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for energy consumers

Illustrative examples note

Summary

This section provides illustrative examples to help explain the potential benefits of options we are considering under the Access and Forward-looking Charges Significant Code Review (Access SCR).

We have updated the five illustrative examples of large users we published as part of our Summer working paper to reflect the new material in this working paper – namely possible distribution connection and transmission charging changes. We have also provided four illustrative examples of small users. These illustrative examples aim to identify the types of investment and operational signals we are seeking to send to these users through these reforms.

1.1. This note builds upon five illustrative examples that we published in our Summer working paper[1] to explain the potential impact of reforming access and charging arrangements for a range of electricity network users:

1. A wind generation developer
2. Local energy scheme
3. Existing large industrial user
4. Business with large vehicle fleet
5. Storage operator

1.2. This note provides four further illustrative examples to highlight the potential impact of reforming access and charging arrangements for small users:

6. Domestic customer - household interested in new smart technologies
7. Domestic customer – household seeking to buy an electric vehicle
8. Domestic customer – vulnerable household with electric heating

[1] https://www.ofgem.gov.uk/system/files/docs/2019/09/summer_2019_-_working_paper_-_illustrative_examples.pdf

9. Microbusiness – small cafe with high energy consumption.

1.3. These illustrative examples are intended to show the types of expected outcomes that we want to achieve, and how the potential reforms under this Access SCR could impact different users' investment and operational choices.

1.4. These options are purely illustrative to help explain the potential investment and operational decisions of individual network users that our reforms might influence. The following examples explain the different options in more detail. As part of our further work, we will do additional analysis to better understand and quantify how options for reform will affect choices for individual network users and the overall energy system.

1.5. For simplicity, the illustrative examples focus on the options for reform under the Access SCR and other options for valuing flexibility (ie procurement of flexibility). As part of our Access SCR, we are taking into account wider reforms (eg the changes to residual charges or reform of the retail market), however this is not the focus of these illustrative examples. The illustrative examples also do not focus on the enablers required to help deliver a smarter, more flexible energy system (eg the rollout of smart meters and settlement reform), although these are clearly important.

Large user illustrative examples

Illustrative example 1 – A small wind generator (under 100MW) connecting to a constrained distribution network

1.6. In this example, a wind generator is seeking connection to the distribution network in a generation-dominated area with network constraints. Due to the volume of generation connected to the local distribution network, the distribution network frequently exports power onto the transmission network and the distribution network operator (DNO) has to either reinforce the network or curtail generators that have agreed to generate at certain times.

Desired outcomes

1.7. We want arrangements to facilitate the decarbonisation of energy at least total cost to consumers, taking into account the costs for networks. We want access and charging

arrangements to incentivise the wind generator to install and manage their generation in a way which takes into account network costs. For example:

- In **deciding where to locate**. The generator should not just take into account the ease of receiving planning permission and how windy an area is – they should also take into account the network costs of bringing that generation to market. Consideration of all these factors should lead to an optimised decision which helps to decarbonise the electricity sector at lowest cost. This might mean that projects in slightly less windy areas become more competitive if they are located where the costs of transporting the electricity across the network is low.

- In **deciding what technology to install**. For example, in taking account of network costs, the generator may decide that it is worthwhile installing a battery to store electricity generated during times of generation-led network congestion, or discharge onto the system at other times.

1.8. We do not want these decisions to be influenced by arbitrary differences in network access and charging arrangements across voltage boundaries, which is one of the reasons we are looking to harmonise arrangements as much as possible.

1.9. We also want arrangements to provide high quality information to network and system operators about where and when new sources of generation, like wind generators, need or value new network capacity. We do not want difficulties in obtaining network access being a major cause of delay to the development of new generation projects (eg those needed to facilitate decarbonisation of electricity supplies).

Current arrangements and issues

1.10. Under the current distribution connection boundary, the wind generator can agree to accept either a:

- **Standard connection offer**. Under a standard connection offer, the wind generator would be able to export with limited likelihood of the DNO having to curtail this output. However, the DNO would need to "reinforce" the network (either through traditional network investment or tendering for flexible solutions) to facilitate this and, under the current shallow-ish connection boundary, the wind

generator would face an upfront charge for a proportion of these costs, which could be significant. This is different to how the arrangements work at transmission, where new customers do not pay towards any network reinforcement that they trigger through their connection charge. At transmission, the customer may be connected in advance of wider network reinforcement being completed. This is not the case at distribution and the need for reinforcement can significantly delay the connection date.

- **"Flexible" or "non-firm" connection offer**. A "flexible" or "non-firm" connection offer allows the connecting customer to connect while avoiding the need for reinforcement. This can allow a quicker and cheaper connection, but it also means that the wind generator would have to accept a greater likelihood of their exports being curtailed by the DNO when the network is congested (ie their access is "non-firm"). Under a flexible connection offer, the customer is not compensated for any curtailment. Generally DNOs provide an estimated curtailment rate, but no cap is defined on the level of curtailment that can be incurred.[2] This uncertainty could make it more difficult for the wind generator to invest on the basis of a flexible connection offer.

1.11. For the majority of distribution-connected users, their access rights do not explicitly define their ability to access the transmission network. As part of the connection process, the DNO works with the Electricity System Operator (ESO) – through the "Statement of Works process" – to establish whether there are transmission constraints that could affect the ability to provide network access to the wind generator. If there are transmission-level constraints the ESO will consider whether the "Connect and Manage" regime should apply.[3] If not, this could delay the potential connection date.

1.12. We are also concerned that, under current arrangements, the wind generator's ongoing network charges will not be cost-reflective. As distributed generation, under the Common Distribution Charging Methodology (CDCM), which applies to customers connected to the high

[2] ENWL have introduced a new curtailment forecast and index for flexible connections, which gives more information about average level of curtailment and introduces safeguards from excessive curtailment.
[3] The "Connect and Manage" regime enables generators to connect ahead of wider transmission network reinforcements, if needed, and their connection agreement will outline the circumstances in which they will/will not receive payments if they are constrained. The associated cost of these payments is socialised across other users.

or low voltage networks, this generator won't pay distribution network charges, but may receive network credits. The rationale is that, historically, generation has largely reduced "net demand" and so would reduce pressure for new network capacity. However, this assumption is no longer accurate, so in an area where generation is driving network reinforcement costs, the distribution-connection generation still receives a credit rather than paying towards costs it is contributing towards.

1.13. Since this generator is smaller than 100MW it also does not pay any transmission network charges, even if it is in an area where generation outweighs demand and so there are generation-driven flows on the transmission network. In contrast, generators over 100MW in size would pay transmission network charges based on their agreed access to the transmission network ("Transmission Entry Capacity" (TEC)).

