

Links with procurement of flexibility – discussion note

Summary

In this note we outline our aim to ensure that flexible resources are used to the full extent that they can provide a more efficient solution to network management issues than traditional network investment, and discuss the different ways that this can be achieved. We define two types of flexibility – network price signal flexibility and contracted flexibility – and discuss how access rights choices, network charging, trading of access and flexibility procurement fit within these.

We consider that there are advantages and disadvantages of these for valuing flexibility:

- **Ability to signal local and real time conditions:** In order to access flexibility, users need to be given the right signals to encourage behaviours that will reduce network costs. From a feasibility perspective, we consider that network access rights, trading of access rights and flexibility procurement may be better able to provide highly targeted, local and real-time signals about the constraints that users can resolve.
- **Competitive price discovery and market power concerns:** A framework that provides for the price of flexibility response to be discovered through a market-based mechanism can support more efficient outcomes. We consider that, where there is adequate competition, flexibility procurement and trading of access rights best reveal efficient price through a competitive market.
- **Ease of engaging with wide range of users and user experience:** Users will only be able to offer flexibility to the system if they can understand the mechanisms by which they can engage or via third parties. We consider that forward-looking charges are currently the simplest and most easily understood way of sending signals to a wide range of users.
- **Certainty of response:** In order to realise the benefits, network and system operators need to be able to rely on the flexibility being provided when they need it. We consider that access rights, trading of access rights and procurement of flexibility provide more certainty about the level of user response than forward-looking charges.
- **Ease of implementation and operation:** Ensuring the proper valuation of flexibility means that some systems, technology and regulations will need to change. Whilst some options are likely to be simple to implement, we consider that the introduction of more dynamic and localised forward-looking charging could require significant investment.

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

1.1. Flexibility is generally defined to mean the ability of electricity system users to vary their generation or demand in response to signals at different times. Historically, most of the flexibility in the system has been provided by dispatchable (eg fossil fuel) generation

connected to the transmission network, responding either to wholesale price signals or providing balancing services to National Grid Electricity System Operator (NG ESO). Small demand users have traditionally been seen as passive, and historically there has limited generation connected to the distribution networks. This is fundamentally changing – as the energy system transforms, some traditional sources of flexibility are declining, but there is increasing potential for demand to be flexible and for substantial distributed generation. This includes the increasing potential for electricity storage which can be highly flexible, and which we consider should be treated as a form of generation.

1.2. The signals for flexibility can come from the access and charging arrangements – which we call **network price signal flexibility** – or from opportunities to contract and earn revenues by providing flexibility to others – which we call **contracted flexibility**. The table below sets out the signals that users face in relation to energy and network management.

Table 1: Sources of value for flexibility providers in relation to energy and network management

Energy and generation capacity		Wholesale market (including Peer to Peer and price arbitrage)
		Capacity market revenues
		Balancing revenues
Network management	Network price signal flexibility	Access rights and forward-looking network charges/credits
		Embedded benefits
		Residual charge avoidance
	Contracted flexibility	Trading of access rights/curtailment
		Procurement of shorter term network management services
		Procurement of longer term network reinforcement services

1.3. We want flexibility providers to realise the value that they can provide to the energy system in different markets. We set out a plan with Government for how we remove barriers to a smarter, more flexible system developing.¹ An important part of this is focusing on the value flexibility can provide in managing constraints on our networks and reducing the need for potentially expensive network infrastructure. For example, if there are frequent constraints on part of the network, the traditional response has been to build more network (such as overhead lines, underground cables, or upgrade transformers) to alleviate it. However, if network users or intermediaries on their behalf can offer flexibility, such as shifting demand away from peaks, the constraint may be relieved without upgrading the network, which can be a more efficient solution. Flexibility has already been used to reduce the need for transmission reinforcement to an extent, but there is significant further potential for flexibility on the distribution network.

¹ In 2017, we published, alongside HM government, “Upgrading our Energy System – smart systems and flexibility plan”, available at: <https://www.ofgem.gov.uk/publications-and-updates/upgrading-our-energy-system-smart-systems-and-flexibility-plan>

Different options for signalling the value of flexibility to the network

1.4. Our aim is to get more out of our electricity system and ensure that flexibility providers are able to access the value they can bring to the system. There are different options for how this value can be signalled:

- **Network price signal flexibility** - where a party varies its demand or generation in response to the price of energy or network use at a particular time and/or location. In the context of the value that flexibility can provide for network management, this can be signalled through forward-looking network charges. These charges can be discounted for users choosing non-standard access rights, ie options that involve them being flexible in their access to the network.
- **Contracted flexibility** - where parties trade and directly contract with one another to procure flexibility. In the context of network management, this could be NG ESO or distribution network operators (DNOs) procuring flexibility services from users. It could also be network users trading access between themselves – for example, a user with a flexible connection could contract with another local user, to trade the extent that it is curtailed. Contracted flexibility can be through long term or short term contracts.

