NETWORKS

Review of large energy users connection policy

ESB Networks Response to CRU/2024001

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Contents

1. Introduction

The twin transitions of digitalisation and decarbonisation underpin the prevailing Irish social, economic and environmental development policies, and are critical to the future of our society. Delivering on them is the defining challenge faced by the Irish energy sector today. As such, ESB Networks welcomes consultation CRU/2024/001 on the CRU Review of Large Energy Users (LEU) Connection Policy.

ESB Networks makes this response on behalf of both ESB Networks DAC, in its licensed capacity as Distribution System Operator (DSO), and on behalf of the ring-fenced transmission system owner (TAO) and distribution system owner (DAO) businesses (collectively referred to as 'ESB Networks' in this response).

CRU/2024/001 sets out a clear objective that the Irish energy system is to support the industries underpinning Ireland's digital economy in a manner that:

- respects the constraints of the Climate Action and Low Carbon Development Act 2015 (as amended), including sectoral emissions ceilings; and,
- efficiently allocates network and generation resources during a challenging period as we adapt the energy system at pace to provide the capacity and resilience needed to support rapid growth in housing, and the electrification of heat and transport.

ESB Networks' purpose, is and has always been to provide universal affordable access to electricity, supporting sustainable social and economic development in communities and business across Ireland. In our function as DSO, we do this by operating, developing and maintaining the distribution system in an economical, efficient and safe manner, and as licensed TAO, ESB Networks supports EirGrid in doing the same. As DSO, ESB Networks is responsible for connecting users to the system. This is reflected in our legal and licensed mandates, including, in the case of the DSO, to connect customers to the electricity system without discrimination while taking into account regulatory direction.

Serving large energy users, as opposed to smaller electricity customers, presents particularly acute challenges. This is for two main reasons:

1. Large energy users are inherently larger than the uses for which the underlying network has been developed. As such, typically it is necessary to extend or increase the capacity of the electricity network to connect any individual large energy user. In contrast, an individual small or medium customer's demand is likely to be in proportion with any existing spare capacity on the system;
2. Large energy users can connect and ramp up their demand rapidly relative to the underlying rate of organic demand growth (associated with all other customers). This means that the methods and approaches which underpin efficient network development are challenged when facing concentrated LEU connections.

Notwithstanding this, ESB Networks has had considerable success in supporting LEU growth in Ireland to date. Ireland's industrial development policies have consistently targeted high technology sectors including information and communications technology and pharmaceutical/health sciences, driving the connection of many significant LEU facilities in these sectors. Most recently, data centres are one category of large energy user which have rapidly grown in Ireland over the past two decades. Since the early 2000s, ESB Networks has connected over 440 MW of data centre customers to the

Irish distribution system in our role as DSO, and approximately 2000 MW[1] of data centre customers to the Irish transmission system, in our role as TAO.

We join the CRU in recognising that Ireland is going through a period of transformative change, characterised by rapid digitalisation and decarbonisation. This transformation involves significant and rapid growth in demand. Digitalisation demands both infrastructures such as data centres, but it also drives increases in the electricity demand across Irish society, with our health, education and business facilities increasingly reliant on computing facilities (and the associated cooling and computing energy demands).

This is occurring at the same time as demand for connections for renewable generation continues to grow; more than 6GW of renewables is already connected to the electricity system and, in line with CAP, this is expected to grow to 22GW by 2030. Added to this is increased electrification across society such as electric vehicle charging infrastructure and electric heating facilities, all of which places significant demands on the electricity system. As per ESB Networks' strategy, Networks for Net Zero[2], over the period between now and the end of this decade, we expect to connect:

- Charging capacity for up to one million electric vehicles, including 800 MW of public charging infrastructure capacity,
- 1.1 TWh of industrial heat demand, across characteristic LEU sectors including food and drink processing and pharmaceuticals, as per the National Heat Study delivered by the Sustainable Energy Authority of Ireland.

The result is that the demand for electricity infrastructure, and its rate of growth, is greater than has ever previously been seen in Ireland.

ESB Networks, EirGrid and the CRU have encountered increasing challenges accommodating the rapid growth in large energy users' demand. Notwithstanding these challenges, we are absolutely committed to meeting our core purpose, and thus we welcome innovative approaches which help to address the need for capacity and support the connection of new and growing electricity demand. As such, we support the CRU's objective, to introduce connections criteria for new large energy user demand, which seek to provide connections to the electricity system while respecting the need for secure and efficient network development and simultaneously having regard to emission constraints.

Large energy users accentuate the challenge set out in ESB Networks' 'Electricity Distribution Network Capacity Pathways[3]' publication as regards network capacity, and as identified by the CRU, MAREI and others as regards the carbon emissions intensity of electricity consumed. However large energy users also have the potential to contribute to the solutions. For example:

- Large energy users' electrification of heating and cooling processes helps transition the energy associated with these processes from fossil fuels to electricity;
- Large energy users' waste heat can support the operation of distributed heat pumps in district heating schemes, reducing the power and energy demands of individual heat pumps and thus the infrastructure and energy they consume;

[1] EirGrid SONI GCS 2023-2032
[2] networks-for-net-zero-strategy-document.pdf (esbnetworks.ie)
[3] ELECTRICITY DISTRIBUTION NETWORK CAPACITY PATHWAYS – CONSULTATION REPORT

- Large energy users' investment in local or behind the meter storage and low carbon generation can contribute to the capacity available for ESB Networks to efficiently manage the local network and serve other customers.

As set out above, ESB Networks' primary role is to connect electricity demand and generation, and efficiently develop the network to ensure that all electricity customers have access to secure, resilient energy. Through the PR5 contract and in line with the provisions of the Clean Energy Package, we are introducing demand flexibility (including as provided by storage or other energy technologies) as an innovative technical solution which complements network reinforcement, within our overall network development strategy.