Relevant options for reform

1.14. Our potential options for reform could have the following implications for the generator:

Area of reform	How potential reforms could impact the user
Improving access choice and definition	The wind generator could have additional or better options for access to choose from: • **Time-profiled access:** The wind generator could install a battery and obtain access overnight (eg between 22:00-07:00) when there may be more spare network capacity. • **Better defined, non-financially firm access:** The terms of the non-financially firm access could state that the generator's output can be curtailed up to a maximum level (which could be set in hours or MWh), with the network operator required to take action to ensure that the level of curtailment doesn't exceed this level, or otherwise compensation may be payable. When the generator is curtailed, it could also potentially trade with other users on the local network to reduce its own curtailment obligation.
Wide-ranging review of DUoS charges	Forward-looking distribution use of system (DUoS) charges could become **more cost-reflective**, better reflecting where locating in certain areas of the lower distribution voltages could add to or reduce network costs. For example, the wind generator may face a charge (rather than a credit) in areas of the network where it is contributing to exports to higher levels of the network. Changes to forward-

	looking charges for users connecting "higher up" the network (at the extra high voltage (EHV) level) could make them more predictable, better supporting the wind generator's decision about where to invest. Changes to the design of forward-looking charges could also inform the wind generator's **operational decisions** about when to export onto the network as charges could be higher during peak network periods. These could be set ahead of time, but vary by season and time of day, or the periods could be notified by the DNO a set amount of time (eg 24 hours) beforehand. Alternatively, forward-looking **charges could be based on the wind generator's agreed access right** (ie agreed capacity and the level of physical firmness). In that case, the wind generator may receive operational signals through being curtailed by the DNO, by trading curtailment obligations with other users (if they have a non-financially firm access right) or through flexibility procurement by the DNO or ESO. For further information on valuing flexibility see the box below on "Work outside of the SCR".
Connection boundary	If we introduced a **shallow or shallower connection boundary,** then the wind generator would pay less towards any network reinforcement that it triggered. This would reduce the wind generator's connection charge, but increase the costs recovered from wider use of system customers. This could weaken the locational signal to the wind generator about where to locate on the network. Alternatively, we could consider options to allow the generator to pay their connection charge over a longer time period. If we introduced a shallow connection boundary, then we would consider introducing **user commitment arrangements**. This could require the wind generator to place security with the DNO to cover a proportion of the money spent by the DNO in providing the connection. The arrangements could also make the wind generator liable in the event that they cancel or delay their project.
TNUoS reforms	As part of the Access SCR we are considering **changes to the design of transmission network use of system (TNUoS) charges for distribution-connected generation users** that are contributing towards, or alleviating, costs at transmission. Changes to the design of TNUoS charges for distribution-connected generation users could inform the wind generator's decision about where to invest (eg driving them to locate in areas where exports from the distribution network are not contributing towards transmission network investment). For example, we could consider removing the charging cap for small, distribution-connected generation

	or we could require small, distribution-connected generation to contribute to local transmission asset charges. **Changing "the reference node"** could reduce the overall amount of revenue recovered from generators, including this wind generator. This could allow the wind-generator to compete on a more level playing field with other providers of energy service (eg sites with behind the meter generation).
Work outside the SCR	Outside of the Access SCR, the development of **flexibility procurement** is an alternative method of achieving a smarter, more flexible energy system. The ESO and DNOs' work in this area could provide the generator with additional opportunities to earn revenue. This may influence the generator's investment or operational decisions. For example, in exchange for a payment from the DNO, the generator may be willing to be curtailed more often than agreed as part of their access right. The cost of this "flexibility contract" may be cheaper to the DNO than the cost of reinforcing the network. Alternatively, this generator may be able to trade the extent to which they are curtailed through better enabling the **exchange of access rights**. If this generator valued staying on the network more than another generator in the local area, then it could pay to exchange its curtailment obligations with another generator. The ENA is progressing work to develop the exchange of access rights as part of their Open Networks programme.

Illustrative example 2 – Local energy scheme

1.15. A community energy project is seeking to connect a new 'solar farm' and large, new community centre at separate sites. Both of these connections are to the same low voltage (LV) electricity distribution network. This project is seeking to match generation and demand locally, as much as possible.

1.16. The area in which the community energy project is located has no capacity for new generation further up the distribution network on the high voltage (HV) network (ie it has a "generation constraint"). This means that new sources of demand connected downstream of the constraint are beneficial in alleviating the generation constraint, but new generation can trigger the need for network reinforcement.

Desired outcomes

1.17. We want all larger users, including community energy projects, to be able to choose the type of network access that most suits their needs and helps to support efficient network development.

1.18. We want to ensure that access and forward-looking charging arrangements reflect where local energy can bring benefits to network management. For example, incentivising users to match generation and demand locally at certain times may make better use of existing capacity, thus avoiding network constraints and the need for reinforcement. We want charging and access arrangements to influence the development of these types of projects, so that they take into account network charges (eg deciding where and how to develop community energy projects).

Current arrangements and issues

1.19. Currently the solar generator and the community centre would need to apply for access (via connection requests) separately.

1.20. For each site, the generators and community centre would need to decide whether it wants a "standard connection offer" or a "flexible connection offer".

- Under a **standard connection offer**, the DNOs would have no way to be assured that the two sites would match their demand and supply and so would therefore need to reinforce the network to accommodate the new generation. Under the current shallow-ish connection boundary, the solar generator would need to pay upfront for a share of this and there may also be a delay in connecting the solar generation.
- Alternatively, the user could choose to accept a **flexible connection offer** for the solar generation site. However, this would leave the user facing an uncertain level of uncompensated curtailment to their solar generation.

1.21. The current **DUoS charging methodology** doesn't accurately reflect the costs or benefits of the community energy project matching demand and generation. For example,

once connected, the solar generator would receive a credit (rather than a network charge), regardless of whether it is contributing to the network constraints or not. The community centre would pay a charge despite the fact that it would actually help to offset network constraints if its demand coincided with peak generation periods in the area.

1.22. **Forward-looking TNUoS charges** are produced using a model of flows across the transmission network that gives different tariffs for different zones ("load flow modelling"). Larger generators' charges are based on their agreed TEC, whereas demand and the majority of small distributed generation (DG) are charged based on their consumption or generation during certain periods. Charges can be positive or negative (ie a credit), but most small DGs' charges are currently capped at zero.

1.23. TNUoS demand charges are based on a user's average consumption during three peak half hour periods between November and February. The three periods must be separated by at least 10 days. While the current Triad approach had been effective at eliciting demand response, but is becoming an increasing source of uncertainty and may not always align with periods of peak network constraints in particular areas.

Relevant options for reform

1.24. Our potential options for reform could have the following impacts on this user:

Area of reform	How potential reforms could impact the user
Improving access choice and definition	The community energy project could have additional or better options for access to choose from. This user would be able to choose from a range of access choices (eg those access choices identified in illustrative example one), but there may be specific access options that are more relevant to this user. For example: • **Better defined, non-financially firm access:** The DNO could offer better defined, non-financially firm access. These options could more clearly specify when the solar generator may be interrupted (eg setting caps on the level of curtailment that the user could occur). This could make curtailment risk easier to manage. The community energy project could also invest in an on-site battery storage to avoid any electricity being wasted (ie electricity generated when the solar generator is curtailed).

