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Delivery Group – 10 May 19

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Delivery Group meeting agenda

Agenda topic	Timing
Welcome and introductions	10:00 – 10:05
Actions	10:05 – 10:15
Review and sign off initial reports	10:15 – 11:00
Forward workplan	11:00 – 12:00
Lunch	12:00 – 12:30
Analytical framework	12:30 – 13:25
Key charging model concepts	13:25 – 14:25
Initial discussion on links between different work areas	14:25 – 15:25
Close and AOB	15:25 – 15:30

Review and sign off initial reports

Initial reports

Before Easter, we sent the initial sub-group reports to the CG for feedback. The sub-groups have reviewed feedback and made changes were appropriate.

Access report 1 – Current approach to the Design and Operation.	**This report aims to provide an overview of the basis upon which the GB network and system operators currently design and operate their electricity networks.**
Access report 2 – Access choices.	This report aims to outline and assess the range of possible access design choices. Alongside the report, we have also published the sub-group's initial assessment of each option (Annex 2).
Locational report	This report aims to outline and assess the options to increase the locational granularity of forward-looking DUoS charges.
Cost drivers	This report aims to assess historical costs to identify and assess key cost drivers. There will be further work to consider future cost drivers.
Glossary	We have produced a glossary to help wider stakeholders understand the terms being used in each of the reports.

The revised version of the reports (and the associated tables collating response to feedback) were sent to the DG last week and comments were due on 8 May.

DG feedback on the reports

This is an opportunity to discuss the feedback received on each of the reports:

- Access report 1
- Access report 2
- Locational report
- Cost drivers
- Glossary

Forward Workplan

Key upcoming milestones – the working papers

1st working paper – July 2019

- The work of DG and CG
- The links between access, charging and flexibility.
- Cost models framework options
- Network charging options
- Access rights options
- Combined charging, access rights and cost model options

2nd working paper – End of 2019

- Small user consumer protection
- Connection charging
- Focused transmission reforms

Forward workplan – access rights

To help parties assess these access choices, we will develop thinking on how access choices could combine to create "access products".

Links between charging and access	We need to better understand and develop the links between access and charging. For example, the extent to which different levels of firmness can be signalled through UoS charges.	Ofgem-led
Legislative change	Develop better understanding of whether any of the options require legislative changes to implement	Ofgem-led
Value to users	• Further engagement with users to better understand the value that these options may deliver to users. • Better understand the links between new access choices and wider current markets/future markets (eg whether new access choices could stop users from operating in any markets).	Ofgem-led with CG and DG input
Feasibility of offering access options and value to networks operators	• Feasibility of offering access options • Impact of access network investment decisions and efficient use of network capacity. • Changes required to maximise the value of access rights (eg monitoring and enforcement)	DG-led.
Small user access	Develop and assess options to improve the clarity and choice of access options for small users *(required for later small user workstream).*	Joint.

We have circulated draft product descriptions. We are keen for feedback. In particular:

- Which workstreams should we prioritise?
- Can we capture input in a more efficient manner than word reports?

Forward workplan – cost models and locational charging

To inform the level of locational granularity of the charging regime (based on a more detailed understanding of cost drivers) and to determine the cost model features that that may be desirable, the following work packages have been identified.

It is anticipated that the most efficient way to carry out this additional assessment will be to combine the Cost Drivers and Locational Granularity subgroups (potentially with some changes to membership, where other experience is required).

Forward looking cost drivers	• Further analysis of cost drivers with a focus on the extent to which they vary locationally • Based on this assessment (and building on the conclusions of previous reports), provide practical options for the granularity of the charging regime that capture these variations.	Cost drivers subgroup
Cost models	• Determine which cost model features are feasible • Provide evidence for Ofgem assessment of the desirability of options • Provide a view on how these cost models might these options affect choices in other areas of the SCR such as locational granularity, charge design and network access arrangements.	Cost drivers subgroup

We have circulated draft product descriptions to cover these areas of work. We are keen for feedback.

Forward workplan – Charge design

To help identify the charging design options for inclusion in a short list of options, Ofgem will be gathering evidence to inform a number of policy questions. Although this work will be Ofgem-led and will be informed by work undertaken by the subgroups, it is expected that some additional input may be required from the Delivery Group members.

Initial assessment of charge design options	• Gather evidence to form preliminary views on several issues that will support assessment of options:
	  • Benefits of static vs. dynamic charging and potential feasibility limitations
	  • Differences in ways of measuring capacity
	  • The impact of data privacy on how network charges are calculated and billed to suppliers
	  • Benefits of supplier aggregated vs. individual customer charges
	• Identify key considerations
	  • Ratio between peak and non-peak chares
	  • Time-of-use vs. flat rate charging for capacity
	  • The Role of amber pricing
	  • Whether there is still a role for volumetric charging
		Ofgem-led

Forward workplan – distribution connection boundary

In our SCR decision we stated that we would review the distribution connection boundary, if we can make DUoS charges more cost reflective. Consideration of this will form part of our second working paper. We expect this work to cover:

Connection boundary options	To identify a longlist of options for amending the connection boundary at distribution (eg shallow, shallow-ish, alternatives to connection boundary change). Assess feasibility of options.	DG led
User commitment options	To identify a longlist of options for introducing user commitments at distribution level. Assess feasibility of options.	DG-led
Legislative changes	Develop better understanding of whether any of the options require legislative changes to implement.	Ofgem-led
Existing users – options	To determine whether a different approach is required for those users that have already paid a shallow-ish connection boundary.	Ofgem-led
Value of options	Assess the impact and value of each options (to both network operators and users)	Joint Ofgem/DG.