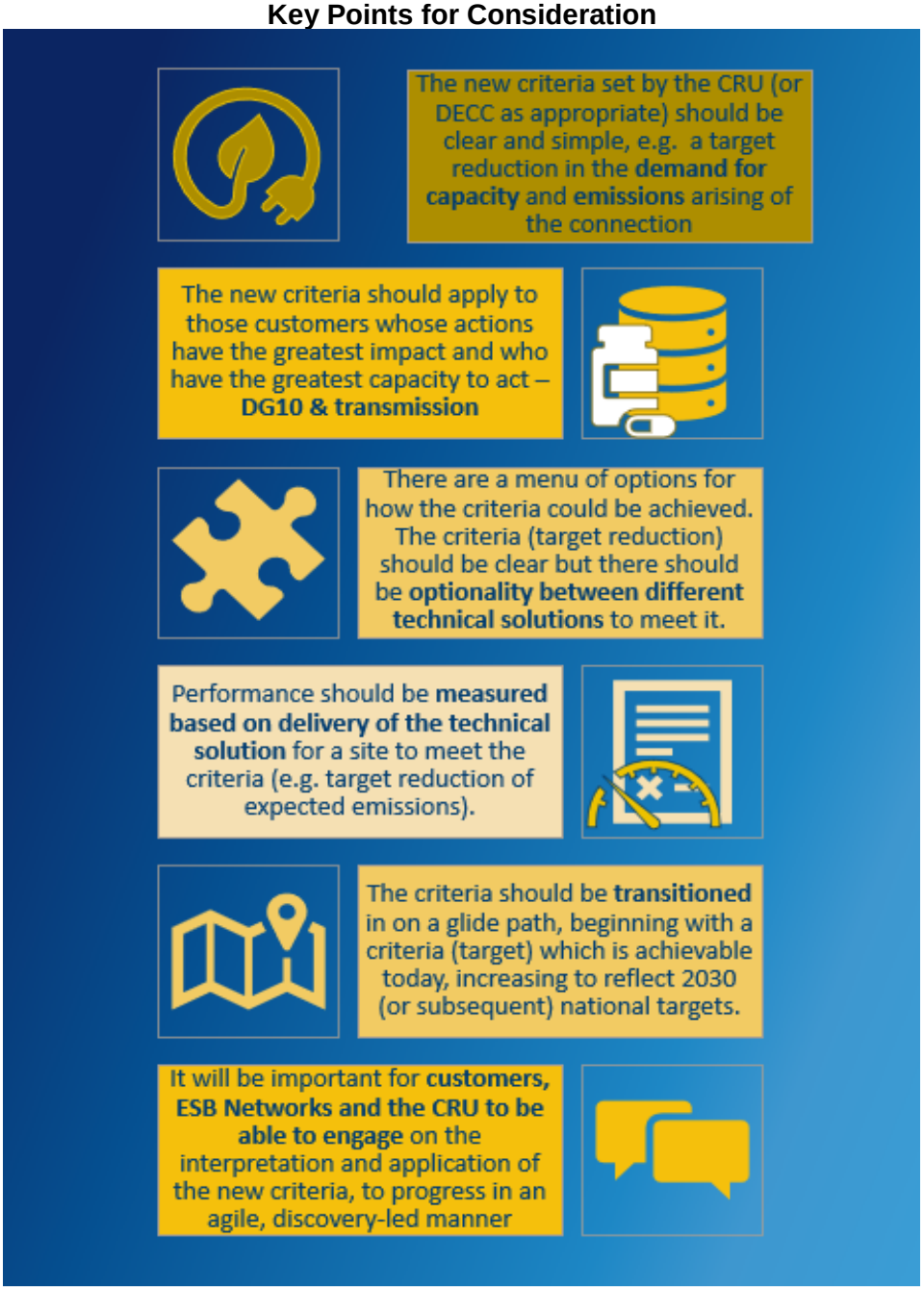
Since the publication of the Climate Action Plan 2023, the initiation of the National Energy Demand Strategy, and CRU Direction (CRU/21/124)[4], we have had an increasing awareness of and focus on the carbon emissions intensity of electricity consumed. We are developing greater expertise and capability to model how this can be influenced by factors including location on the system, time, and the use of demand flexibility and storage. Over the past year, we have embraced each opportunity to share these insights and collaborate with other organisations who can help further this critical area of activity.

We are striving to design products, services and policies which seek to abate or avoid additional carbon emissions associated with electricity demand. However, if and to the extent it is proposed that ESB Networks would take on any mandatory role in this regard, mindful of our existing obligations under various licence conditions and domestic and European law, we consider that clarity of this role in both the legal and regulatory framework would be essential, and that additional legislation is likely to be required to establish a clear mandate.

ESB Networks has embraced the challenge created by successive Climate Action Plans, and we are excited about the opportunity to implement new solutions which better meet customer and societal needs. Until such time as a clear legal and regulatory framework for any more substantive role is in place, we continue to innovate and engage with customers on how best to do this and look forward to working in partnership with the CRU to build on this. In the graphic below we have set out the key points that we believe should be considered with further detail throughout the document.

[4] CRU21124-CRU-Direction-to-the-System-Operators-related-to-Data-Centre-grid-connection-.pdf (divio-media.com)

Key Points for Consideration



2. Summary of Key Points

In the following sections ESB Networks provides responses to the individual questions posed in CRU/2024/001, for ease of review. However, we consider it important at this time to draw attention to our core response, which sets out solutions, key challenges, and some of the key actions that would be needed to begin to progress.