	• **Shared access:** The development of an option for "shared access" could allow the solar farm and the community centre to share access, up to a jointly agreed level. The parties could then coordinate to share access between themselves. Sharing access to stay within a specified level may reduce the need for network reinforcement. There are significant practical issues about sharing access. For example, shared access would require access to be monitored at both an individual and aggregate level. To ensure that users remain within their shared access right, it also requires an individual (eg the network users themselves, a third party or the network/system operator) or technology, to monitor and manage cumulative usage. Sharing access also presents challenges about how to charge for this access (eg if the two users that are sharing access are at different voltage levels then this could require significant changes to how the network charging models work). In particular, sharing access across a wider area could create additional challenges (eg the value of user's access may not be equal in each location and sharing access may require an "exchange rate") and may be more difficult to implement. At lower voltages the DNOs already assume a high degree of sharing through their use of diversity assumptions in planning the network. We have concerns that introducing explicit shared access rights may reduce natural wider network diversity and consequently increase costs for consumers. We are therefore thinking that there may be limited benefit in shortlisting shared access for reforms to be taken forward at this stage. We are keen to better support innovative ideas and consider that further industry trials may be a better way of taking this forward. Please let us know if have views on this.
Wide-ranging review of DUoS charges	This could result in improved locational signals at the lower distribution voltages and improved cost-reflectivity. If the community energy project is balancing generation and demand locally, helping to avoid the need for network reinforcement, it could receive lower distribution network charges or network credits. This could influence investment decisions about where to progress community energy projects. Changes to the design of network charges could also influence the design and operation of community energy projects. For example, capacity-based charges could encourage the solar generator to invest in, and operate, a battery to store

	some of the electricity generated during the day to reduce the maximum export capacity required.
Connection boundary	Our work to consider options to reform the distribution connection boundary could have a significant impact on the local energy scheme: • If we moved to a **shallower or shallow connection boundary** then the community energy project would pay for less, or no, network reinforcement that it triggered. This could significantly reduce the cost of a standard connection and influence investment decisions about where to progress community energy projects. We have stated that moving to a shallow connection boundary would be contingent on introducing improved locational signals at the lower distribution voltages. Alternatively, we could amend when the local energy scheme pays its connection charge (ie so that it can pay the connection charge over time, rather than upfront). • The introduction of **user commitment arrangements** would incentivise the community energy project to provide accurate and timely information about their access requirements, and should help reduce the risk of stranded assets which push up costs for all consumers. However, any security arrangements would need to be designed to ensure that it doesn't create a barrier to community energy schemes connecting to the network.
TNUoS reforms	Changes to the design of **TNUoS charges for distribution-connected generation users** that are contributing towards, or alleviating, costs at transmission could impact this community energy scheme. For example, the solar energy project could pay transmission charges in areas where it is expected to increase long term costs. This would help reduce distortions in competition between generators connecting at different network locations and could influence the solar energy project's investment decisions. **Changing "the reference node"** could amend the overall amount of revenue recovered from generators and demand users, including the solar farm and community centre. This could influence their decision about whether to invest or not. It may also allow the solar farm to compete on a more level playing field with other providers of energy service (eg sites with behind the meter generation). As part of the Access SCR we are also considering the **design of TNUoS charges for demand users**. This could result in changes to the current approach to critical peak pricing (ie Triads). For example, we could notify critical peak periods in advance to provide more certainty to suppliers about when the peak period will occur, we could introduce greater locational granularity in critical peak signals to

	reflect local network conditions or we could introduce more critical peak periods to smooth signals to suppliers. These reforms could improve cost-reflectivity and certainty of signals to suppliers to avoid contributing towards transmission network peaks. These signals could influence the design and operation of the community energy project – for example the changes may incentivise the relevant supplier to reduce the community centre's demand during critical peak periods.
Work outside the SCR	The ESO and DNOs are progressing work to develop the procurement of flexibility from distribution-connected users. Under these proposals, the local energy project could sell a service to the network operator to avoid the need for reinforcement (eg the local energy project could be paid to reduce generation or increase demand). The development of the procurement of flexibility may inform the local energy project's operational decisions about when to use their generation. For example, the generator may agree to a flexibility contract with the local DNO where it agrees to reduce its level of export at specific periods (eg peak periods in summer), in exchange for a payment. Alternatively, better enabling the exchange of access rights could allow the generation site to trade curtailment obligations with other generators in the local area. These others generators may be more able to be flexible about their network access.

Illustrative example 3 – Existing large industrial user connected to distribution network

1.25. In this example, we focus on an existing large demand user that is connected to the EHV distribution network and has an onsite generator to meet some of its demand. The industrial user has the ability to participate in demand-side response and is considering increasing the size of its onsite generation.

Desired outcomes

1.26. We want this demand user to be able to choose the access rights which meet its needs, as efficiently as possible. The arrangements should result in more efficient use of the network and better information to network operators about how the network needs to develop.

1.27. We want the demand user to face cost reflective forward-looking charges that reflect the incremental costs or benefits they confer on the system. Forward-looking network charges should be simple, transparent and predictable. This should enable user to make investment decisions (eg whether to invest in new on-site generation) and dispatch decisions (eg when to optimise use of their onsite generator) based on the charges or wider arrangements (eg flexibility markets). Arrangements should also mean that the onsite generator competes on a leveller playing field with directly-connected generation (ie facing broadly equivalent forward-looking charges if they are having a similar impact on the network).

Current arrangements and issues

1.28. Under the current regime, the customer determines what level of access they require when they connect to the system or upgrade their connection. However, beyond that, the user has a very limited choice of access rights. If the industrial site's revised access rights require reinforcement of distribution assets, then the customer will be required to pay for a proportion of these costs through the connection charge.

1.29. Forward-looking distribution charges for customers connected to the EHV distribution network can currently be unpredictable, quite volatile and hard to respond to. Without clear, predictable signals to influence user behaviour, the user may not take into account network charges when making investment decisions (eg whether to invest in additional onsite generation) and operational decisions (eg when to import electricity and when to use their existing on-site generation).

1.30. TNUoS charges for demand users are based on a "Triad" approach to charging. Triad charges are based on a user's average gross consumption during three peak half hour periods between November and February. The current Triad approach had been successful in facilitating demand response, but has become an increasing source of uncertainty and may not always align with periods of peak network constraints in particular areas.

1.31. There are currently differences in how directly-connected generation and on-site generation are charged. These differences may incentivise users to invest or not invest in directly-connected generation. These differences may also send different operational signals to directly-connected generation and on-site generation about when to generate electricity.

