of long term (multi-year) and short term rights (settlement period)
ToU/seasonal	User choice; Locational symmetry (same signal for demand and generation)
Firmness (financial)	User choice of firm/non-firm financial rights; financial compensation if network is unavailable (buy back); Hedge-able risk
Firmness (physical)	Right to flow on and off the network subject to physical capacity (however defined) and connection to the system; network companies maintain availability with standards (e.g. 99.99% reliability)
Standardisation of access choices	Level playing field with same rights for all; no differentiation; same liabilities to pay for network (e.g. capacity charges/KW)

Access – Community Energy User Perspective

Definition of access rights	Design Features
Depth	Depth and UOS options to be available – with option to access and supply local customers or local LV network. Potential for netting off a proportion of balanced local supply and demand for calculation of UOS charges at higher voltage levels.
Lifespan	User choice; likely to favour long-term (multi-year) as required for investment.
ToU/seasonal	User choice; Locational symmetry (same signal for demand and generation)
Firmness (financial)	User choice of firm/non-firm rights at different depths; Local energy to have the option of non-firm above LV network for generation and higher level domestic rights (e.g. EV charging)
Firmness (physical)	Right to flow on and off the network subject to physical capacity (however defined) and connection to the system; network companies maintain availability with standards (e.g. 99% reliability)
Standardisation of access choices	Access choices that recognize value of matching supply and demand locally. Leasing network choice - potential for annual fixed LV usage charge for local energy /local network leasing structure.

Access – Large Demand Perspective

Definition of access rights	Design Features
Depth	Full access to the UK network including the National Balancing Point to trade on the wholesale market is the preferred option for most. Future peer-to-peer trading models that make use of industrial loads may not trade on the wholesale market. It remains possible that such models may not require full network access but this remains to be fully tested.
Lifespan	Evergreen access rights are the preferred option for most. There is likely to be minimal demand for less than evergreen rights.
ToU/seasonal	Large variety of choice desired regarding limits on export/import during a season or other specific time periods for commensurate reduction in network charges.
Firmness (financial)	Financially firm connections at least and physically and financially firm for many is the preferred option. Compensated buy-back of any unused capacity is essential.
Firmness (physical)	99.99% reliability is essential.
Standardisation of access choices	As far as possible, more aligned approach to connection boundary between Transmission and Distribution. Access choices show clear financial value where demand offsets local generation and supports system balancing.

Access – Distribution Network Operator Perspective

Definition of access rights	Design Features
Depth	Provide options for access to the distribution networks to supply energy to all connected customers for example up to the nearest primary, BSP, GSP and where required the transmission network to supply energy from DG, with future T rights to be procured possibly though DTEC product
Lifespan	Provide options for users to contract based on short term (HH/day/month) and long term (multi-year) right
ToU/seasonal	Provide options for users to contract based on time of use eg non-peak times only or seasonal eg winter period only (Nov to Mar) rights
Firmness (financial)	Provide options for users to contract based on non-firm financial rights ie without compensation or firm financial rights ie with compensation during constraint events
Firmness (physical)	Provide firm (N-1 or greater) and non-firm options (ie N-0) or physical connection arrangements to ensure users have the physical ability to export/import energy on and off the network (subject to their agreed capacityand having appropriately funded the agreed connection arrangements).
Standardisation of access choices	Provide standard access rights for all, subject to availability and customers' willingness to pay

Access – Transmission System Operator Perspective

Definition of access rights	Design Features
Depth	Choice for users to have access to the whole system and all markets (including anciliary service provision). Operators needs to have certainty of delivery of services when called upon, irrespective of voltage level.
Lifespan	User choice as default, but has to be considered in tandem with the level of user commitment required.
ToU/seasonal	As default more choice is better than less. However consideration needs to be given to how network owners plan and operate the system. The more choice – the more complex and volatile the signals will be and less diversity can be assumed when allocating capacity.
Firmness (financial)	User choice of firm/non-firm financial rights; financial compensation if network is unavailable (buy back).
Firmness (physical)	User choice of firm/non-firm physical rights. (If physically firm, then you have access to all markets e.g. CM, wholesale and Ancillary). Network operators will continue to require certainty of dispatch
Standardisation of access choices	Network users should have consistent choice in the access products and be exposed to similar costs to reflect these rights. (E.g Higher cost for firm access rights).