1.5. The different options we are considering within our Access SCR will affect how the value that flexibility can bring to network management is signalled. In this note we explain the different options for valuing flexibility in more detail. We subsequently discuss the relative merits of these different options. There may also be hybrid solutions between pricing and contracting flexibility.

Network price signal flexibility

1.6. We consider network price signal flexibility can be provided through both access rights and forward-looking charges. We discuss both below.

Access rights

1.7. Access rights can be either a form of contracted flexibility (see section below) or a form of price driven flexibility.

1.8. A user's choice of access right is a form of price driven flexibility because of the "discount" in network charges (either upfront connection charges and/or ongoing use of system charges) that a user would likely receive when choosing a more flexible access right which lowers the network costs of their use.

1.9. For example, any form of non-firm access provides flexibility to the network by allowing the DNO to curtail users during times of constraint. Flexible users (those which can accept non-firm access) can be rewarded through shorter connection times, lower connection charges or lower ongoing network use-of-system charges. Time-profiled access can also encourage flexibility by encouraging users to offer flexibility to the network at times where they value access less than other times. Shared access rights may also encourage users to be flexible, or enter into agreements with other users, to ensure their

combined usage does not exceed the level of their agreed capacity in their shared access agreement.

1.10. Currently, users on flexible connections carry an open ended risk of curtailment. DNOs are able to use this flexibility without cost. This should be expected to distort the decision making for DNOs in their choice of whether to use flexible connections, procured flexibility or invest in network infrastructure.

Forward-looking charges

1.11. Forward-looking charges could be used to drive price signalled flexibility. At one end of the spectrum, there might be a fully localised and dynamic price for using network capacity in real time. This would allow flexible users to take import/export decisions based on real time network charges (in addition to their other revenue streams), leading to efficient whole system solutions. Even without real time pricing, options for time-of-use charges, or Critical Peak Pricing, as described in our Charge Design discussion note, can still send signals to users about the cost of using the network during times of expected constraints. This gives users the financial incentive to be flexible and shift their demand to times where there is lower use of the network.

Contracted flexibility

1.12. We consider contracted flexibility can be provided through both trading of access rights and flexibility procurement (which could be either shorter term network management services or longer term network reinforcement services). We discuss both below.

Trading of access rights

New markets to trade curtailment liability are being developed which would allow users with non-firm access to trade their curtailment bilaterally. In these arrangements, users who are expecting to be curtailed will be able to purchase the right to access the network from other users (and therefore avoid curtailment). This would further value flexibility by allowing flexible users to supplement revenue through trading their network access. We consider these kinds of access arrangements to be contracted flexibility, as the flexibility is called on through contractual arrangements.

Flexibility procurement

NG ESO and the DNOs can procure flexibility directly to resolve system and network issues. Commercial arrangements typically comprise an availability payment and/or a utilisation payment. The ratio of those components can be defined by the bespoke network need and the risk appetite of the flexibility provider.

1.13. NG ESO's procurement mechanisms and markets are well established, though they are continuing to evolve to reflect new NG ESO requirements and to open them out to distribution-connected users. Via the Balancing Mechanism and a suite of ancillary service products, NG ESO procures flexibility to manage system balancing and operability. Originally, the Balancing Mechanism was only open to transmission-connected generation, but this has now been opened out to include distributed generation. The Trans European Replacement Reserves Exchange (Project Terre) is a cross-border balancing project designed to optimise the allocation of replacement reserve across the different Transmission System Operators (TSOs). The implementation of Terre is further opening access to the Balancing Mechanism by allowing aggregators to participate in the Balancing

Mechanism. This will allow behind-the-meter assets to participate and offer Balancing Services.

1.14. NG ESO is also facilitating Power Responsive, which is aimed at increasing participation of demand side response in flexibility markets. NG ESO is increasingly using these markets to procure services that enable deferral or avoidance of traditional transmission network reinforcement.

1.15. The DNOs' procurement functions are more nascent, although in December 2018,² all DNOs committed to opening up network reinforcement requirements to flexibility providers. As of 2018, a total of 270MW flexible services were contracted by DNOs. The ENA forecasts that DNOs will tender significantly more than 270MW by the end of 2019, as we work with DNOs and third parties to support the roll out of flexibility procurement products, processes and market platforms.