Relevant options for reform

1.32. Our potential options for reform could have the following impacts on this user:

Area of reform	How potential reforms could impact the user
Improving access choice and definition	This could provide additional options for this user to choose from. The user would be able to choose from a range of access choices (eg the access choices identified in the other case studies), but there may be specific access options that are more relevant to this user: • **Time-profiled, non-financially firm access:** The DNO could offer better defined non-financially firm access. This option could specify time periods when the industrial site may be interrupted. For example, the user may be willing to be curtailed during peak hours in the winter months. During these times, the industrial site could use their on-site generation to continue operating. This is an example of how access choices could be defined and is not definitive.
Wide-ranging review of DUoS charges	Changes could lead to **greater stability** of forward-looking charges for those connecting at EHV through changes to network charging cost models and/or by setting charges on a zonal basis rather than for each individual site. Clearer, more predictable charges may incentivise the industrial site to take into account network impacts when making investment decisions (eg deciding whether to install additional on-site generation). Changes to the design of forward-looking charges could also inform the industrial site's **operational decisions** about when to use their existing on-site generation. For example, demand charges could be designed so that they are higher during peak network periods (as explained further in illustrative example one). This would incentivise the industrial site to reduce the amount of electricity that they import during these periods. Alternatively, forward-looking charges could be solely based on the industrial site's agreed access rights and these operational signals could be sent via the procurement of flexibility.
Connection boundary	Where an existing user wants to vary their access rights (eg by requesting an increase to their agreed maximum import or export capacity), then they could face a connection charge. The changes we are considering could allow the user to pay that charge over time and/or, in cases where reinforcement is needed,

	reduce the extent to which the user needs to contribute to the costs of it through the connection charge. If the industrial site wants to use an onsite generator to reduce its level of access, but is not planning to export onto the network, then it is unlikely to trigger the need for additional reinforcement.
TNUoS reforms	As part of the Access SCR we are **considering the design of TNUoS charges for demand users**. Changes to the design of transmission demand charges may impact on the industrial user's investment and operational decisions. For example, a move towards an agreed capacity approach for charging demand may encourage the large industrial user to invest in, and operate, additional on-site generation to reduce the maximum import capacity required by the site. This is also more consistent with the approach for charging directly-connected transmission generation. We are also considering **changes to "the reference node"** which could increase the overall amount of revenue recovered from demand users, including this existing large industrial user. This would allow the industrial site to compete on a level playing field with other providers of energy service (eg directly-connected generation).
Work outside the SCR	Outside of the Access SCR, the development of **flexibility procurement** is an alternative method of achieving a smarter, more flexible energy system. The Energy Networks Association (ENA) is progressing work to develop the procurement of flexibility as part of their Open Networks programme. The development of the procurement of flexibility may inform the industrial site's operational decisions about how to profile their work and when to use their existing on-site generation. For example, the industrial site may agree to a flexibility contract with the local DNO where it agrees to reduce its level of consumption at specific periods (eg peak periods in winter), in exchange for a payment. To achieve the reduction in demand, the industrial site may need to use its on-site generator. Alternatively, if the industrial user has agreed to access rights that allow it to be curtailed, then it may be able to trade the extent to which it is curtailed. The ENA is working to better enable the exchange of access rights as part of their Open Networks programme. If the industrial user valued staying on the network less than another user in the local area, then it could be paid to exchange its curtailment obligations.

Illustrative example 4 – Business connecting new electric vehicle (EV) charging facilities to the distribution network

1.33. In this example, a delivery company is looking to invest in a fleet of electric delivery vans. The delivery company is located in a demand constrained area to the HV distribution network, and is considering **increasing its maximum import capacity** to connect several rapid EV chargers for its fleet of delivery vans.

Desired outcomes

1.34. We want arrangements to facilitate the decarbonisation of transport at least total cost, taking into account the costs for networks as well. We also want the delivery company to be able to obtain access to the network that reflects their needs.

1.35. We want forward-looking charging arrangements to incentivise users, like this delivery company, to charge EVs in ways that are both compatible with their business model and cheaper for the network. This might include influencing decisions on where to charge the fleet and how (eg potentially using some storage or self-generation), and on whether to discharge electricity back to the system during peak times (using vehicle-to-grid (V2G) services: this enables energy stored in EVs to be fed back onto the system).

Current arrangements and issues

1.36. Under the current arrangements, the customer determines the level of network access they require (ie the maximum amount of import capacity required). Beyond this there are **limited network access choices** available to demand users. In some areas, network operators have engaged with users to provide bespoke access arrangements, but generally there are limited "flexible connection" offers available for demand users.

1.37. If the delivery company wanted to increase its level of access to accommodate several new EV chargers, this could trigger network reinforcement. Under the current distribution connection charging regime the delivery company would contribute to the cost of this reinforcement through an **upfront connection charge**. The cost of the network reinforcement may be prohibitively costly for the delivery company and create a barrier to it being able to transition to EVs. Even if they are able to commit to the financial investment, the

need to undertake network reinforcement may significantly delay the company from being able to install new EV chargers.

1.38. We are also concerned that the delivery company's **ongoing distribution network charges** may not be cost-reflective. Under the current arrangements, DUoS demand charges are based on a single network model for each DNO region and include static time-of-use charges that may not reflect peak times for the local network. Demand network charges are therefore the same, regardless of whether the user is located in a demand-dominated area and contributing towards additional network costs. We are questioning whether this is the most cost reflective approach.

1.39. Under the current **TNUoS charging methodology** suppliers are charged according to the aggregate demand of their Half Hourly-settled customers during three critical peak periods each year. However, these critical peak periods may not align with periods of local network constraints in the area where the delivery company is located.

Relevant options for reform

1.40. Our potential options for reform could have the following impacts on this user:

Area of reform	How potential reforms could impact the user
Improving access choice and definition	This could provide additional options for this user to choose from. The user would be able to choose from a range of access choices (eg those access choices identified in the other illustrative examples), but there may be specific access options that are more relevant to this user. • **Time-profiled, non-financially firm access:** the delivery company may be willing to accept a cheaper, non-financially firm access right. For example, the user may be willing to be interrupted (up to a cap) during working hours when the majority of their vans are delivering goods and not based at the site. This is an example of how access choices could be defined and is not definitive.
Wide-ranging review of DUoS charges	Improved **locational charges** would improve the signals to the delivery company about how their behaviour can increase or reduce network costs. This may influence the delivery company's investment decisions. For example, the introduction of credits for demand users in generation-dominated areas could

	encourage the company to install EV chargers at another site in a generation-dominated area, where it could reduce the need for network reinforcement and receive network credits. Changes to the design of forward-looking charges could also influence the delivery company's operational decisions. Network charges could vary by season or time-of-day to reflect peak network periods. This could incentivise the delivery company to charge their EVs at off-peak periods (eg overnight) when there is more spare capacity on the network. The delivery company may also be able to use V2G to help reduce demand during peak periods. Alternatively these signals could be sent via the procurement of flexibility.
Connection boundary	Where an existing user wants to vary their access rights (eg by requesting an increase to their agreed maximum import or export capacity), then they could face a connection charge. Changes to the connection boundary may impact the connection charge incurred by the delivery company. Moving to a **shallower connection boundary** or **shallow connection boundary** could influence the delivery company's investment decisions. For example, moving to a shallower connection boundary could significantly reduce the cost to the delivery company connecting rapid EV chargers to its site. Alternatively, we could change arrangements to allow the fleet operator to pay the connection charge over a longer time period. The introduction of **user commitment arrangements** may require the delivery company to provide security (eg cash sum, letter of credit or performance bond) to cover the delivery company's liability in the event that it cancels or delays its request for additional capacity. This should incentivise the delivery company to provide accurate and timely information about its future capacity requirements.
TNUoS reforms	Making changes to the current approach to **calculating transmission demand charges** may also influence the delivery company's operational decisions. For example, introducing more locationally granular critical peak periods may encourage the delivery company to charge their EVs when there is spare capacity on the local transmission network. This may be at a different time than the system peak, which is reflected in the current arrangements.
Work outside the SCR	Outside of the SCR, the **procurement of flexibility** is an alternative method of delivering a more flexible energy system. The development of flexibility markets would improve the signals to the delivery company about the value of the being flexible. Selling flexibility services to the local network operator may provide an additional source of revenue for the fleet operator.