Addressing the need for additional capacity to serve all electricity customers, which is particularly acute as regards to large energy users given their scale and pace of ramping demand, is a complex technical and societal challenge. There are **solutions available today**. Some of these solutions can begin to ease the immediate need to connect customers, and other solutions can efficiently provide the secure capacity needed in the long term. There is a willingness to invest both on the part of ESB Networks and of the large energy users seeking to connect. However, there is no "one size fits all" solution, either for the large energy users, for the electricity system or for the communities local to large energy users who may benefit from the energy resources brought by them.

As such, in this response we set out that:

- **The new developments to LEU connections policy should apply to those customers whose actions have the greatest impact and who have the greatest capacity to act** in this context, we propose that it should apply to DG10 and transmission connected customers. Based on what is learned through this first step, and sectoral / customer impact analysis, elements of the policy could be extended to smaller large energy users.
- **There are solutions** for most cases. To leverage these solutions as part of the connections process, in 2024 we have commenced the development of new flexible (initially timed) connection products, following intensive customer engagement in 2023. At a high level, these connection products would enable and incentivise the following customer-led solutions (to complement any network reinforcement required on an interim or permanent basis):
    - The large energy user connecting **storage** either behind their meter or locally on the network, and operating this storage as per DSO flexibility schedules (including simple "timed" schedules), stacked with their potential SEM participation;
    - The large energy user connecting **controllable low carbon generation** behind their meter (for example gas generation matched by biomethane or hydrogen production, or a combination of renewable technologies and storage) and operating this generation as per DSO flexibility schedules stacked with their potential SEM participation;
    - The large energy user providing **demand flexibility**, and operating this storage as per DSO flexibility schedules, stacked with their potential SEM participation;
    - The large energy user or system operator seeking to **co-locate** any one or a combination of the above technologies in a network location where the large energy user is connecting;
    - The large energy user choosing to **co-locate** with existing or planned generation and/or storage facilities, in the preferred location of those generation and/or storage facilities (noting that co-location with renewables in itself does not remove the network capacity challenge, it just moves it to that alternative location).

- **To progress these solutions as part of connections policy, we would need clear, simple criteria, set by the CRU.** For example, a criteria could be for a target reduction in the network demand and the carbon intensity of the electricity consumed by a new demand applying to connect. There are a range of technical solutions which could be used to meet this kind of simple, overarching criteria, for example co-location with renewable generation, behind the meter generation or storage, participating in demand flexibility, power purchase agreements etc. However the criteria should not be prescriptive as regards the specific technical solutions adopted (i.e., prescriptive criteria with respect to each of location, behind the meter resources, etc). This approach - setting clear overarching criteria which can be met using a range of different technical solutions including location, behind the meter resources and demand flexibility – would support progress without constraining our collective ability to innovate and progress the best solutions on a case by case basis.
- **Given the innovative approaches involved, and the potential to leverage the benefits of immature solutions,** we believe it will be important for customers, ESB Networks and the CRU to be able to engage on the interpretation and application of the new criteria, so that effective solutions can be progressed in an agile, discovery-led manner.
- As a mature distribution system operator and party to a range of technical working groups including the Energy Networks Association and Cigre working groups, ESB Networks operates to robust and well accepted technical analyses to characterise the network capacity available for connections (and which are being adapted to provide for flexible/timed connections). However, for our customers, and ESB Networks to have clarity on which solutions meet any carbon intensity criteria set, it is likely that a robust and consistent framework for measuring the emissions associated with electricity consumption will be needed. This is identified in the CRU's questions regarding how CPPAs, location, time and other factors are accounted for in emissions calculations associated with connections. **ESB Networks proposes that rather than creating a standalone framework, the enhanced LEU emissions reporting framework being developed as per CAP 2023 (EL/24/22)** be adopted to measure the carbon intensity of a customer's demand. We join other organisations and public sector bodies in our view that this framework and its application will likely need statutory footing.
- A clear legal and regulatory basis is required for ESB Networks as DSO (including in collaboration with other system operators) to apply the criteria in how we assess connection applications and the connection methods and provisions introduced. This will need to be considered in the light of more developed proposals, but may require changes to legislation and/or licences in addition to connection policy, connection agreements, and potentially other regulated documents, to allow the DSO to perform any proposed role, whether that is integration of expected carbon intensity of demand into the connection process, the measurement of the carbon intensity of the energy consumed subsequently, or actions to enforce any proposed limits on the carbon intensity of demand through the connection agreement.
- **This is a cross sectoral challenge, and the best solutions are cross sectoral solutions.** Plans led to meet large energy users' electricity demands in isolation from their demand for (and the potential solutions provided by) gas, water, telecommunications, transport and human resources are unlikely to succeed. The National Energy Demand Strategy has begun to accelerate dialogue and collaboration between different system operators (gas, electricity), government departments (energy, enterprise, housing, agriculture) and agencies (SEAI, IDA and Enterprise Ireland). To ensure this translates into action at the right pace and scale, it will need ongoing regulatory, structural and cross departmental support. This may involve, inter alia, consistency between regulatory treatments, government policies, strategies and support mechanisms, and potential legislative development.

- Although there are solutions available today, many of them are innovative and immature in nature. They may involve new technologies, new investments for both system operator and large energy user, and new operational, regulatory and commercial constructs. As such, we would welcome a **transitional approach**, by which we mean that the CRU provides certainty and proportionality by setting:
    - **The definition** of the criteria up front, to provide regulatory certainty. For example, the CRU might define the criteria as a requirement for some % of a new demand application to be subject to carbon intensity / capacity solutions.
    - **An initial criteria** (i.e., a specific %) applicable from 2024 which reflects what is achievable today, considering both customer and system operator capabilities, the technological solutions available etc.
    - **A glide path** for the criteria level to increase for new demand applications year on year, towards the CRU's ultimate target level for additional demand connecting over the period between now and 2030 (or whatever time horizon the CRU deems appropriate).