We have circulated draft product descriptions to cover these areas of work. We are keen for feedback.

Questions to consider:

- When should we seek to start work on connection boundary? Could we start sub-groups now? Which workstreams should we prioritise?
- How can produce documents that capture thinking, but require less work than word documents?

New work stream – small users (1)

Our initial view is that we expect the work focused on small users to cover:

Foundational analysis	• Understanding of user characteristics • Developing alternative 'protection' approaches, including a 'core' access level • Implementation considerations eg engaging with the HHS Design Working Group
Analytical approach	• Developing understanding of guiding principle 2 for 'essential' or flexible use • Considering potential options for scope of protections
Coordination of options across workstreams	• Drawing together a picture of the range of arrangements which may apply to small users • Contributing to assessment of options across other workstreams and contributing to their options development to inform assessment and modelling
Behavioural response	• Understanding of likely response, through supplier engagement and potential trialling

Is there additional work that we should include as part of this workstream?

New work stream – small users (2)

We intend to establish a subgroup of relevant industry experts to contribute to aspects of this work, with others being led by Ofgem or others.

Spring /summer 2019	Ahead of the launch of the subgroup, we would like to establish up a 'standing' subgroup to contribute on an ad hoc basis to analysis led by Ofgem or other parties
Q3/4 2019	Once launched, the subgroup will join with the network companies to develop specific pieces of analysis relating to small users, as well as inputting to Ofgem-led analysis

We are now seeking expressions of interest to join this 'standing' subgroup focused on small users issues. We would be keen to include representation from those with experience on the access and charging subgroups.

If interested, please email NetworkAccessReform@ofgem.gov.uk

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Our core purpose is to ensure that all consumers can get good value and service from the energy market. In support of this we favour market solutions where practical, incentive regulation for monopolies and an approach that seeks to enable innovation and beneficial change whilst protecting consumers.

We will ensure that Ofgem will operate as an efficient organisation, driven by skilled and empowered staff, that will act quickly, predictably and effectively in the consumer interest, based on independent and transparent insight into consumers' experiences and the operation of energy systems and markets.

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Analytical Framework

What our Analytical Framework Needs to Achieve

- We need to be able to understand the likely impacts of the options we are considering to be confident we are making the right decision for consumers
- Our approach is guided by our Impact Assessment guidance (see below)
- For the purposes of these options, the main impacts we think we need to consider are:
  - Impact on networks – through reduced opex or capex and any impact on network resilience
  - Impact on wider system – impact on generation/flexibility mix (including ability to connect new low carbon generation quicker) and costs
  - Consequent environmental impacts, particularly carbon
  - Distributional impacts, particularly for vulnerable consumers
  - Other impacts for *consumers*, eg quicker connections, certainty of access/charges
  - Implementation costs, eg system changes

Ofgem's Impact Assessment Guidance includes:

- An IA should focus on the assessment of a range of options developed during the 'concept' phase of work. The guidance notes that options will be discarded throughout the development process based on the assessment of available evidence
- The shortlisted options identified should be assessed to take into account the full range of impacts, costs and benefits, considering where possible:
  - Monetised, aggregate cost-benefits analysis (CBA)
  - Distributional effects
  - Hard-to-monetise, strategic and sustainability considerations
  - Consideration of competition and consumers
  - Burdens on business
- The IA should generally consider risks, unintended consequences and wider impacts
- **Our IA guidance recognises the likely uncertainties inherent in future costs and benefits forecasts, and challenges associated with accurate identification of the value of costs and benefits. It is therefore recognised that analysis will typically be both qualitative and quantitative where appropriate**
- An impact assessment is not the sole determinant of Ofgem's final decisions, but forms a vital part of the decision-making process

Progress Made and Planned Activities on Analytical Framework

Work Undertaken:

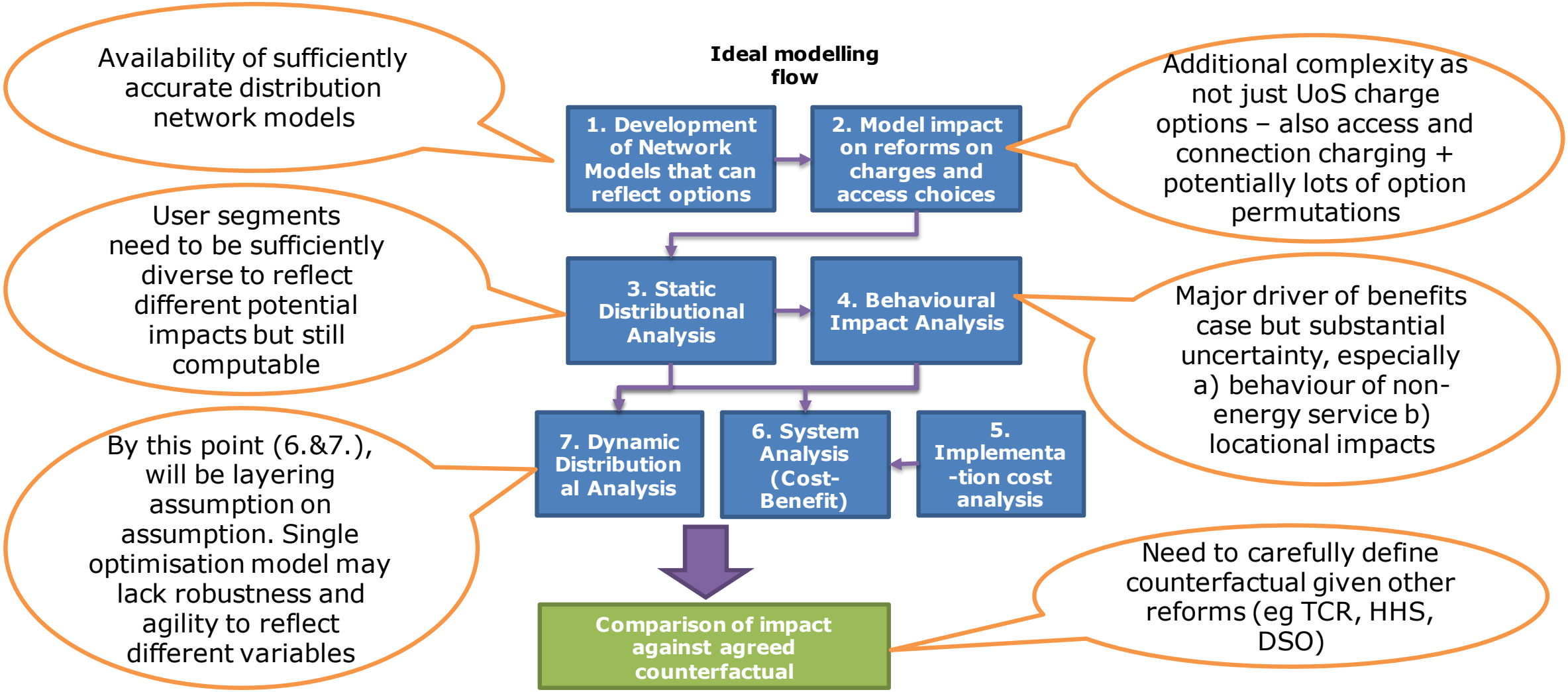
- Developed and engaged on guiding principles, that will guide our qualitative assessment
- Begun analysis of long-list of options against these principles
- Review of existing available models and market engagement with external consultants on capabilities/options for modelling
- Engagement with TCR to understand approach and lessons learned
- Discussion of approach with Ofgem Analytical Panel (ongoing)

Work Planned:

- Continue qualitative assessment of long-list of options
- Develop scope for tender for modelling support, including:
  - Finalising requirements re. approach/outputs
  - Determining whether modelling should undertaken through a single contract or split into segments
- Agreeing detailed approach with consultants once they are in place, taking into account feedback from a further CG discussion

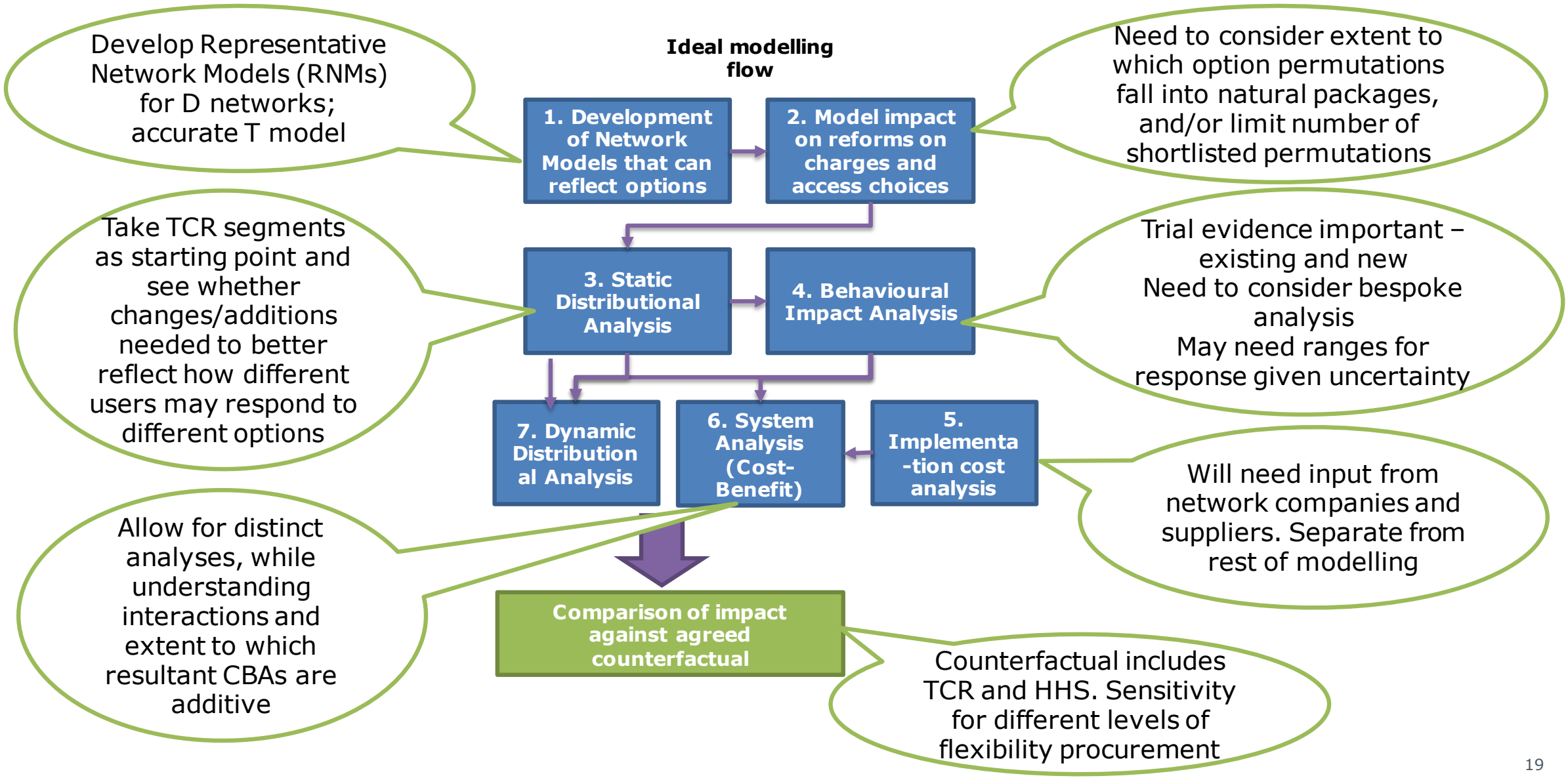
- We have made good progress in developing our modelling requirements however this is a work in progress and we are continuing to refine these requirements.
- There will be elements of the requirement such as the detailed methodology, assumptions and shortlist of options to assess which are defined once a contract with consultants is in place