	This may influence the delivery company's investment decisions. For example, the delivery company may decide to install EV chargers at an alternative site in a region where the DNO has issued a request for new providers of flexibility. The development of flexibility markets could also influence operational decisions. For example, the delivery company may sign a flexibility contract to increase or decrease demand at specified times, in exchange for a payment from the DNO. Alternatively, if the fleet operator has agreed to access rights that allow it to be curtailed, then it may be able to trade the extent to which it is curtailed. The ENA is working to better enable the exchange of access rights as part of their Open Networks programme. If the fleet operator valued staying on the network less than another user in the local area, then it could be paid to exchange its curtailment obligations.

Illustrative example 5 – Storage operator choosing between transmission and distribution network

1.41. In this example, a storage operator is looking to invest in a new battery storage site. The storage operator can choose whether to connect to the transmission or the distribution network. The local distribution and transmission network both face generation constraints.

Desired outcomes

1.42. We want storage operators to be able to get access to the energy system that meet their needs, as efficiently as possible. The arrangements should result in more efficient use of the network and better information to network operators about how the network needs to develop.

1.43. We think that storage facilities should face forward looking charges or credits for both "import" and "export". These credits or charges should reflect the costs or benefits that the storage operator confers on the network. We want charging and access arrangements to influence the development of storage projects, so that the projects are designed to make best use of capacity and take into account network charges (eg deciding where to develop storage projects and the level of network access required).

1.44. We want to avoid decisions about where to connect from being influenced by arbitrary differences in network access and charging arrangements between transmission and distribution as far as possible.

Current arrangements and issues

1.45. There are differences in how forward-looking charges are calculated for "import" and "export" for **both** transmission and distribution networks. At **distribution** level, generators do not receive charges, even if they contribute towards network costs. In comparison, demand users are not eligible for credits, even if it helps avoid the need for network reinforcement.

1.46. At **transmission level for generation**, transmission-connected generation and large distribution-connected generation pay transmission generation charges based on their TEC. Transmission-connected generators also pay local substation tariffs and onshore local circuit tariffs where relevant. In comparison, smaller distributed generators are treated as "negative demand" which means they face a charge or do not pay anything at all.[4]

1.47. At **transmission level for demand**, charges are currently based on a user's average gross consumption during three peak half hour periods between November and February (ie the Triad methodology). Whilst the current Triad approach has been effective at eliciting demand response, it is becoming an increasing source of uncertainty and the three peak periods may not always align with periods of peak network constraints in particular areas.

1.48. In addition, the **connection charging arrangements** are different between transmission and distribution. These differences could be distorting investment decisions (eg whether to connect to the transmission or distribution system).

[4] 1.47. They currently receive a payment known as the Embedded Export Tariff, which is calculated based on their average half-hourly metered generation export over the three Triad periods.

Relevant options for reform

1.49. Our potential options for reform could have the following impacts on this user.

Area of reform	How potential reforms could impact the user
Improving access choice and definition	This could provide additional options for this user to choose from. The user would be able to choose from a range of access choices, but there may be specific access options that are more relevant to this user, for example • **Better defined, non-financially firm access:** The user could accept non-financially firm access to allow quicker and cheaper connection to the distribution network (that avoids the need for network reinforcement). The access choices could include well-defined limits on the extent to which the storage operator can be curtailed (eg it will face a maximum of 10 hours of curtailment per month). The storage operator may be willing to accept this in exchange for lower charges as it will be flexible enough to import/export electricity outside of local network peak periods. This is an example of how access choices could be defined and is not definitive.
Wide-ranging review of DUoS charges	We are considering cost model options where generation and demand receive equal and opposite charges and credits. This could influence a storage operator's operational decisions. For example, credits for demand may incentivise storage to import electricity at times when it can alleviate generation constraints. Options to introduce locational differences in the "super-red" period to reflect local network conditions may also influence the storage operator's operational decisions. For example, the storage operator may amend when it exports or imports onto the network to avoid contributing towards local network constraints. Differences in how network charges are calculated at transmission and distribution level may also influence the storage operator's investment decisions. Using an alternative network cost model or a different level of locational granularity (eg zonal charges) may improve the predictability of distribution network charges for EHV-connected users. It may also minimise a potential distortion between transmission and distribution arrangements that may affect investment decisions.
Connection boundary	**Moving to a shallow or shallower connection charging boundary** at distribution could reduce an undue barrier to the storage operator connecting to the distribution, by reducing the cost of connection. However, it could weaken the locational signal for the storage operator to invest in locations with spare network

	capacity. It would also increase the costs recovered from wider use of system customers. Alternatively, we could change when the timing of the distribution connection charge, so that the storage can pay its connection charge over time, rather than prior to energisation. The introduction of **user commitment arrangements** may also require the storage operator provide security to cover any reinforcement costs incurred by the DNO. This should reduce the risk of the DNO investing in assets that become "stranded" if the storage operator cancels or delays the project.
TNUoS reforms	**Reforming how small DG are treated for TNUoS charges** could impact on this storage operator's investment decisions. Options to align small DGs' charging with that of larger generators would mean that this storage operator would incur the same transmission forward-looking charges, regardless of whether it connected to the transmission or distribution network. This could remove a potential distortion with the current arrangements about where to invest. We are also considering **changes to "the reference node"** which could increase the overall amount of revenue recovered from generation and demand users. As part of the Access SCR we are considering **the design of TNUoS charges for demand users.** If it decided to connect to the transmission network, then reforming how transmission demand charges are calculated could influence the storage operator's operational decisions. For example, introducing an "ex-ante" approach to critical peak charging where the ESO notifies parties in advance of a critical peak period occurring would allow the storage operator to adjust their operational activities and avoid a critical peak period. The critical peak period could also vary regionally to reflect local network peaks. Alternatively moving towards an agreed capacity approach could influence the storage operator's investment decisions by incentivising the storage operator to reduce the amount of capacity requested and smoothing the amount of import and export over a longer period.
Work outside the SCR	Outside of the Access SCR, the development of **flexibility procurement** is an alternative method of achieving a smarter, more flexible energy system. The ENA is progressing work to develop the procurement of flexibility as part of their Open Networks programme. Selling flexibility services to the local network operator may provide an additional source of revenue for the storage operator. This may influence the storage operator's investment or operational decisions. For example, signing a flexibility contract with a local DNO may financially incentivise the user to connect to the

	distribution network, rather than the transmission network. Alternatively, a flexibility contract may influence a storage operator's operational decisions about when to export and import onto the network. Alternatively, if the storage operator has agreed to access rights that allow it to be curtailed, then it may be able to trade the extent to which it is curtailed. The ENA is working to better enable the exchange of access rights as part of their Open Networks programme. If the storage operator valued staying on the network less than another user in the local area, then it could be paid to exchange its curtailment obligations.