3. ESB Networks' Response to Consultation Questions

Category of LEU to which this policy applies (Questions 1, 2)

ESB Networks remains of the view that the proposed developments should apply to DG10 and transmission connected customers ("extra large energy users") initially. It could be applied on a phased basis to smaller large energy users (DG7 – DG9), pending robust analysis of the potential impact on these customers, as well as the learnings from its initial application to XLEUs and may need to be modified accordingly.

ESB Networks has commenced activity to analyse and categorise business customers based on their MW, MWh, demand profile, economic activity and business operations, to inform future flexibility market developments. As yet this work is immature, but already it is identifying that the impact of new measures on LEUs operating in different sectors would likely vary significantly and in a manner that cannot readily be identified by considering their MW, MWh or profile in isolation from qualitative knowledge of their business operations and economic model. Given the high volume of customers which meet the definition of LEU, it will take time to complete the analysis needed to avoid the risk of unintended economic or energy consumption consequences.

In contrast, extra large energy users represent a small number of companies operating in an even smaller span of sectors. They typically have the financial resilience to accommodate change more readily than smaller businesses, and the human resources to optimize the technical and commercial solutions available to them to meet new criteria. Furthermore, by influencing the decisions of this small number of larger energy consumers, substantial volumes of change can be influenced through a relatively small number of connections.

Ultimately, however, it is critical that the policy can be applied in a clear, consistent, and transparent manner, based on clearly defined characteristics of the connecting party.

Finally, to the extent that the policy applies to extra large energy users, we anticipate that this policy will supersede the existing data centre direction (Decision CRU/21/24) ("Data Centre Direction"). However, we also anticipate that the Data Centre Direction would continue to apply to smaller data centre connecting as other DUoS Groups. As such, it will be important that provisions of the new connections policy are at least as readily enforceable and consistent with (albeit potentially exceeding) the existing data centre direction. This is important so as to avoid a situation where smaller data centres [are unfairly prejudiced or might be in a position to] seek to connect at a higher voltage to avoid the conditions which currently apply. In any development of the policy for LEUs, it would be important both for the system operators and for industry that CRU makes clear what are the implications for/interactions with the existing Data Centre Direction.

Transition period (Questions 3 - 6)

As set out above, ESB Networks supports a transitional period. By this we mean that the provisions (criteria or requirements) that apply from 2024 might be set at a more achievable level than those that should apply in later years.

Although there are solutions available today, many of them are innovative and immature in nature. They may involve new technologies, new investments for both system operator and large energy user, and new operational, regulatory and commercial constructs. We suggest that a balanced approach providing both certainty and proportionality would be to set the following up front:

- The definition of the criteria, to provide regulatory certainty. For example, the CRU might define the criteria as a requirement for some % of a new demand applications to be subject to carbon intensity / capacity solutions.

- An initial criteria (i.e. a specific %) applicable from 2024 which reflects what is achievable today, considering both customer and system operator capabilities, the technological solutions available today etc.
- A glide path for the criteria level to increase for new demand applications year on year, towards the CRU's ultimate target level for additional demand connecting over the period between now and 2030 (or any subsequent horizon the CRU deems appropriate).

In terms of the timing of this transition (for example, when increased requirements are triggered) we propose that it be aligned with the timing of related requirements in the Climate Action Plan. For example, the Climate Action Plan sets a national target for 15% of demand flexibility in 2025 (which can be met using the same range of technological solutions set out by ESB Networks in this response) and 20% in 2030. The Climate Action Plan also sets out the intention that larger energy users would make relatively larger contributions to achieving these targets. As such, it might be appropriate that the initial criteria are in line with the 15-20% target and glide towards a 20%-30% value by 2030.

We propose that it will be important to maintain optionality between different technical solutions which can be used to meet either the initial criteria or subsequent criteria along a glide path. The enhanced emissions measurement framework under development as per the Climate Action Plan action EL/24/22 is intended to account over time for the carbon intensity of demand impact of a range of solutions including behind the meter generation or storage, location, time of use and power purchase agreements, on a consistent basis. To achieve initial criteria in a timely and efficient manner, respecting individual customers constraints (for example, space on site, business operations) this optionality should be leveraged. Similarly, to achieve incremental levels of challenge along a glide path, it is likely that some large energy users will need to add additional solutions or measures over time.

We note that to the extent that a glide path involves the provisions that apply to a given customer changing over time, compliance measurement and enforcement will require greater levels of activity and resourcing. This would need to be accounted for in PR6 resourcing and allowance decisions. Furthermore, given the high levels of employment in the Irish economy at this time, and the high resourcing requirements needed across the energy sector (including in ESB Networks and CRU) to support the energy transition, considerations should be given to whether this is the most effective allocation of resources.

Measuring performance (Questions 7-14)

In order for ESB Networks to implement any proposed criteria as conditions for connection, or ongoing conditions for compliance with the Connection Agreement, these criteria will need to be set in a clear manner by CRU (potentially in conjunction with the Department). We envisage that review will be required to ensure that CRU has the requisite statutory vires to set such criteria. ESB Networks' role would be to apply these criteria and assess customers' expected performance relative to criteria as part of the connections process.

We consider it appropriate that the criteria might be set at a relatively high level both for the glide path and any enduring criteria, to allow the appropriate degree of flexibility in terms of *how* the targets (in respect of both network capacity and emissions) may be achieved. This does not mean that the criteria should be in any way vague or uncertain, rather that if clear, overarching requirements are set, it may not be necessary to prescriptively pre-determine how a customer will meet those targets, as being overly prescriptive in this regard could inhibit innovation. The CRU should also specify the assumptions that are to be applied by the system operators in measuring customer compliance, to ensure consistency of these assumptions.