Challenges with Modelling with this SCR



These challenges are substantial. We still intend to aim to undertake modelling but it is clear **methodology needs careful consideration** and the level of uncertainty about modelling robustness means results will need to be handled with care, and **reinforces importance of qualitative assessment.**

Responsibilities for the Analysis

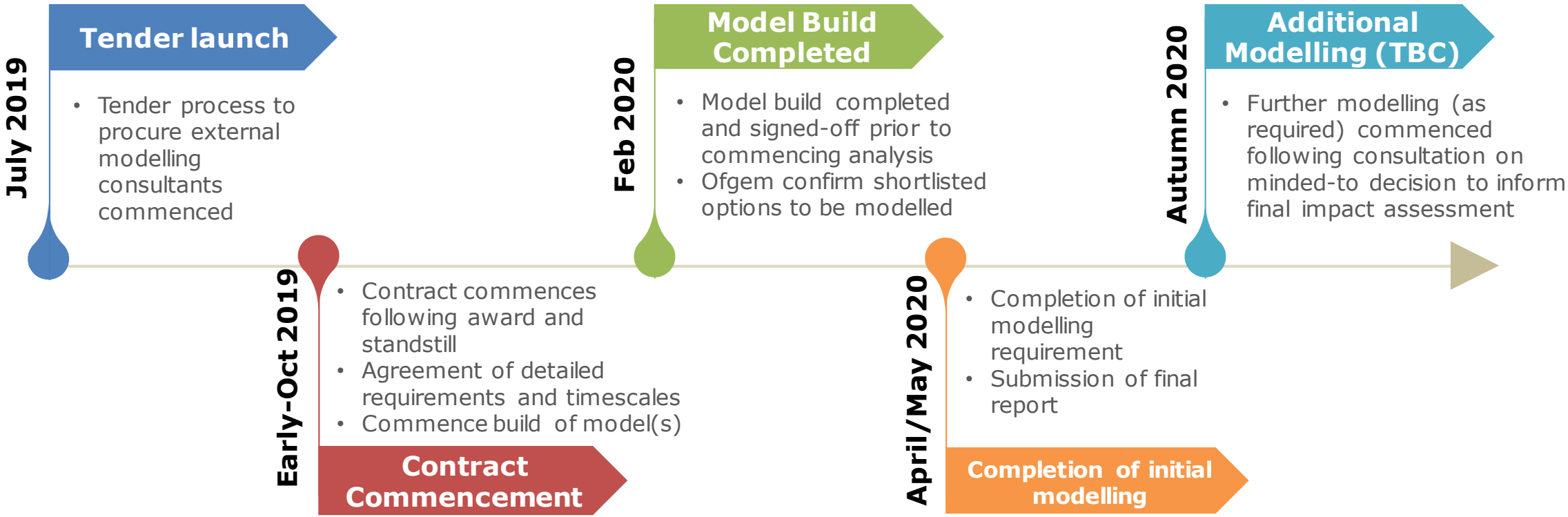


Responsibilities for the Analysis

Ofgem, the commissioned consultants and the Delivery/Challenge groups will all contribute to the modelling requirements we have identified in this presentation. These responsibilities are indicative, as modelling support may split into segments and sourced through different routes.

Requirement	Ofgem role	Consultant(s) role (these activities may be split across more than one consultancy)	Delivery Group (DG) and Challenge Group role
Options shortlisting	• Define options • Qualitative assessment of options long-list • Define options shortlist for quantitative analysis and further Ofgem qualitative assessment	• Quantitative analysis of shortlisted options (modelling)	• DG development of agreed products (eg network cost drivers, locational options feasibility) to feed into Ofgem option development and assessment
RNM Development and Tariff Modelling	• Define criteria to be reflected in RNMs • Define options which will impact upon tariff models and work with consultants to determine impact	• Build of RNMs • Work with Ofgem to assess option impact on tariff models and model EDCM/CDCM tariff models to reflect cost model and charge design options	• DG (DNO/TO/ESO) provision of data to develop RNMs • Potential DG role in RNM / Tariff modelling • Provide feedback on modelling outputs
Distributional Analysis	• Identification of user archetypes • Sign off of agreed archetypes following consultant feedback • Potential role in undertaking elements of distributional analysis	• Comment on Ofgem identified archetypes based on knowledge of available data sets and thinking on behavioural impacts • Undertake static and dynamic analysis	• Provide feedback on archetype choice through stakeholder engagement
Behavioural Analysis	• Literature and academic paper review to determine responses • Workshops with suppliers and potentially additional user testing • Sign off of proposed behavioural modelling approach • Engage with relevant trials	• Provision of additional evidence from existing expertise/studies/trials – but not carrying out additional user testing • Definition of what impacts are to be quantified • Application of any evidence we provide to modelling	• Provide feedback through stakeholder engagement
Economic / System analysis	• Identify priority analysis areas • Sign off approach and analysis • Work with Delivery Group to get necessary inputs	• Lead definition and delivery of analysis • Determination and management of options linkages	• Delivery Group to provide network cost data • Provide feedback through stakeholder engagement
Stakeholder engagement	• Identify additional key stakeholders • Co-facilitation of workshops	• Lead stakeholder engagement process (workshop design and delivery)	• Participation in workshops to inform modelling methodology, assumptions and test outputs