1.16. Procurement processes across DNOs vary. We are expecting the DNOs to roll out flexibility products for network services, and harmonise those products and procurement processes wherever possible.³ There are multiple DNOs, who may have different ways of contracting for flexibility, so there is potential for higher transaction costs for flexibility providers connected to the distribution networks. This needs to be considered as products and markets are formulated in order to maximise participation.

1.17. We expect contracting for flexibility to evolve and increasingly to be traded on comprehensive flexibility market platforms rather than bespoke tendering rounds. This summer, we published a Future Insights paper on flexibility market platforms, considering how their coordinated development could lead to more liquid markets and better enable access to a diverse range of revenue streams for market participants.⁴ We consider it increasingly important that flexibility procurement is coordinated across network boundaries, so that NG ESO and DNOs avoid conflicts and maximise synergies when buying services.

How could network price signal flexibility and contracted flexibility signals combine?

1.18. Figure 1 illustrates how the different choices within our access reform SCR could combine to signal flexibility, or leave more of this signal to be provided through flexibility procurement. We consider that the key drivers are the extent to which charges are dynamic and/or based on time-of-use, including when charges are set, (which is a type of network price signal flexibility, on the vertical axis) and the extent to which there is significant access right choice (which can be both a network price signal and contracted flexibility, on the horizontal axis). Another dimension to this framework is the extent to which charges and access choices are locational – if charges are more averaged across different areas then this means that there will be areas where additional flexibility provision through procurement (beyond that incentivised by the charge) is likely to be warranted.

² ENA, 2018. [Britain's local electricity network operators launch ENA Flexibility Commitment](#)

³ See the joint Ofgem and BEIS open letter to the ENA, which provides clear objectives for progress on smart energy networks. Available at: <https://www.ofgem.gov.uk/publications-and-updates/open-letter-ena-open-networks-project-ofgem-and-beis>

⁴ <https://www.ofgem.gov.uk/publications-and-updates/ofgem-position-paper-distribution-system-operation-our-approach-and-regulatory-priorities>

Figure 2 – Illustration of the different mechanisms to provide flexibility under the SCR

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

Relative merits of access rights, network charges, and flexibility procurement

1.19. In making our Access SCR, an important consideration will be how best to signal the value of flexibility for network management. We therefore intend to carefully consider the relative merits of the different options. We set out our initial assessment of these below, set against assessment criteria.

1.20. We link these criteria back to our guiding principles in the sections below. Table 2 shows a summary of our thinking, with more detailed discussion in the following sections.

Table 2: Summary of the relative merits of flexibility mechanisms

	Price signal flexibility		Contracted flexibility	
	Access rights	Forward-looking charges	Trading of access rights	Flexibility procurement
Ability to signal local and real time conditions	<ul style="list-style-type: none"> • Potential for DNOs to instruct users to turn down when there are local constraints. 	<ul style="list-style-type: none"> • May not be feasible to calculate a network charge that can accurately signal the constraint. • Moving from a daily time-of-use to a seasonal time-of-use or Critical Peak Pricing should provide an increase in efficiency. 	<ul style="list-style-type: none"> • Would have the potential to signal local constraints in real-time. • The extent of trades that will occur and level of liquidity is still unclear. 	<ul style="list-style-type: none"> • Procurement can be highly locational and dynamic because DNOs and NG ESO are able to procure flexibility where it is needed, and define their tenders or requests to reflect the value of flexibility at that location.
Competitive price discovery and market power concerns	<ul style="list-style-type: none"> • Initial allocation will not have market mechanisms to reveal the efficient price of access. 	<ul style="list-style-type: none"> • Not reliant on there being adequate competition. • More suited to areas where there are market power concerns, or where flexibility markets are in their infancy. 	<ul style="list-style-type: none"> • The price that users with flexible access rights (such as non-firm) are willing to pay others to avoid being curtailed will be revealed through a competitive market. 	<ul style="list-style-type: none"> • Where there is adequate competition, should reveal the efficient price. • Market mechanisms could either be one-off tenders for specific needs cases, or a continuous real time market
Ease of engaging with wide range of users and user experience	<ul style="list-style-type: none"> • Can help users have a more direct choice over the extent to which they offer flexibility. • Access rights for the network are not something that the average electricity consumer is used to engaging with 	<ul style="list-style-type: none"> • Signal could be sent to all users of the network. • Dynamic pricing of network use is inherently more volatile. 	<ul style="list-style-type: none"> • Some users may find difficult to engage with, and so is better suited to more sophisticated users 	<ul style="list-style-type: none"> • Relies on network users being more proactive in engaging with emerging flexibility markets and in them having sufficient confidence that NG ESO and DNOs will develop transparent and accessible procurement processes. • Role here for aggregators to engage with users that would be otherwise unable to engage.
Certainty of response	<ul style="list-style-type: none"> • Degree of certainty of response if implemented via active network management • Other options for enforcement (eg exceedance charges) would result in a lower level of certainty of response. 	<ul style="list-style-type: none"> • Do not provide the same certainty of response, given that users have the choice to respond to the network price signal. 	<ul style="list-style-type: none"> • Network operator would require a high degree of certainty of response from user who participate, given that the constraints would need to be resolved in close to real-time. 	<ul style="list-style-type: none"> • Should also give reasonable degree of certainty in the response.
Ease of implementation and operation.	<ul style="list-style-type: none"> • Flexible access rights already used through flexible connections. 	<ul style="list-style-type: none"> • Some charge designs (such as a seasonal time-of-use charges) are likely to be relatively simple to implement. • The introduction of more dynamic and localised charging could require significant investment 	<ul style="list-style-type: none"> • Requires investment in monitoring and control equipment and the implementation of market platforms. 	<ul style="list-style-type: none"> • Network monitoring equipment for NG ESO/DNO procurement can be rolled out on a targeted basis. • Procurement markets are not yet mature.