In relation to any conditionality on emissions for the purposes of the connections process, it is important that there is a clear distinction between what is being measured for the purposes of customer compliance, as compared with actual emissions. In ESB Networks' view, what the CRU would be setting is targeted emission reduction levels, to be measured by reference to verifiable, committed customer actions. The system operators would be enforcing compliance by reference to these verifiable actions, rather than actual carbon intensity of the customer's demand (see further below commentary on actual carbon intensity).

So, measuring compliance with connection conditions should be done on the basis of measuring whether committed actions were taken, as opposed to being based on measured carbon intensity of demand subsequently. This is because the basis of the connection agreement is likely to be:

- Modelled / forecast carbon intensity of electricity demand based on a range of standard assumptions established by the CRU about prevailing demand and generation conditions, many of which are external to the LEU and cannot be perfectly predicted;

- Modelled / forecast carbon intensity impact of additional measures (for example storage, colocation, installation of generation, demand flexibility).

There are two reasons why the most valid means of measuring performance is to measure compliance with the additional measures which were committed. Firstly, the assumptions used to model both the expected carbon intensity cannot be recreated in the real world. As such, the measured carbon intensity performance will depend significantly on factors which may differ from point in time connections studies, and are outside the LEU's control. Secondly, the carbon intensity of a site's demand, with and without the committed additional measures, are counterfactuals only one of which will ever have been realised. It is not reasonable to measure performance based on comparing a measured counterfactual with a point-in-time modelled / forecast baseline.

Beyond this point, we agree that the methodology applied for carbon intensity / emissions modelling and measurement will need to account, *inter alia,* for guarantees of origin, locational and temporal coincidence, time granularity and the associated glide path, self reporting, the requirement for indigenous resources and storage. ESB Networks proposes that rather than creating a standalone framework, the enhanced LEU emissions reporting framework being developed for the purposes of CAP 2023 (EL/24/22) should be adopted for the purposes of connection policy also. ESB Networks' understanding, based on the development activity undertaken to date, and led by the SEAI, is that all of the factors set out above will be considered in the development of this framework. Like the proposed connections policy, we anticipate that the introduction of this framework will be on a phased basis, initially adopting more achievable approaches (for example longer time intervals) and progressing over time (for example towards real time measurement).

To the extent that these requirements are to be incorporated into connection agreements, it is appropriate that the relevant system operator would be responsible for monitoring and enforcement. It will be important that appropriate measures supporting this are provided for in updated connection agreements and approved by the CRU, along with any associated policies, licence conditions and potentially statutory provisions. It would also be important that it is clear there is a dispute resolution process applicable in respect of enforcement of the new policy, both at the connection stage, and for enforcement during the lifetime of the connection agreement. In this regard, it would be helpful to ensure the route for disputes is clear under any new regulatory framework and policy (e.g. by clarifying that Section 34 of the Electricity regulation Act 1999 as amended applies to disputes relating to the enforcement of requirements arising of the new criteria).

The development of this policy will require close consultation with the system operators and with industry. In addition, given that this will be a very new framework, it would be worth considering how the system operators and the CRU will work together [with industry] during the early stages of implementation to ensure as smooth a transition as possible and to benefit from shared learnings as this develops.

As regards the task of measuring actual emission levels (e.g. ex-post) , this is not an appropriate role for a DSO, but we are engaging with the SEAI as part of the steering group for the emissions measurement framework, and committed to leading the initial implementation of this as set out in the Climate Action Plan. We understand that regardless of where the ultimate responsibilities lie, ESB Networks will have a central role in the provision of data to support this activity. This will be reflected in ESB Networks' PR6 submissions as greater clarity becomes available, and will require the development of the requisite technology and expertise. Although it is beyond the scope of this consultation (to the extent that it is independent of measuring compliance with connections criteria), we note that any party undertaking this activity will likely depend on the introduction of a legal basis for undertaking this activity and mandating the participation of the relevant customers. Considerations concerning the sharing of data will also need to be considered as part of the implementation of the in-development emissions measurement framework.

Location of LEUs (Questions 15 – 20)

ESB Networks would not support a standalone mandatory requirement for new LEUs to be connected close to areas of renewable generation and/or storage or within energy parks. While we believe that co-location with existing or planned renewable generation, and/or the development of energy parks may offer a sustainable and economic solution for some large energy users, it will also create new infrastructural challenges and will not provide a solution for many other large energy users.

Large energy users operate in a broad range of sectors including ICT, chemicals, pharmaceutical, food and drink processing, advanced dairy processing, amongst others. Each of these sectors and businesses have specific requirements in terms of human resources, transport infrastructure, gas, electricity, heating, cooling, telecommunications infrastructure, proximity to supply chain and raw materials (including agricultural produce). Even within industries, requirements may vary. For example, whereas some forms of artificial intelligence (AI) activity will be conducive to development and operation in locations which are remote from the Dublin metro fibre network, other AI activities will require connection to this network.

In the absence of alternative solutions with the same emissions and capacity impact, mandating co-location on this basis might be necessary. However, on the basis that there are a range of different technological solutions which should meet criteria set on the basis of overarching emissions or capacity, we would not support a standalone mandatory requirement with respect to the location of LEUs. In this context, we note that the enhanced emissions reporting framework is expected to measure the impact of locational proximity to renewables in a robust and consistent manner. This should provide a strong signal for LEUs to choose between co-location or other measures with the same impact, on a technology neutral basis.

To the greatest extent possible we would support the introduction of overarching requirements which minimise the need for exemptions for a given customer type. Any provision for exemptions would require careful consideration to minimise the risk of discrimination.

To the extent that any locational requirements are however introduced, we would urge that they are introduced in a manner that accounts for other infrastructural impacts. For example, if a location is

favoured, it will be important that the impact on local water infrastructure, gas infrastructure, housing, health and educational infrastructure (for direct and ancillary workers), transport infrastructure, and electricity network infrastructure are considered in a coordinated manner. Cognisant of this, we welcome recent developments both within and in parallel with the National Energy Demand Strategy to bring together representatives of diverse agencies and government departments to begin to consider this issue. We note that many of the broader impacts and requirements associated with mandating specific locations are beyond the remit of either ESB Networks or the CRU, and thus warrant broad consultation and engagement, and potentially additional legal, structural and budgetary developments.