Small User illustrative examples

Illustrative example 6 - Domestic customer: household interested in new smart technologies

1.50. In this example, we consider a domestic household interested in new smart appliances and innovative, new products and services.

Desired outcomes

1.51. We want our reforms to bring benefits to consumers by enabling them to benefit from new technologies and services, while keeping bills down, supporting decarbonisation at lowest cost. This may mean individual consumers benefitting from taking action directly, or benefits being realised by suppliers which are shared with a wider range of consumers. We want all consumers to benefit from a smarter, more flexible energy system, even if they are not able to directly take action themselves.

1.52. We want access and charging arrangements to reflect the needs of consumers as appropriate for as essential service, and not lead to inappropriate outcomes or unacceptable impacts for them, particularly those in vulnerable situations. This includes having sufficient information to be able to reasonably predict their future access and charges and avoiding undue affordability pressures, or situations where users, or suppliers/intermediaries on their behalf, are unable to adequately understand arrangements.

Current arrangements

1.53. Most small users **do not currently have a well-defined level of access** to the electricity system. In practice, their access to the system is typically only limited by their fuse size or service cable. Most consumers may never have considered or "chosen" the level of access they require.

1.54. Where a household or small business with less than a 100 amps fuse size installs new electrical equipment in their existing premises, this does not trigger a connection charge providing they do not trigger an upgrade to their existing fuse. Any reinforcement costs associated with their increased usage are paid for through DUoS charges by all customers of the relevant DNO.

1.55. Suppliers face separate DUoS and TNUoS charges on behalf of their customers for their use of the system. Suppliers decide how to pass through these cost signals. For most small users, distribution network charges are a combination of a fixed charge and a volumetric charge, which will soon vary by time-of-use under recent changes.[5] Within each DNO area there are no locational differences in distribution network charges. TNUoS charges for demand consist of a volumetric charge based on usage between 4 and 7 pm.

Relevant options for reform

Area of reform	How potential reforms could impact the user
Improving clarity of access right and access choice	Reforms could introduce the option of households being asked to nominate what level of access they need (for example, in terms of their maximum kW requirement averaged over a half hour period). Those with higher requirements would need to nominate higher levels, with the charges their supplier faced being commensurately higher. They could also choose more flexible access rights in exchange for a bill discount: • **Time profiled access:** The household could profile their level of access over time to better reflect when they want access to the network. For example, if

[5] Households that are half-hourly settled are billed on aggregated actual consumption in each time period. Non-half-hourly settled users are billed based on a generic usage profile that is then applied to each time period.

	the household uses less at peak times than off-peak times it may choose to have lower peak access. • **Non-firm/curtailable access:** The household could agree to their supplier or DNO being able to curtail, or reduce, some of its usage at certain times. This is only likely to be suitable for appliances with smart controls, where users can be flexible about their usage (eg dishwashers, washing machines). If a user exceeded their agreed level of access, their supplier may face additional charges, but arrangements would not permit the supplier to disconnect or de-energise the user as a result of these changes. If the household exceeded their agreed access then they – or their supplier - could face an excess capacity charge, and/or have their access requirement increased automatically. There would be additional elements to reduce the potential risk of the household making choices that unintentionally leave it unable to meet basic needs. This could take the form of limits on access choices, such as not allowing them to choose to restrict their access to the network below a specified threshold.
Wide ranging review of DUoS charges and focused review of TNUoS	Our reforms are likely to lead to greater locational and temporal granularity of network charges. These network charges would be paid by suppliers that decide how to pass this cost to their customers. **More locationally granular charges** may improve signals to the user, or their supplier, about how behaviour can reduce or increase network costs in a specific location. The impact on the household would be dependent on their supplier's offering. For example, the signal may incentivise the supplier to invest in energy-efficiency measures (eg loft insulation or high efficiency light bulbs) for households within a specific location that could reduce the need for network reinforcement in that area. At the same time, the household would benefit from a reduction of their energy consumption and therefore of their bill, especially if they have electric heating. Changes to the **design of transmission or distribution forward-looking charges** could also influence the supplier's offering. For example, stronger time-of-use charges may incentivise the household to install smart technologies such as smart appliances (eg washing-machines and dishwashers), to reduce usage during peak periods (and consequently reducing network charges). In agreement with the customer, these smart appliances may also be managed by suppliers within specified parameters.

	To ensure that arrangements are appropriate for small users, we could also introduce limits on the locational or temporal granularity of charges. For example, we could limit the differences between charges by location, how often these charges vary, or how much notice is given if they do.
Connection boundary	As long as this existing user stays within their existing fuse size, any reforms to the distribution connection boundary would not impact them.
Retail-focused measures	Instead of making changes to the design of network charges and access arrangements, we could rely on retail-focused actions and **principles-based obligations** to ensure that consumers make informed choices about their energy usage (eg requirements for suppliers to undertake effective engagement and provide users with suitable information) and are offered suitable choices (eg proactive engagement to ensure are not making choices that could have a detrimental impact on them). Suppliers would likely have a role in providing tools and guidance to support the household's decision on what access arrangements they need. With the household's consent, suppliers could potentially even make choices on behalf of some consumers. This would need to take into account how the household uses energy, and their ability to be more flexible, including considering any particular circumstances such as customers in vulnerable situations.
Work outside the SCR	As the ESO and DNOs develop routes to **procure flexibility** from distribution-connected resources, the household may be offered payment or bill discounts if they agree to provide demand response services (eg delaying use of a washing machine). This is may require the user to have a smart appliance and would likely be managed automatically by their supplier or a third party (an "aggregator") within agreed parameters. This could be in addition to or an alternative to signals through access and charging arrangements.

Illustrative example 7 - Domestic customer seeking to buy an EV

1.56. In this example, a domestic household is seeking to buy an EV. The domestic customer is connected to a constrained part of the distribution network. The household is keen to identify opportunities to reduce their energy bills.

Desired outcomes

1.57. We want arrangements to facilitate the decarbonisation of the energy system at least total cost, enabling EV uptake while taking into account the impacts on networks and the costs for energy consumers in general. We also want domestic households to be able to obtain access to the electricity network that reflects their needs, including their transport needs, including those in remote areas or with particular needs who may be reliant on their vehicles.

1.58. We want forward-looking charging arrangements to incentivise users, like this domestic household, to charge their EV in a way that it makes better use of existing network capacity, and to reduce the need for reinforcement, while enabling them to adopt this new technology. This might influence the household's decision on where or when to charge their EV. It could also influence the household's decision about whether to discharge electricity back to the system during peak times, using V2G services.