1.21. No mechanism in isolation performs best across all criteria, while different criteria are relatively more important for different use cases. This indicates that a combination of tools may be best. We need to identify the optimal combination of access right, network charges and flexibility procurement (and potentially other measures) which promotes our principles and helps to decarbonise the energy system at lowest cost.

1.22. The optimal solution may be different for different users (eg arrangements for generation and demand users; small and large users) or for different voltage levels (eg transmission or distribution). However, if different arrangements were adopted for different users or voltage levels, we would need to avoid creating any undue distortions to investment or operational decisions.

Ability to signal local and real time conditions

1.23. In order to access flexibility, users need to be given the right signals to encourage behaviours that will reduce network costs by relieving constraints. Constraints on the network are highly time-dependent and location-dependent, and so the ability to signal local and live conditions is an influencing factor to how valuable a particular access right, network charging or flexibility procurement approach can be. Locational constraints can only be resolved through the actions of a specific set of users ie those who have an influence on the flows of that part of the network. Providing targeted signals to users about the constraints that they can resolve will be more efficient than signals that are averaged out over wider geographical areas.

1.24. This criterion relates to our first guiding principle on economic efficiency, given that the more locational and dynamic a signal can be, the more cost reflective it can be.

Access rights

1.25. While access rights don't send local dynamic signals through prices, non-firm access rights have the potential for DNOs to instruct users to turn down when there are local constraints.

1.26. However, we expect access rights to be agreed at the time of connection, and so may have less scope to adapt to evolving future conditions than charging of flexible procurement arrangements. Additionally, valuing the access rights (through connection discounts, use of system charge discounts or other means) will involve complex calculations to determine the value to the system of the user's flexibility.

Forward-looking charges

1.27. One challenge with network charging is being able to signal very localised network constraints through an administratively calculated charge. Network charges at lower voltage levels are currently averaged over a wide geographical area, in part, due to challenges associated with modelling the network to such a locationally granular level. For highly localised constraints, it may not be feasible to calculate a network charge that can accurately signal the constraint.

1.28. It also matters when the flexibility is signalled ie when there are constraints on the network. For example, we would expect that moving from a year round time-of-use to a seasonal time-of-use approach for distribution network charges (which we discuss in our Charge Design discussion note) should result in a more efficient signal for flexibility. The prices would be signalling the need to shift demand away from times when there is an

expectation of constraints on the network. Moving to Critical Peak Pricing should provide an even greater increase in the efficiency of the flexibility signal, as the constraints are signalled just a day (or more) ahead, and so can more accurately reflect the time of network constraints.

1.29. It's also important to recognise that the less precise the locational or time elements of charges are, then the greater the risk that they could lead to inefficient actions, such as encouraging users to turn up or down where there are not actually constraints at a particular location or time. For example, a year round time-of-use signal in a DNO region may encourage users to shift their demand away from the peak time during the few times of year that there is a constraint on the network. However, it may also encourage users to shift their demand away from the evening 'peak' time every day, even when that action provides no or little benefit to the network at all. This could result in a loss of welfare (eg encouraging households to delay the use of appliances) without providing a network benefit.

Trading of access rights

1.30. Trading of access rights, through a curtailment liability trading mechanism, would have the potential to signal local constraints in close to real-time. At this stage, the extent of trades that will occur and level of liquidity is still unclear.