Proposed Modelling Timelines and Process



Role of the Delivery Group

The Delivery Group will have a key role in supporting the delivery of the modelling requirements. This will include:

- The development of identified products (work which has been ongoing), including those which may be determined in future
- **Providing additional data (eg network cost data) to support the development of robust network models and a robust baseline / counterfactual**
- Providing feedback on the methodology and proposed distributional, behavioural and system analysis to be undertaken, **with a particular focus on how different behavioural changes could influence network costs**
- Participating in workshops as arranged during the modelling contract to provide feedback and inform methodology, assumptions and outputs

Immediate Actions:

In preparation for the launch of a procurement process for this modelling, we are keen to further understand:

- The process by which DNOs have previously provided input into developed models and whether they have been updated more recently (for example previous analysis undertaken by industry to calibrate the Transform model and other representative network models (e.g. those used by WS7 and Imperial College))
- How best to proceed in developing data / development of network model for modelling purposes – including who should do what, whether it should be combined with other initiatives and who should be involved in detailed discussions

This relates to a request we raised recently by email to identify who has been involved in Transform-type modelling, though since then we have learned about modelling being developed for the ENA Low Carbon Technologies group. We are keen to discuss how best to take this forward.

Cost models

Today's session will cover:

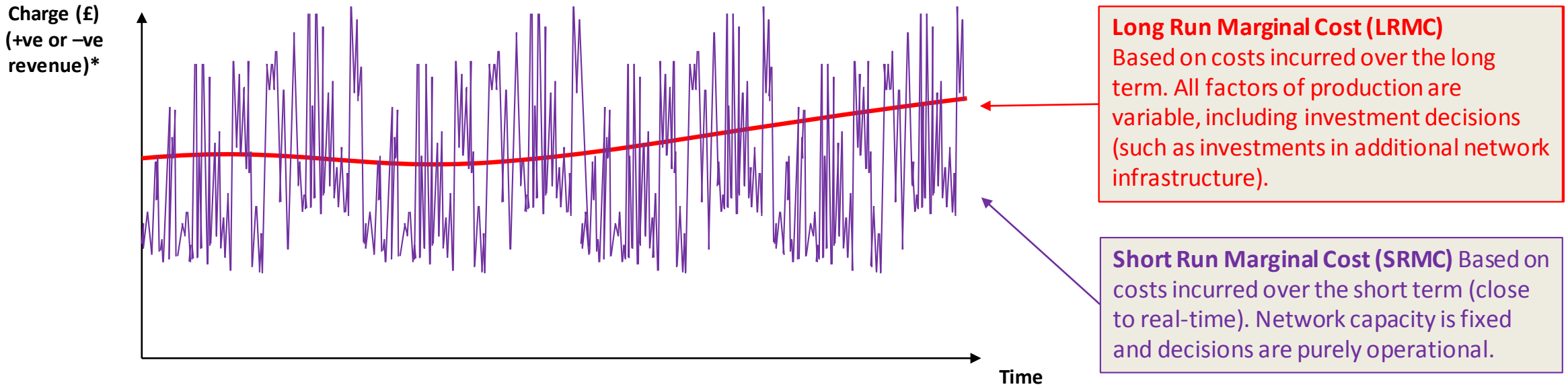
- Short Run Marginal Cost (SRMC) and Long Run Marginal Cost (LRMC) charging approaches
- The different costs that could be included in an LRMC based charge
- How users are exposed to upstream/downstream costs in a cost-reflective way

This presentation outlines our initial thinking that we are keen to test with the challenge group. It does not reflect any formal policy positions.

Today, we are keen for your views on:

1) The merits of charges based on short-run operational costs (SRMC) versus long-run investment costs (LRMC).
2) If adopting an LRMC approach, the merit of including replacement costs ('ultra' long-run) or just focusing on reinforcement costs ('moderate' long-run).
3) Whether having a "top-down" approach to charging can be consistent with a level playing field.

Long Run Marginal Cost (LRMC) versus Short Run Marginal Cost (SRMC) Charges



Long-Run Marginal Cost

Factors that could be considered include:

- whether demand is located close to generation (or vice versa)
- the marginal cost associated with an increment of generation/demand. This could be based on the drivers of network cost that are associated with reinforcement, asset replacement and the availability of spare capacity.

Short-Run Marginal Cost

Factors that could be considered include:

- whether or not the network is constrained in real-time (or close to real-time) and cost of managing this constraint in terms of the
- the degree to which adding (or removing) a MW at each location on the network will alleviate/exacerbate the constraint

*Note that graphical representations in this presentation are for illustrative purposes only.