Non-firm demand connections (Questions 21 – 27)

ESB Networks is working to deliver new connections solutions, subject to CRU approval, which would involve the connecting customer or potentially other customers in a given location committing to operating on a timed or flexible basis. In effect, this means that new connections would be physically "non firm".

There are a range of ways that a non-firm connection of this nature could be offered, including:

- The development of standalone non-firm connection offers which mandates that a portion of the customers' demand is flexible, timed or interruptible;
- The provision of standard connection offers contingent on the customer signing a separate flexibility services contract for a portion of the customers' demand is flexible, timed or interruptible.

We propose that at this point in time no individual contractual construct (two examples of which are provided above) be selected, but that the principle of introducing non-firm connections be introduced and the contractual construct developed over the course of 2024. We note that ESB Networks has commenced this activity as part of our committed action to develop flexible demand connections as part of our Flexibility Multiyear Plan 2024 – 2028.

The portion of demand that should be non-firm might be determined by network capacity, in which case the right answer will vary significantly by location, or some broader measure for example emissions, in which case the right answer will vary as a function of the emissions measurement framework. Rather than introducing a fixed portion of demand that should be non-firm, we would support an approach that is based on applying an overarching emissions or capacity criterion to establish the right answer on a case by case basis. The level of this criterion could be linked to national targets with respect to demand flexibility (as set out earlier in this response).

Regardless of the contractual construct employed, it is important to note that there is a difference between physical firmness and contractual firmness. Our understanding that physical firmness is not the CRU's preferred policy in all instances, as per the PR5 objective of leveraging non wires alternatives and considering network and flexibility solutions on an equal basis. We recognise that there are certain locations and conditions where enduring flexible arrangements may offer the right economic and technical solution in the longer term, whereas in many locations the most economic and technically optimal solution will be network reinforcement.

Notwithstanding this, from a customer perspective, it may prove important to provide commercial firmness i.e., a guarantee that whether it is provided using wires or alternatives including storage or local demand flexibility, the customers' full demand will be supported by the system operator on an enduring basis. We are supportive and look forward to engaging in an open and progressive dialogue with the CRU and other organisations over the coming months on this issue.

On-site generation and storage, demand flexibility (Questions 28 – 36)

As set out previously in this response, rather than prescriptive criteria with regard to individual issues like location, behind the meter generation or storage, demand flexibility etc, one or two overarching criteria, for example a % of demand which must be covered by network/security/emissions solutions would support progress without constraining our collective ability to innovate and progress the best solutions on a case-by-case basis.

Solutions such as storage, demand flexibility and behind the meter generation can in many instances be interchangeable in terms of their system impact, however some will be more or less suitable to given customers depending on their cost, practical constraints (for example site availability) and interaction with their business operations.

We would support the adoption of the enhanced emissions measurement framework as per CAP action EL/24/22 to determine whether the requirement is met and to compare different options for how it might be met. We believe that this is the best way of identifying the optimal solutions from the perspective of the customer, the electricity system and other customers in the community local to where a large energy user connects.

Notwithstanding this, we note that ESB Networks believes there is significant potential to stimulate the production of domestic renewable energy (for example biomethane) by promoting the role of domestic renewable energy in meeting large energy users' emissions or connection requirements. Furthermore, ESB Networks is strongly committed to the role of demand flexibility in supporting electricity and energy system operation, and increasing renewables self-consumption. Finally, we note that ESB Networks is in the process of introducing and piloting flexibility services, flexible connections and timed connections (where a "timed" connection is effectively a simple form of flexible connection).

Energy efficiency (Question 37 – 39)

ESB Networks is strongly supportive of schemes whereby waste heat from large energy users is used to support the operation of local district heating schemes. We are increasingly aware of the potential for this, including as part of fifth generation district heating whereby distributed heat pumps (in homes and businesses) operate within a scheme also supplied by waste heat. We believe that there is significant potential for this to enable both energy efficiency and heating demand flexibility, and would welcome the opportunity to collaborate with large energy users, energy companies and other organisations seeking to trial or introduce schemes of this nature.

Gas (Questions 40 – 46)

As set out in ESB Networks' response to the National Biomethane Strategy consultation, biomethane production and usage can play an important role in helping Ireland progress towards net-zero emissions. It can have a central role to help decarbonise those sectors of our economy whose energy related emissions are hard to abate. In addition, its production offers a secure and sustainable future activity for Ireland's agricultural economy.

Through our work to deliver demand flexibility in partnership with the CRU, government departments, and stakeholders from across our economy, we have become increasingly aware of the need for cross sectoral solutions. Demand flexibility can support the development of secure, low carbon electricity, gas, heat, transport and water sectors. To make this a reality, it is critical that we consider these sectors and the challenges they face together, not in isolation.

Throughout 2023, ESB Networks worked actively with a number of the largest LEUs operating in Ireland to design products to enable them to flex up to 20% of their electricity demand based on local

electricity system conditions. Through this work it was identified that a solution to sourcing zero carbon LEU demand flexibility today involves LEUs providing localised electricity demand flexibility using behind the meter gas generation, and matching every unit used for this purpose with a PPA for domestic biomethane injections.

One of the key benefits of this approach is that whereas some demand flexibility solutions (e.g., changes to heating, cooling and computing processes) are only viable in certain sectoral contexts, the proposed biomethane based solution is viable for applications in other hard to decarbonise LEU sectors, including for example the pharmaceutical sector.