Flexibility procurement

1.31. Flexibility procurement can be highly locational and dynamic because DNOs and NG ESO are able to procure flexibility where it is needed, and define their tenders or requests to reflect the value of flexibility at that location. Where flexibility is procured ahead of time, NG ESO or DNO will be able to call on the provider to flex when it is needed. In the case of real-time markets, NG ESO or DNO will be able to procure the flexibility at times when, and locations where, there is a need.

1.32. The procurement timescales for flexibility procurement will be an important factor in determining how well it can signal local and real time conditions. For long procurement timescales (such as up to a year or more before the response is needed), the live conditions may have changed, and the value of the response may not properly be reflected in the pricing structure of the contract. This would be expected for tendered flexibility procurement. The closer the procurement is the time to the required response (eg up to real-time flexibility markets), the more efficient the procurement should be expected to be.

Competitive price discovery and market power concerns

1.33. A framework that provides for the price of flexibility response to be discovered through a market-based mechanism can support more efficient outcomes. This can reduce the cost to wider consumers by; helping reduce the price needed to secure flexibility, provide information to potential flexibility providers about the level of need, and can also provide useful information to network operators about the case for network reinforcement (for example, if users' need a high price to provide flexibility in a particular area then this could mean that traditional network reinforcement is justified). The full extent of these benefits is reliant on there being adequately competitive markets. If this is not the case, then the price revealed by the market may reflect market power and not support efficient outcomes. This may be a particular concern if the need for flexibility is very localised and/or there are only a small number of flexibility providers that can offer the desired service.

1.34. This criterion relates to our guiding principle on economic efficiency.

Access rights

1.35. Access rights will be linked to charging, as the network charges (including connection charging) should reflect the price users pay for the type of access they agree. Therefore, the initial allocation of access rights generally will not have market mechanisms to reveal the efficient price of access.

Forward-looking charges

1.36. We do not think there is a viable option to set network charges through a market-based mechanism. Instead, charges are set by NG ESO and DNOs through an administrative price setting process and based on pre-agreed common methodologies. This does not allow for market-based price discovery, and creates the risk that the administered price could under or overvalue flexibility at certain times and places. This is closely linked to the discussion above under the first criterion (ability to signal local, live conditions).

1.37. On the other hand, this option is not reliant on there being adequate competition, and so could be more suited to areas where there are market power concerns, or where flexibility markets are in their infancy.

Trading of access rights

1.38. Should the systems for trading of curtailment obligations be rolled out, then this would introduce a market mechanism to valuing flexibility. The price that users with flexible access rights (such as non-firm) are willing to pay others to avoid being curtailed will be revealed through a competitive market. As above, the extent of trades that will occur and level of liquidity is still unclear. However, it has the potential to allow for the price of flexibility to be revealed competitively.

Flexibility procurement

1.39. Where there is adequate competition between flexibility providers, this should reveal the efficient price for delivery of flexibility services. Market mechanisms could either be one-off tenders for specific cases, or a continuous real-time market, like the Balancing Mechanism, in which the price evolves in line with the prevailing market conditions. In either case, care must be taken to design the markets so that they cannot be "gamed". In areas where there are market power concerns – this could also lead to higher prices and inefficient outcomes. However, even with functioning markets, unless they are accompanied by appropriate cost reflective charges, there is a risk that those users causing constraints end up being paid to fix them, with the cost of this being socialised across a wider consumer base.

Ease of engaging with a wide range of users and user experience

1.40. Users of the energy network, particularly on the demand side, are often not completely engaged in energy and sometimes are unaware of their bills or rights to access the system. While this may be particularly true of small users, this may also be the case for some larger users, especially if electricity costs are not a large proportion of their expenditure. Users will only be able to offer flexibility to the system if they can understand the mechanisms by which they can engage or via third parties. Aggregators and suppliers

operating in this space may be able to engage large numbers of users if they can make simple and beneficial offers. Increasing smart technology may also help to resolve the barriers to engagement, by automating the flexibility provided by users that would otherwise find it difficult to engage.

1.41. This criterion relates to our guiding principle that reforms should be practical and proportionate, as users will need to change the way that they engage with the sector in order to offer flexibility to the system. It also relates to our guiding principle on electricity as an essential service, as we need to consider the extent to which we expect users to be able to engage with providing flexibility or be exposed to sharp and complex pricing signals. The criterion also links to the economic efficiency guiding principle, as the efficiency of the reforms depends on the eliciting a response from network users.

Access rights

1.42. Having a choice of access rights can help users have a more direct choice over the extent to which they offer flexibility as opposed to responding to charging signals. For example, a user may select a level of firmness or time-profiled access which they consider is beneficial to them in exchange for an appropriate and agreed level of benefit. Users may also value having a choice over their access rights. Access rights could also be used as a form of hedging against volatile charges, rather than if users are exposed them to dynamic pricing.