Long-Run Marginal Cost

Benefits

- Proven internationally, and is the current basis for the GB model across both transmission and distribution.
- Provides a more stable and investable signal without having to forecast and hedge against a volatile real-time signal.
- Short-term flexibility actions still valued under some charge design options (particularly time of use variants) at average LRMC charge.

Drawbacks

- Unlikely to fully resolve network congestion, therefore must be supplemented by additional tools (e.g. flexibility procurement, network access arrangements).
- The charging signal is only efficient if the methodology is well designed to capture drivers of network cost (such as those which may be locational or based on time of use).

Short-Run Marginal Cost

Benefits

- Can theoretically help minimise network congestion in real-time and reveals the true value of additional network infrastructure. Locational Marginal Pricing (LMP) particularly attractive in theory.

Drawbacks

- Difficult to see how can create accurate SRMC signal other than through either a) ex-post charge (see BSUoS Task Force draft conclusions on challenges) or b) LMP/market splitting.
- If implemented through an ex-post charge, very difficult to forecast, and may not be able to create a marginal price.
- Latter seems superior approach, but no examples globally where has been implemented at distribution level and major practical challenges (computation resource, quality of network data, lack of alignment with existing GB/EU energy market design). For these reasons, not within scope of SCR.

Over time, both LRMC and SRMC should theoretically converge on signals for the efficient build of network infrastructure.

Costs that could be included in an LRMC charge (1/2)

Which costs should be included in the network charge if adopting a LRMC approach?

This depends on which network costs are considered as 'forward looking' under a Long Run based regime.

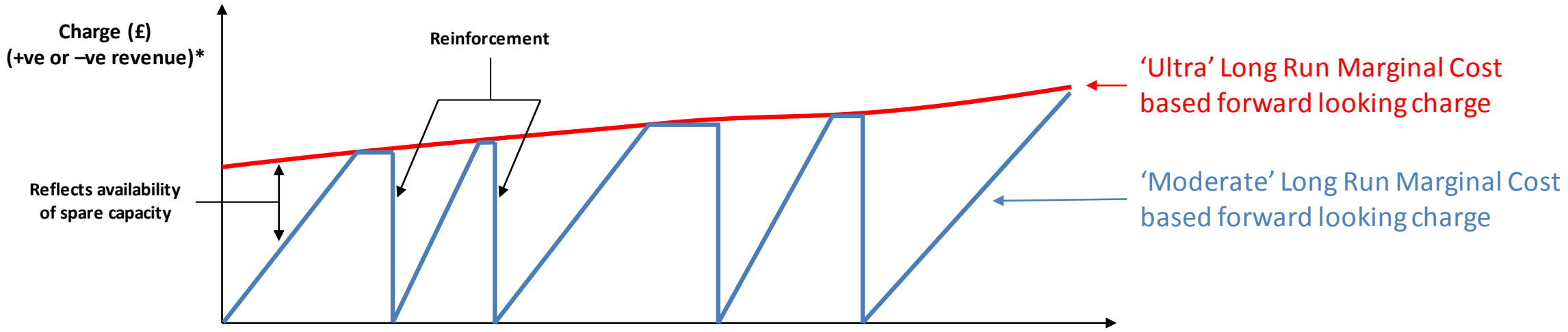
Under an 'Ultra' Long Run Marginal Cost based approach, a wider range of costs are associated with the forward looking charge:

- **Reinforcement and replacement costs** are used as a basis for the forward-looking charge.
- The CDCM (Common Distribution Charging Methodology) and transport model could be considered examples of this.
- The CDCM methodology 're-builds' the optimal mix of network assets as the basis for a customer's charge (and captures replacement/reinforcement costs by proxy). It is indifferent to timing of replacement/reinforcement and load growth assumptions. It does not conduct any power flow modelling.
- The transport model is based on electrical distance between generation and demand, and is not based on load growth. It therefore captures the total costs associated with the network assets required to accommodate an additional MW at each location.
- **These approaches send long-run charging signals that reflect the incremental costs associated with the total cost of network assets.**

Under a 'Moderate' Long Run Incremental Cost based approach, costs are directly related to incremental reinforcement only.

- **Incremental reinforcement costs** associated with increases in load are used as the basis for the forward-looking charge.
- The approaches used in the EDCM (Extra high voltage Distribution Charging Methodology) for distribution are examples of this.
- The charges come from a power flow based assessment of today's network, modelled to a nodal level of granularity.
- Charges are more closely linked to the timing of network reinforcements based on load growth assumptions.
- The charges are derived from the incremental cost of reinforcing at each node to accommodate the addition or removal of a MW.
- **It sends long-run charging signals that reflect the incremental costs associated with reinforcing the existing network.**

Costs that could be included in an LRMC charge (2/2)



'Ultra' LRMC

Benefits:

- Provides an efficient signal for long-term network costs
- Could include very long-term timeframe costs such as replacement
- Charges are likely to be more stable, and send a clearer long-term signal for where to locate on the network.

Drawbacks:

- May not appear efficient in the near-term and could produce counter-intuitive results (e.g. areas of the network where spare capacity is available in the near-term due to historical build, but might not be efficient to utilise in the long-term).
- Inclusion of very long-time horizon costs may not provide a meaningful signal (e.g. asset replacement costs that occur beyond the lifetime of a power plant).

'Moderate' LRMC

Benefits:

- Could provide stronger signals where network costs are more imminent
- Potentially encourages more efficient locational decisions in the near-term
- Could be adapted to include replacement costs as assets approach end of life

Drawbacks:

- Could be very volatile as highly linked to near-term usage of the local network.
- May increases uncertainty based on ability to make accurate future forecasts, which would depend on information relating to network reinforcement.
- May be too focussed on the near-term, and therefore not send an efficient signal in the 'ultra' long run.