Furthermore, we believe that putting the approach set out above in place has the potential to benefit the Irish biomethane sector, by stimulating a domestic market for the production and usage of biomethane more quickly and cost effectively than might otherwise be achieved. To demonstrate this, we plan to progress a lighthouse project of scale, to establish the role that XLEU demand can play in accelerating the production and sustainable use of biomethane in Ireland.

As set out in the Draft National Biomethane Strategy "*Sustainable Biomethane production volumes will always be limited by the availability of sustainable feedstocks. It is critical that biomethane resources are principally used in sectors where no alternative decarbonisation options exist*." This is currently the case for a portion of XLEU energy demand. However, infrastructure development and technological advances over the coming decade, in particular as regards to green hydrogen production, are expected to address these concerns in the longer term.

We understand that it is important to establish whether there is sufficient sustainable biomethane generation capacity in Ireland to support the range of different energy uses which are hard to decarbonise. We would defer to the Sustainable Energy Authority of Ireland (SEAI) and Gas Networks Ireland (GNI) estimates of this, noting that the SEAI and GNI estimates give a range from 5.9 TWh to 10+ TWh of gas production per annum. As regards LEU potential demand relative to this, we can offer a number of observations:

- Even at a high level of LEU uptake and very frequent (near daily) dispatch for demand flexibility purposes, we expect that the maximum LEU demand for biomethane for the purposes of demand flexibility would come to less than the lower end estimate of annual biomethane production set out above.
- Based on our engagement with XLEUs to date, we have reasonable confidence that whilst in the short term biomethane is viewed as a solution, in a 2030+ timeframe, these customers expect to transition to green hydrogen. It is our understanding that at least one of these companies is in the early stages of hydrogen trials, and do not believe that XLEU readiness will be a constraining factor to the mainstream adoption of hydrogen as a fuel source used for either backup power or electricity demand flexibility purposes. Additionally, we note that as identified by MAREI, later in this decade and into the coming decade, increasing portions of LEU demand can be met using excess renewable electricity generation, thus the need to leverage biomethane as a solution should naturally decrease.
- In the shorter term, based on months' of engagement with parties including the SEAI, GNI, the IDA and the Department of Enterprise, Trade and Employment, we believe that rather than competing with other energy users for supplies of biomethane, the revenue certainty (and by extension financeability) offered by LEUs to prospective biomethane producers would more likely stimulate biomethane production sooner and at a lower cost to other energy users than would otherwise be the case.

This means that there is a low risk of XLEU demand creating excess competition for limited sources of biomethane in the long term; whilst in the short term, this demand could stimulate biomethane

production. As a solution that can be put in place today, this could reduce the need otherwise for public subsidies to accelerate biomethane production, or the associated costs being concentrated on smaller customers with heating needs.

At a high level, the proposed approach is as follows:

- XLEUs are seeking to abate the carbon intensity of their electricity demand and support the secure operation of the local electricity system by shifting their electricity demand away from peak periods. To achieve the emissions reduction proposed, either the fuel consumed to shift electricity demand should be from a low or zero carbon source; or demand is shifted to periods of excess renewable electricity generation.
- A technology that is currently available and meets both the customer's and the local system needs in terms of capacity, and carbon emissions (pending the fuel sourcing arrangements), is behind-the-meter gas generation for use at specific times of demand shifting. Other solutions (including network reinforcement, process shifting, and green hydrogen production) will be available in future years (i.e., later this decade and post 2030).
- Power Purchase Agreements (PPAs) are an established mechanism to provide energy production projects with the revenue certainty needed to secure debt finance. It is proposed that LEUs participating in demand flexibility set out above would match all units of gas consumed with PPAs for domestically produced biomethane.
- This solution also offers the Irish biomethane production and usage sectors short to medium term benefits that would likely be more costly or slower to materialise otherwise. Without this revenue certainty, Ireland's ample pipeline of biomethane production – and potentially important activity for our agricultural economy – is not currently successfully securing the debt needed to deliver production projects. Alternative means of providing this revenue certainty would likely involve greater degrees of public intervention and cost socialisation (for example subsidies or other measures which result in cost socialisation amongst all gas customers).
- To test the proposed approach set out above, ESB Networks proposes to immediately progress a lighthouse project, of appropriate scale, with a single XLEU. This would help all parties establish the necessary contractual framework, and demonstrate the benefits to Irish biomethane producers, users, and XLEUs set out above.

The running profile involved in a scheme as set out above would likely involve the demand flexibility (supported by biomethane) being dispatched frequently – potentially near daily throughout extended periods of the year. This reflects the growing need for habitual, rather than infrequent, demand flexibility, to meaningfully shift demand patterns on the electricity system. Additionally, we note that a usage pattern of this nature would result in a relatively high degree of revenue certainty for prospective biomethane producers. At this point in time, we consider that the absence of such revenue certainty is a far greater contributor to the risk of biomethane scarcity than an excess of demand is, and that by stimulating production, the risk of insufficient biomethane at a national level (for any application) will be reduced.

The identified electricity system need is material as a proportion of the total sustainable biomethane production capacity identified in Ireland today. In the short to medium term, the solution above could provide a route to market of scale for biomethane production in Ireland. It is reasonable to anticipate that this would help accelerate cost reduction for all other users (as set out in the draft biomethane

strategy[5]) who need to transition in full or in part to biomethane over the coming years. As set out above, alternative technologies and infrastructure reinforcement mean that this XLEU demand can transition to other solutions later in this decade and from 2030 onwards. This means that while XLEUs can accelerate biomethane production and cost reduction in the short to medium term, it is not expected to compete with other biomethane demands in the longer term.

As regards interruptible gas connections for LEUs, we note that there is a risk that the interruption of their gas supply would coincide with a period when they are required to provide demand flexibility. As such, any interruptible gas connection may give rise to the requirement for some form of gas or electricity storage in addition to gas and electricity connections (unless a given LEU is in a position to reduce underlying demand without damage to their business operations).