1.43. However, access rights to the network are not something the average electricity consumer engages with, as in many cases they are not clearly defined. Therefore, small users may be wary of making choices that could commit them to being flexible, and instead may prefer to choose higher levels of access than they actually need. This may be because they cannot be certain about their level of requirements and/or that they will always be able to, or want to provide flexibility during times of network constraints. Additionally, we expect access rights to be agreed at the time of connections, and so may have less scope to adapt to future conditions as they evolve than charging of flexible procurement arrangements.

Forward-looking charges

1.44. One of the principle advantages of charging is that a signal could be sent to all network users (or currently in most cases, to their supplier), all of whom receive signals about their network impacts.⁵ This means that network charges are potentially able to drive a shift in what might be described as the baseline demand (or generation) level by shifting use of the network away from times which generally drive network costs. Charges can also be relatively transparent and reasonably predictable (depending on the charging design and cost model), which can help give flexibility providers a clear investment signal.

1.45. However, dynamic pricing of network use is likely to be inherently more volatile and this could increase network users' risk exposure to suddenly sharp charges. This could have an undesirable adverse impact on those who are less engaged or less able to respond. However, a user's exposure to those network price signals depends on how suppliers incorporate them into their retail price offerings. It could also raise the risk premium for suppliers, large users or generators, generally, which might flow into the prices they charge their customers. Additionally, the engagement from users will be based on the ability of

⁵ Currently, suppliers are billed for the network charges based on their consumer's consumption (if HH settled, though for NHH settled customers, charges are based on average profiles for that customer class).

users to understand and predict their future charges. Charging currently is sometimes seen as opaque and unpredictable, which can make it difficult for users to invest or change behaviours on the basis of charging signals alone.

Trading of access rights

1.46. When it comes to trading access (through curtailment trading or through other mechanisms), this may be difficult for some users to engage with, and so be better suited to more sophisticated or engaged users.

Flexibility procurement

1.47. Flexibility procurement relies on network users being more proactive in engaging with emerging flexibility markets, as they need to enter into the procurement process. This means flexibility procurement may engage fewer users than network charging signals. This may be particularly true for small users, who may be less aware and/or less inclined to engage with flexibility markets than more sophisticated or engaged larger users.

1.48. However, as discussed above, there is a role here for aggregators to engage with users that would be otherwise unable to engage with complex flexibility procurement mechanisms.

1.49. There has been a perception that DNOs, and to a lesser extent NG ESO, are biased towards network build solutions or that their decision-making processes are otherwise insufficiently transparent. The ESO has attempted to make decision making more transparent through the Network Options Assessment, which makes recommendations to transmission owners across Britain as to which projects to proceed with to meet the future network requirements. While we have a number of measures in place or planned to address this⁶, there is still a risk that any actual or perceived lack of neutrality in procurement could harm engagement and investment signals. Prices and revenues could also be less predictable than administered access rights and charging reforms, which may mean less investor confidence.

Certainty of response

1.50. A significant part of the value of flexibility is the use in deferring the need for investment in traditional network infrastructure. In order to support this, it is critical that NG ESO and DNOs can continue to have confidence that they can operate their networks securely, ie without risk of them being overloaded and causing outages. This means they are dependent on being able to rely on the flexibility being provided when they need it, ie they have sufficient certainty of response.

1.51. This criterion relates to the guiding principle on economic efficiency, as greater certainty of response means there can be less expenditure on network infrastructure.

⁶ Our totex approach under RIIO aims to ensure that network companies do not favour traditional reinforcement (capex) solutions over flexibility (opex) solutions, and we intend to strengthen this further under RIIO-2. We are also ensuring that the network companies have the right plans in place to develop flexibility procurement solutions, working with the ENA Open Networks project.

Access rights

1.52. Non-firm access rights should give system and network companies a significant degree of certainty of response if implemented via active network management (ANM) schemes (which comes with associated costs) which are more reliable than response from price driven flexibility. Additionally, the ESO has certainty of response from users connected to the transmission network through connect and manage. However, there are other options for enforcement (such as exceedance charges for a user going over their level of agreed capacity) which would result in a lower level of certainty of response. There also needs to be appropriate enforcement mechanisms to ensure users are adhering to their time-profile under the time-profiled access option.

Forward-looking charges

1.53. Charging signals do not provide the same certainty of response⁷, given that users have the choice to respond to the network price signal or continue using the network and pay the associated price. TOs, the ESO and DNOs will need to estimate the level of response for planning purposes. If the extent of flexibility provided in response to the price signals is not adequately taken into account, this could undermine the network savings that are achieved.