*Note that for ease of illustration the charge is depicted as generally increasing, but could also be falling (based on underlying changes in incremental network cost of a MW).

Should upstream users face signals about downstream costs? (1/2)

The current charging framework is based on the premise that users need to pay charges reflecting the cost of flowing their electricity to/from the central transmission hub (the "reference node"). This means that users connected at higher voltages are not exposed to any downstream costs.

One question that has been raised is whether this tilts the playing field in favour of more centralised generation.

We do not think this is the case, providing that it is possible for users to also get credits that reflect where they offset peak flows on the network. Conceptually it works through:

- Generation paying for the cost of transporting electricity to the reference node
- Demand paying for the cost of transporting electricity from the reference node
- For both, where the dominant power flows are in the opposite direction then rather than paying they can receive a credit to reflect the costs they are offsetting

On the next slide, we set out four illustrative scenarios for network cost drivers depending on the direction of peak network flows at the distribution and transmission level, and the associated charges/credits we think would be needed to ensure that overall charges are cost-reflective.

Note that the charges set out do not reflect the current framework.

Should upstream users face signals about downstream costs? (2/2)

Example A: Peak flow away from reference node

Network level	Peak flow direction	Charging	
Transmission reference node	↓	All demand in zone	TNuoS charge
Transmission zones		All generators in zone	TNUoS credit
Grid Supply Point	↓	Distribution-connected demand	DUoS charge
Distribution-connected customer		Distributed generators	DUoS credit

Example B: Peak flow towards reference node

Network level	Peak flow direction	Charging	
Transmission reference node	↑	All demand in zone	TNUoS credit
Transmission zones		All generators in zone	TNUoS charge
Grid Supply Point	↑	Distribution-connected demand	DUoS credit
Distribution-connected customer		Distributed generators	DUoS charge

Example C: Peak flow mixed – away (transmission), towards (distribution)

Network level	Peak flow direction	Charging	
Transmission reference node	↓	All demand in zone	TNuoS charge
Transmission zones		All generators in zone	TNUoS credit
Grid Supply Point	↑	Distribution-connected demand	DUoS credit
Distribution-connected customer		Distributed generators	DUoS charge

Example D: Peak flow (mixed) – towards (transmission), away (distribution)

Network level	Peak flow direction	Charging	
Transmission reference node	↑	All demand in zone	TNuoS credit
Transmission zones		All generators in zone	TNUoS charge
Grid Supply Point	↓	Distribution-connected demand	DUoS charge
Distribution-connected customer		Distributed generators	DUoS credit

The purpose of the next Product Descriptor is to inform the level of locational granularity of the charging regime (based on a more detailed understanding of cost drivers) and to determine the cost model features that that may be desirable.

The work packages will together provide evidence and options for the treatment of:

- Reinforcement, replacement and other network cost categories (or all network costs).
- Options for locational granularity that captures the variation in these costs and their drivers.

- Cost model features – what is feasible and what may be desirable, including:
  - SRMC vs LRMC: How feasible is each approach? What are the different variants of each approach?
  - How are different costs treated (e.g. replacement/reinforcement)?
  - How is spare capacity treated?
  - Do cost models approaches require load flow analysis or asset based modelling?
  - What are the stability/volatility impacts with respect to sending an effective and cost-reflective charge?

Work Package 1 – Locational Cost Drivers

1. **Further analysis of cost drivers with a focus on the extent to which they vary locationally:**
   - Which cost drivers could be considered as forward looking?
   - What are the network costs associated with them?
   - What are the relative magnitudes of these costs?

2. **Based on this assessment (and building on the conclusions of previous reports), provide practical options for the granularity of the charging regime that capture these variations.**

Work Package 2 – Cost Models

1. **Determine which cost model features are feasible**
   - Conduct a qualitative assessment of different cost model features and provide an overall assessment of feasibility based on factors such as the availability of input data (linking to work package 1), and whether the option can be implemented within the timescales of the SCR.

2. **Assess the desirability of options reform**
   - Conduct an assessment of the desirability of different cost model features in terms of their strengths and weaknesses, and the overall economic efficiencies associated with different options.

3. **Provide a view on how these cost models might these options affect choices in other areas of the SCR such as locational granularity, charge design and network access arrangements.**

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Electricity Network Access

Links slides for May Challenge Group

Access team
14/05/19

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Aim of this item

- We have broken down our thinking on the options we are considering within our review of access and charging into different workstreams to aid tractability
- The principal focus of Challenge Group discussions to date has been on these individual workstreams
- Purpose of this item is to build understanding of how those components fit together, and on how the options fit with wider work on flexibility
- We're keen to get your feedback on our initial thinking on the key links between these different areas

Our questions for you on Menti will be:

1. Do you agree with our characterisation of links between different charging aspects? Are there other important links to consider?
2. Do you agree with our characterisation of links between access and charging aspects? Are there other important links to consider?
3. What are your views on the relative pros and cons of the different routes for flexibility provision?

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Re-cap on access rights and forward-looking charges

Access rights

- Defining the right to use the network (ie either importing or exporting electricity over it) in accordance with your needs.
- As part of this project we are considering better definition of access rights and what choices should be available.
- The ENA are leading a parallel workstream looking at potential improvements to how access rights are allocated.