Finally, as set out previously we do not propose that a standalone criterion for the use of behind the meter generation or biomethane should be introduced for LEUs, but that the solution set out above would be one of a menu of options available to an LEU for the purposes of meaning a broader overarching criterion (e.g. for a certain portion of new demand to be flexible, or meet a capacity or emissions constraint).

Assessment Criteria (Questions 47 – 51)

As set out previously in this response, ESB Networks' strong view is that maintaining optionality will be important to ensuring the right pace and efficiency of investment. ESB Networks' ability to establish the relative adequacy of different technical solutions to meet local capacity conditions is well established and is evolving over time as we introduce products for storage and demand flexibility. Similarly, the enhanced emissions measurement framework under development as per the Climate Action Plan action EL/24/22 is intended to account over time for the emissions impact of a range of solutions including location (ref: question 48), behind the meter generation or storage, time of use and power purchase agreements, on a consistent basis.

To achieve initial criteria in a timely and efficient manner, respecting individual customers constraints (for example, space on site, business operations) this optionality should be leveraged. Furthermore, as regards a transition period, we reference the response provided in the "Transition period" section of this response (ref: question 49).

Separately we note that some of the proposals set out in the consultation will possibly be predicated on the use of Private Wires or Direct Lines. ESB Networks notes that the Department of the Environment, Climate and Communications (DECC) recently held a consultation on this issue with the intention of creating a new policy in this area. ESB Networks is supportive of private wires in certain instances. Please see ESB Networks detailed response to that consultation at the following link: ESB Networks Response to DECC Consultation on Private Wires[6] which provides analysis of the issues arising from the introduction of Private Wires and a suggested framework that would allow private wires to be implemented giving due consideration to all technical, legal and regulatory requirements. Any considered use of Private Wires would need to take in to account all the key elements set out in our response including the necessary overarching principles, criteria to determine when a private wire is allowed and the governance framework to enable the same.

[5] https://assets.gov.ie/283775/722e5b23-9167-4e03-96cc-0895fa8a174d.pdf

[6] ESB Networks Response to DECC Consultation on Private Wires

Role of Other Organisations (Questions 52 – 54)

It is our view that the challenge presented is inherently cross organisational and cross sectoral. A solution for LEUs must be considered in the context of the development of secure, low carbon electricity, gas, heat, transport, water and potentially other sectors (for example health and education). To make this a reality, it is critical that we consider these sectors and the challenges they face together, not in isolation.

For example, the responses above with regard to biomethane, and the potential future role of hydrogen, would depend on the sustainable development of LEUs in locations with both gas and electricity connectivity, as opposed to locations which are optimal from an electricity perspective but not reached by the gas grid. This example, at least, relies on coordination amongst a relatively small number of fully regulated entities, sharing a single economic regulator.

Taking another example, approach premised on LEUs collocating with renewables in remote regions would rely on the extension of appropriate transport and water infrastructures to these locations, in addition to the development of the housing, education and health infrastructure to support the construction and ongoing operation of the facilities in question. In the case of some LEU sectors (for example pharmaceutical facilities), their sectoral regulation and operating models strictly require highly skilled resources on site, and as such the sustainability of such co-location may depend on sustainable social infrastructures being developed in the area.

Similarly, when considering LEU locations, rather than focussing on the potential for LEUs to collocate with renewable electricity generation, it may also be prudent to consider the potential for LEUs to bring renewable energy solutions to more urbanised environments. For example, the growing potential for LEUs to contribute waste heat to district heating schemes could be leveraged in more urbanised environments, but would have limited potential in a rural environment with low population densities.

As such, a “plan led” approach premised on the promotion of LEUs should be pursued in a manner that balances the diverse expert perspectives of a number of government departments and agencies, including but not limited to the CRU, Irish Water, and the government departments responsible for housing, enterprise, transport, energy, water, health, education and local government.

In a broader sense, through our engagement with the SEAI and various government departments and agencies we believe that there may be a gap in terms of:

- Accountability and vires for monitoring and enforcing compliance with overall sectoral emissions ceilings (ref: question 54) – we believe that addressing this either by allocating responsibility to an existing entity or creating a new entity with this responsibility would increase certainty for all parties with individual related roles (e.g., the DSO with responsibility for issuing connection offers).
- Accountability and vires for the measurement (and any enforcement) of individual facilities scope two emissions, potentially applying the enhanced LEU emissions measurement framework EL/24/22 (We note that the Environmental Protection Agency has both the responsibility and expertise for licencing and compliance with facilities’ scope one emissions, as opposed to scope two emissions, whose profiling and measurement is a materially different technical discipline).

At this time, ESB Networks is not proposing that any particular entity should be allocated responsibility for these. However, we would note that the sooner these gaps are addressed, the sooner the necessary resourcing and capability requirements can be progressed. We also note that existing entities including in particular the CRU, the SEAI, and the system operators have pre-

existing knowledge, experience and areas of responsibility which could be leveraged in efficiently addressing these gaps.

Finally, in the context of an inherently cross sectoral challenge, we note that clear accountability will be increasingly important. Gas, electricity and water network development is fully regulated, with clear accountability for system planning, development and operation allocated to system operators and accountability for the economic regulation thereof allocated to the CRU. This supports efficient and effective coordination of future development plans between the relevant operators.

4. Conclusion

ESB Networks is supportive of the CRU's consultation on this topic and considers it a timely point to carry out such a review. The growth of LEUs in the context of Ireland's climate action targets continues to be an area of scrutiny for both policymakers and the public, and all efforts to mitigate the associated carbon emission impact of this growth are to be welcomed. ESB Networks remains available to support the CRU and look forward to further engagement as this important policy area progresses.