Trading of access rights

1.54. In the case of curtailment liability trading, the network operator would require a high degree of certainty of response from users who participate, given that constraints need to be resolved in close to real-time. As with the ANM schemes, users would need the installation of control equipment giving the DNOs certainty of response.

Flexibility procurement

1.55. Flexibility procurement should also give network companies a reasonable degree of certainty in response, which is more reliable than the price driven flexibility response. However, this level of certainty may be less than the certainty currently provided through flexible connections (existing non-firm access rights, see Access rights discussion note), which involve the installation of control equipment giving the DNOs certainty that they will get a response.

1.56. Flexibility procurement contracts are usually centred around; availability payments (which pay the provider for being available to provide flexibility), and utilisation payments (which pay users for the times they are called on to provide flexibility). The extent to which the cost of flexibility procurement can be an alternative to network reinforcement (and thus relied on to relieve constraints) will hinge on whether the DNO can consider the service to be sufficiently reliable.

Ease of implementation and operation

1.57. Ensuring the proper valuation of flexibility means that some systems, technology and regulations will need to change, potentially at significant cost. In our guiding principles,

⁷ However, aggregators may be able stack charging revenues with flexibility procurement to provide a degree of certainty of response to the network operators.

we have said that changes need to be proportionate when considering the benefits that come from those changes. We expect that different access right, network charging and flexibility procurement arrangements will have different levels of implementation cost and timing, which need to be considered when comparing the relative merits of each.

Access rights

1.58. There are already flexible access rights being used through the implementation of flexible connections and the number of flexible connections on the distribution networks across GB is expected to grow in the near future. These are mainly used by generators.

1.59. Monitoring and enforcing the access right choices will likely entail technology and systems costs. These may be disproportionately higher for smaller users, depending on the approach taken. Additionally, there are feasibility challenges with offering financially firm access rights due to the impact on network planning standards.

Forward looking charges

1.60. The current charging framework does have some elements of time-of-use pricing already, so some charge designs (such as a seasonal time-of-use charges) are likely to be relatively simple to implement within the current regulatory framework and institutional arrangements for network charging.

1.61. However, the introduction of more dynamic and localised charging could require significant investment in systems and technology needed to monitor the network and administer the processing of a large volume of network charges. The practical challenges of implementing dynamic charging increase as you go down the voltage levels, because the high voltages already have more monitoring technology and systems embedded. Smart meters will address this to some extent, though they will not provide monitoring of the network infrastructure.

Trading of access rights

1.62. Curtailment obligation trading would need investment in monitoring and control equipment for DNOs and participants, the implementation of market platforms to facilitate trading, and investment from the participants themselves in order to engage appropriately with the market platforms.

Flexibility procurement

1.63. Network monitoring equipment for NG ESO/DNO procurement can be rolled out on a targeted, strategic basis, ie where there is a specific need. It is likely to be more efficient to roll out monitoring infrastructure at the lowest voltages on an 'as needed' basis rather than to all parts of the network due to the costs and practicalities of doing so. Again, smart meters will address this to some extent.

1.64. Distribution flexibility procurement markets are not yet mature, and there are institutional developments and technological solutions that need to be implemented to deliver the full benefits. DNOs have all started tendering for flexibility, but there remains more work to do, to ensure these markets develop in a way that ensures low transactional costs of entering them, eg through coordination of requirements.

Ensuring access rights, network charges and flexibility procurement work together effectively

Flexibility procurement and the network charging model

1.65. Forward looking charges are calculated as an allocation of the costs of reinforcing the network. At present, the cost of reinforcement is assumed to be the cost of new physical network infrastructure. However, we expect network companies to increasingly use flexibility to defer or even replace traditional physical reinforcement. This raises the question of whether the cost of flexibility procurement should be reflected in the network charging cost model (ie should the forward looking charge reflect the cost of flexibility procurement rather than the cost of network reinforcement, or a combination of the two). A further question that has been raised is whether there is any case for a distribution-level version of the Balancing Service Use of System charge⁸, as DNOs procure more flexibility services.

1.66. Our preliminary view is that no changes are warranted in response to either question at this stage. We set out our reasoning below.

Should the cost of flexibility procurement be reflected in the network charging cost model?

1.67. The forward-looking charge signals the future marginal cost of providing network capacity. This is currently based on the assumption that the capacity is provided by new network infrastructure. In situations where it is cheaper to provide capacity through flexibility procurement instead and this provides a long-term solution to increasing network capacity, then there could be a case for the marginal cost of that flexibility procurement to be the basis of the charging signal instead.