Network charges

- One of the key obligations associated with having network access rights. Made up of forward-looking and residual elements.
- Forward-looking elements provide signals about how users' decisions can increase or reduce future network costs, while residual charges make up the remainder of network companies' allowed revenues.
- This SCR is considering improvements to forward-looking charging signals.
- The BSUoS task force has been considering whether BSUoS should be considered a forward-looking or residual charge.

Key building blocks of network charges

Upfront (connection) charges = Cost of extension of existing network to connect user* + *For connections to distribution networks only:* Contribution to any reinforcement needed to wider network

**For transmission connections, some extension assets can be recovered through local circuit TNUoS charges.*

Ongoing (use of system) charges = **Locational charging model output** (**Locational charging granularity** Extent to which charges are calculated separately for different locations + **Network cost model methodology** Approach to calculating future network costs at different locations) x Conversion factor to change model output into desired **Charge design** (eg £/kW, £/kWh at different times) + Residual charge *(focus of TCR)*

Highlighting some key links between the aspects within this SCR

Upfront (connection) charges =

Potential substitute for sending locational signals

For connections to distribution networks only:
Contribution to any reinforcement needed to wider network

Ongoing (use of system) charges =

Choices on level of locational granularity in DUoS interact with what data is needed/available for cost methodology + different approaches to cost methodology could impact case for additional locational granularity.

Some charge designs may be incompatible with cost methodology + some combinations could lead to significant charge uncertainty

Locational charging model output

Locational charging granularity
Extent to which charges are calculated separately for different locations

Network cost model methodology
Approach to calculating future network costs at different locations

Conversion factor to change model output into desired **Charge design** (eg £/kW, £/kWh at different times)

Potential to have charges and/or peak charging periods vary by location

Access building blocks and links with charging

In principle, forward-looking network charges should reflect what the potential better definition and choice of access rights mean for future network costs:

Choice

Firmness	• Non-firm access may reduce extent network companies have to pay money to manage network constraints (through reinforcement or flex procurement) • Would they reduce need to replace existing network assets over time to the same extent?
Time-profiled	• Off-peak access (eg overnight or outside of certain seasons) may reduce extent network companies have to pay money to manage network constraints • Would they reduce need to replace existing network assets over time to the same extent?
Shared	• Sharing access behind a constraint may reduce extent network companies have to pay money to manage constraints. Where there are no constraints, the value of sharing access to the network operator may be limited. • Would they reduce need to replace existing network assets over time to the same extent?
More explicit definition	• Clarity that small DG have equivalent access to, and impact on, transmission network as larger generators • Greater clarity on access requirements of small users

There will be a need to consider how these can be reflected under the different charging options:

1. Generally, greater emphasis on access right choice suggests a stronger role for capacity charges rather than time of use volumetric charges – as under the latter the value of going for more flexible access rights is less recognised.
2. Case for cheaper connection charge/forward-looking use-of-system charges for more flexible access choices clearer if charges focused on signalling reinforcement costs, less clear if also about more long-term replacement costs
3. If access choices are not standardised, this will make it harder to reflect in use of system methodology (easier with bespoke connection charging calculations)
4. Is there a role for "overrun" charges, and would these need to be calculated using a different charging methodology?

Providing the right incentives for flexibility providers – key high level messages

1. Our aim is that we want flexibility to be used to the full extent this can offer benefit relative to traditional approaches. In the context of this project, this means managing network constraints through use of flexible resources **to the full extent that this is more efficient than traditional network upgrades.**
2. **Network access and forward-looking charging arrangements will provide the incentive for flexibility providers to come forward** (this can be termed 'price-driven flexibility'). **The different options we are considering will do this to differing extents**. We explore this further on the next slide.
3. **Where there is any shortfall (relative to the efficient level) in the extent of flexibility provided in response to access and charging signals, then we would expect the SO and DNOs to procure flexibility** ('contracted flexibility'). This is already incentivised under RIIO framework, though we will be considering whether further enhancements are needed for RIIO 2.
4. As such, **the value on offer to flexibility providers through access, charging and ESO*/DNO flexibility procurement should reflect the amount of value they can provide in terms of reducing the costs of managing network constraints**
5. Other aspects of the market design - particularly the wholesale, capacity and ESO energy balancing markets – should reflect the value that flexibility can provide in offsetting the need for generation capacity. **We recognise the importance of considering how flexibility providers can stack value across different markets.** We are working in conjunction with the ENA Open Networks project on the different models for flexibility procurement, to make sure that the competitive and coordinated markets develop.
6. We will need to **consider the relative pros and cons of the different routes for providing signals for flexibility carefully as part of our decisions within this SCR**, for example in how they differ in terms of accessibility for different parties and the level of certainty they provide in ensuring network resilience.

*This excludes SO procurement for energy balancing purposes, as noted in point 4

Sources of flexibility value under different access and forward-looking charging options

The matrix below illustrates how different potential SCR outcomes could mean the value of flexibility is relieving network constraints is recognised in different ways. These are simplified potential outcomes; in practice, there might be some other variants or hybrid options.

	No access right 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 charge methodology 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/demand 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**.

As alluded to here, additional decisions impact the extent that access/charging will provide full value to flexibility:

- Even with time of use charges, the different options will more or less accurately reflect the real short-run costs that the ESO/DNOs would face (under the counterfactual of no charges) to manage network constraints. Eg fixed time of use vs real time pricing
- To the extent that charges do not fully reflect locational differences in costs, there may still be a need for flexibility procurement in high cost areas, where the averaged charge (or discount to charges for flexible access choices) does not engender sufficient flexibility