1.59. We do not want access or forward-looking charging arrangements to lead to inappropriate outcomes or unacceptable impacts, particularly for those consumers in vulnerable situations.

Current arrangements

1.60. The first small user illustrative example above describes the current access and forward-looking charges arrangements for domestic users.

Relevant options for reform

Area of reform	How potential reforms could impact the user
Improving clarity of access right and access choice	Our work could better define **small users' access rights** and improve the range of access choices available to small users. Some of these options may be more relevant to this user, for example: • **Time-profiled access**: the domestic user may be willing to accept a cheaper, time-profiled access right. For example, the user may have a higher level of access overnight, so that they can charge their EV overnight avoiding triggering network reinforcement.

	• **Non-firm/curtailable access:** The household could agree to their supplier or DNO being able to curtail, or reduce its EV charging at certain times, subject to agreed conditions. If the household exceeded their agreed access, then they – or their supplier - could face an excess capacity charge, and/or have their access requirement increased automatically. These arrangements would not introduce new grounds for suppliers to disconnect or de-energise consumers. There could be additional elements to reduce the risk of the household making choices that unintentionally leave it unable to meet basic needs. This could take the form of limits on access choice, such as not allowing them to choose access options that would restrict their access to the network below a specified threshold.
Wide ranging review of DUoS charges and focused review of TNUoS charges	Network charges could vary by season or time of day to reflect peak network periods. This could incentivise the domestic user to charge their EVs in **off-peak periods** (eg overnight) when there is more spare capacity on the network. The domestic user may also be able to use **V2G** to help reduce demand during peak periods. Alternatively, network charges could be based on the level of access capacity that the user has chosen (eg time-profiled access). In some locations, charges may be higher to reflect the higher costs associated with using the network in that location. Households in those areas may face a stronger incentive to be flexible with how they charge their EV, which could mean charging more overnight or making more use of EV charging facilities away from their home (such as at their workplace). To protect users being exposed to strong and dynamic price signals for their basic needs, we could consider introducing thresholds below which usage would have weaker time/locational signals. This could target price signals towards usage that does not relate to basic needs at peak times (for some users this could include charging their EVs) and reduce differences between users in different locations.
Connection boundary	The majority of existing domestic users will not be affected by any options to reform the distribution connection boundary. If this user wanted to increase their level of access above their existing fuse size, then moving to a **shallower or shallow connection boundary** could significantly reduce the upfront cost to the domestic user of increasing its level of access, by reducing their contribution to any network reinforcement that this is triggered. The user would still be required to pay for any electricity network assets

	that only they use (eg a larger cable from the street to their house) and may be required to provide a deposit to act as security for any network reinforcement costs that they trigger.
Retail-focused measures	Similarly to the first example, instead of making changes to the design of network charges and access arrangements, we could rely on **principles-based obligations** to ensure that consumers make informed choices about their tariff and are offered suitable choices. Suppliers would likely have a role in providing tools and guidance to support the household's decision on what they needed. With the household's consent, suppliers could potentially make the choice on their behalf. This would need to take into account how the household uses energy, and their ability to be more flexible, including considering any particular circumstances such as customers in vulnerable situations. These network charges would be paid by suppliers, based on their customers' usage. The impact on the household would be dependent on their chosen supplier's offering – for example, the household might be able to choose between an offering that would pass through time-of-use tariffs directly to the customer, versus a flat tariff offering with a discount if they agree that their supplier can manage their EV charging within certain parameters (eg that it needs to be 80% charged by 7am the next day).
Work outside the SCR	As the ESO and DNOs develop their approach to **procuring flexibility** from distribution-connected resources then the household may be offered payment or bill discounts if they agree for their EV to be charged flexibly. This would likely be managed automatically by their supplier or a third party (an "aggregator") within agreed parameters. This could be in addition to or an alternative to signals about when to charge through access and charging arrangements.

Illustrative example 8 - Domestic customer: vulnerable household with electric heating

1.61. In this example, we illustrate the potential impacts of our reforms on a vulnerable household. We focus on an elderly customer that lives in a poorly insulated house with electric heating. The customer lives in a rural area and is not connected to the gas grid. The customer has low income, struggles to pay their energy bills and is relatively disengaged from the energy market.

Desired outcomes

1.62. We want our reforms to help reduce system costs and therefore reduce bills for all consumers. We also want to provide opportunities for individual customers to save on their bills, if they are willing to be flexible about their usage. But we also want other consumers who do not choose to or cannot be more active about their energy usage to also benefit from these reforms.

1.63. We recognise that electricity is an essential service, important for many parts of our economy and society, including for people's comfort and health. Some consumers may be flexible with their demand, particularly in future with new forms of demand, but others will not readily be able to change their time or level of usage without some risk of detriment. We therefore want to ensure that arrangements do not lead to inappropriate outcomes or unacceptable impacts for customers; especially for those in vulnerable situations.

Current arrangements

1.64. The first small user illustrative case study above describes the current access and forward-looking charges arrangements for domestic users.

Relevant options for reform

Area of reform	How potential reforms could impact the user
Improving clarity of access right and access choice	Reforms to access arrangements could involve better defining consumers' access rights in terms of the level of capacity they require. Our reforms could also introduce greater choice of access rights for small users. Improved choice and definition of access rights (eg development of time-profiled access rights) could help support more efficient use and development of the electricity system (as described in the previous illustrative examples). To protect this vulnerable user from inappropriate choices that may cause them detriment, we could limit the access choices available. For example, we could set minimum access thresholds below which the user is unable to reduce their level of access as it may not be appropriate for their circumstances, especially since they rely only on electric heating to warm their home.

	If a user exceeded their agreed level of access, a supplier would not disconnect or de-energise the customer, although we would expect that their supplier may face additional charges. The consumer's access may be increased to a more appropriate level if they repeatedly exceeded their access level.
Wide ranging review of DUoS charges and focused review of TNUoS charges	We intend to consider the potential risk that this type of household may face detriment as a result of these changes, for example through any potential for unexpected and significant bill increases if they use more than expected at peak charge times, or affordability pressures if they are in a higher cost area, should we decide to introduce more granular locational charges. This could be particularly relevant in this example, considering their specific circumstances (ie an elderly user using electric heating in a poorly insulated home). We could introduce limits on the degree of locational or time variation in charges. For example, we could introduce thresholds for usage/access levels below which locational variation in charges is limited. Similarly, strong variations in charges at different times could be limited for usage below a threshold. Any threshold could aim to protect basic usage which may be less flexible from stronger signals. But the situation of this household demonstrates that setting a uniform threshold may be challenging, as they are likely to have high peak electricity consumption to heat their poorly insulated home. This indicates there may be a need to consider scope for different thresholds for different customer groups, for off-gas grid consumers for example.
Connection boundary	Since this customer has an existing connection and is not intending to connect any new appliances, our reforms of the connection boundary are less relevant.
Retail-focused measures	Alternatively, instead of making changes to the design of network charges and access arrangements, we could rely on our regulation of suppliers. Suppliers are subject to **principles-based obligations** under their licence, and have duties with regards to vulnerable customers. We could rely on supply licence obligations, including principles/standards of conduct to provide sufficient protection to this user. Suppliers need to give consideration to this when deciding on their offerings and how best to pass through network cost signals to their customers. We would expect suppliers to ensure the user's choices of access options and tariffs are clearly understood and appropriate for their needs (eg providing additional support and guidance). Suppliers will need to tailor their retail offerings to reflect their users' needs and capability. This could involve the supplier engaging with the user to understand their needs and characteristics and identifying appropriate safeguards for this

	customer, such as offering them a flat retail tariff or undertaking activities to improve the household's energy efficiency to unlock network benefits while reducing the overall household's energy consumption.
Work outside the SCR	If this household was less likely to engage with smart appliances, the development of flexibility procurement markets may be less relevant to this user. We note many vulnerable consumers may also be supported to engage with and benefit from providing flexibility, depending on their individual circumstances.