1.68. At present, it seems reasonable to continue to base the charging signal on the cost of new network infrastructure, as there is not yet a clear record of flexibility procurement consistently deferring the need for network investment. As and when this record is established then there may be a case for reviewing whether flexibility procurement should be used as the marginal cost of providing network capacity (where it is the most efficient solution) within the charging model. We think that such a review is unlikely to be realistic within the timeline of this SCR.

Is there a compelling case for a distribution-level Balancing Service Use of System charge?

1.69. Even though DNOs will increasingly be using flexibility procurement, it does not mean there should be an additional charge on top of the existing forward-looking charges (based on marginal costs of network infrastructure). To the extent, they are substitutes (ie a network constraint can be addressed by either flexibility procurement or new network infrastructure). An additional charge could effectively amount to double charging, as there would be a charge for the marginal cost of reinforcing the network to address network

⁸ The Balancing Service Use of System charge allows NG ESO to recover the cost of balancing the system, paying for ancillary services, and constraint management.

constraints and a separate charge for the marginal cost of managing those network constraints through flexibility procurement.⁹

1.70. Building on the reasoning above, we do not see compelling arguments at this time for a separate Balancing Services type charge aimed at sending forward-looking signals about the costs of flexibility procurement. In managing network constraints, we expect flexibility procurement and new network infrastructure to largely be substitutes. The DUoS forward-looking element would send a charging signal with regards to new network infrastructure, then an additional distribution-level Balancing Services type charge sending a forward-looking signal could amount to double-charging.

1.71. This leaves the question of whether there is any case for the approach to residual charging to differ for DNOs' network infrastructure and flexibility procurement costs. We do not see any clear arguments for this, as the principles for residual charging apply to the costs that are incurred – ie forward looking costs should be recovered by those who impart those costs on the system, and sunk costs should be recovered fairly and non-distortionary. Moreover, we note that the differences in institutional framework between transmission and distribution arrangements mean that the transmission approach cannot be readily applied at distribution-level.

1.72. At transmission-level, flexibility procurement costs are incurred by NG ESO, while network infrastructure costs are incurred by transmission owners. We set separate price controls for these parties, ie they have separate allowed revenues. This means it is easy to identify what revenues need to be recovered through the separate BSUoS and TNUoS charges.

1.73. In contrast, at distribution-level all costs will be incurred by DNOs. Through our RIIO framework for DNOs we set a single allowed revenue to cover their total expenditure ("totex") and do not set distinct allowances for spending on network reinforcement versus spending on flexibility procurement. This gives them the incentive and flexibility to pursue the best option to support efficient management of their network. Each DNO's single allowed revenue is then recovered through charges, with any shortfall in revenues raised from DUoS forward-looking charges covered through residual charges. Given the single "totex" allowed revenue, it is difficult to envisage how any shortfall could be said to be a shortfall against network reinforcement expenditure or flexibility procurement expenditure. This would be necessary in order to be able to define what costs should be recovered through DUoS residual charges and what costs should be recovered through a new distribution-level version of the Balancing Service Use of System charge.

Coordination of signals for flexibility

1.74. A possible outcome could be signals for flexibility providers from both time-of-use charges (in some form, such as time-of-use volumetric charges, actual capacity charges or dynamic charges), access right choice, and through flexibility procurement. In that case, there would be a need to ensure the signals worked together to drive an efficient outcome, and not over-reward flexibility. For example, a storage provider could be both receiving a credit under network charges and receiving a utilisation payment for exporting to the grid when it is helping relieve a constraint at peak times. If the flexibility procurement takes account of the charging benefits when agreeing the pricing structure for the contract, then

⁹ The BSUoS task force report discusses this concept in more detail at paragraph 4.4.5.2. Link here: <http://www.chargingfutures.com/media/1348/balancing-services-charges-task-force-final-report.pdf>

this should be acceptable. However, we need to be aware of the potential for double counting in these cases.

1.75. An additional issue between access rights is the ability for users to value stack their access benefits and participation in flexibility markets. For example, could a user with non-firm or shared access rights participate in the Capacity Market, Balancing Mechanism and distribution level flexibility markets? See our Access rights discussion note for further consideration on whether users with alternative access rights will be eligible to participate in wider flexibility markets.

1.76. One issue that has been raised is a hypothetical case where a user may receive apparently contradictory signals from different mechanisms – for example if an action to resolve a supply-demand imbalance (through the Balancing Mechanism) may actually cause localised network constraints. Providing that the different signals accurately reflect the different costs and value that a user can provide to different parts of the system then this should not inherently be an issue in supporting an efficient overall system – it can support users in optimising their response given the different costs and value streams they can confer on the system. Whether or not value stacking will provide a benefit to the system will depend as well on the timescales under which the contracting for services has been conducted, and whether the user has enough notice to react to signals.