Illustrative example 9 – Microbusiness customer: small cafe with high energy consumption

1.65. In this illustrative example, we focus on the potential implications for a small café that meets the definition of microbusiness.[6] The cafe has standard business working hours (07:00 – 18:00) and does not have a well-defined level of capacity, but has a relatively high level of consumption due to the kitchen appliances they use. The cafe owner is engaged in their energy use and keen to identify opportunities to reduce their energy bills.

Desired outcomes

1.66. We want users, including microbusinesses, to be able to obtain the network access that meets their needs, while heling to support efficient network development.

1.67. We want the cafe to face cost-reflective forward-looking charges that reflect the incremental costs or benefits it confers on the system. Forward-looking network charges should be simple, transparent and predictable. This should enable the user to make investment decisions (eg whether to invest in smarter, more energy-efficient kitchen appliances) and operational decisions (eg when to use their equipment) based on the charges or wider arrangements (eg flexibility markets).

[6] A Microbusiness is defined in the gas and electricity supply licence as:
A Non-Domestic Customer:
(a) which is a "relevant consumer" (in respect of premises other than domestic premises) for the purposes in article 2(1) of The Gas and Electricity Regulated Providers (Redress Scheme) Order 2008 (S.I. 2008/2268); or
(b) which has an annual consumption of gas of not more than 293,000 kWh
(c) which has an annual consumption of not more than 100,000 kWh electricity

1.68. We want arrangements to support microbusinesses to benefit in the transition to a smarter, more flexible and low carbon energy system. We are considering how to help them engage with and maximise the benefits from those options, and whether adaptations or protections may be needed to avoid potential adverse impacts (such as from unsuitable access or tariff choices).

Current arrangements

1.69. Under the current arrangements, the arrangements for microbusiness are similar to those for domestic users. Most microbusiness customers have no (or limited) choice about their type of access. The current access arrangements are also often not clearly defined.

1.70. Currently, the microbusiness's charges may not be cost-reflective. The customer's DUoS demand charges would be based on a single network model for each DNO region and may include static time-of-use charges that may not reflect peak times for the local network. Demand network charges are the same, regardless of whether the user is located in demand-dominated area and contributing towards additional network costs.

1.71. Under the current TNUoS charging methodology suppliers are charged according to the aggregate demand of their customers during the period 4pm-7pm year-round.[7] However, these critical peak periods may not align with periods of local network constraints in the area where the delivery company is located.

1.72. Suppliers currently face DUoS and TNUoS charges on behalf of the consumers they supply. They have a role in determining whether and how charging signals are passed through to the consumers, combining options into tariffs.

[7] To address a double charging issue when customers elect to migrate to half-hourly settlement, we approved CMP266, under which non-domestic customers in Measurement Class G are charged TNUoS according to the non-half hourly methodology. Although there are exceptions, it is generally expected that a microbusiness customer would fall into Measurement Class G. We recently approved CMP318, which extends the CMP266 solution until 31 March 2023.

Relevant options for reform

Area of reform	How potential reforms could impact the user
Improving clarity of access right and access choice	Reforms could introduce options requiring the cafe to nominate what level of access they need in terms of their maximum kW requirement averaged over a half hour period. Those with higher requirements would need to nominate higher levels, with the charges their supplier faced being commensurately higher. They could also choose more flexible access options in exchange for a bill discount, such as: • **Time-profiled access**: the cafe may be willing to accept a cheaper, non-financially firm access right. For example, the user may be willing to accept a lower level of access when the café is closed (eg 18:00-07:00) and therefore their energy consumption is lower. This would still need to take into account appliances working overnight, such as refrigerators. There could be additional elements to reduce the potential risk of the cafe making choices that unintentionally leave it unable to meet its electricity network access requirements. This could take the form of limits on access choice, such as not allowing them to choose access options that would restrict their access to the network below a specified threshold.
Wide ranging review of DUoS charges and focused review of TNUoS charges	Improved locational charges would improve the signals to the cafe about how their behaviour can increase or reduce network costs and how this is reflected in their bill. The supplier may decide to offer a time-of-use tariff, to allow the customer to benefit from cheaper energy overnight (eg when the cafe is closed and the owner may be operating their bread oven). Alternatively, the microbusiness may be offered a cheaper flat tariff by their supplier, that could then use smart appliances (eg dishwasher) to enable flexible response and unlock benefits for the network. Changes to the transmission and distribution design of forward-looking charges could also influence the design of the supplier's retail tariff. For example, a capacity-based approach could encourage the supplier to take steps to enable the café owner to reduce the level of capacity they required (eg facilitating investing in smart or more energy-efficient kitchen appliances). To ensure that arrangements are appropriate for small users, including microbusinesses, we could introduce limits on the locational or temporal

	granularity of charges. We could limit the how often these charges vary (ie how dynamic network charges are), or how much notice is provided if they do.
Connection boundary	Since the cafe has an existing connection and is not intending to connect any new appliances, our reforms of the connection boundary may be less relevant.
Retail-focused measures	Similarly to the previous examples, instead of making changes to the design of network charges and access arrangements, we could rely on **principles-based obligations** to ensure that consumers make informed choices about their energy usage and are offered suitable choices. However, although microbusinesses face many of the same issues as domestic consumers, given the diversity of their requirements, there may be specific circumstances for small businesses that suppliers will have to consider when engaging with them. For example, the type of activity and the business's working hours will have to be considered. Retail competition driving innovation means we would expect consumers to be presented with different innovative offers, potentially including new technologies, where these could offer benefits. Suppliers would likely have a role in supporting a small business in deciding what level or type of access they need or what would be the most suitable tariff for them. The supplier would need to understand the cafe's energy consumption, how they use energy and their business's energy needs, and assess their ability to be more flexible including whether any technology enablers may be needed (such as batteries or smart appliances) as part of their offering.
Work outside the SCR	The ESO and DNOs are developing approaches to **procuring flexibility** from distribution-connected resources. As a result, in the future this cafe may be offered payment or bill discounts if they agree to be flexible with their usage. This would likely be managed automatically by their supplier or a third party (an "aggregator") within agreed parameters. This could be in addition to, or an alternative to, signals through access and charging arrangements.