

Q1. What are the risks and opportunities in relation to the development of micro grids and what issues do these raise for the connections framework in NI?

Systems that can operate autonomously, but which may occasionally and unexpectedly need full supply from the regional grid, have the potential to result in high costs of provision, as very few kWh units are being transferred on average, resulting in low long term contributions to wider system security and environmental costs. e.g. If many depended on wind and had limited battery storage, so that considerable additional supplies could be required towards the end of a long windless period.

There are opportunities when there is less need for little used grid connection capacity. A particular opportunity is where the micro-grid includes heating provision using electric heat pumps powered by adjacent renewable energy provision, where heat can instead be provided from local thermal storage or low capital cost boilers. There are likely to be additional commercial and community applications where renewable electricity generation can largely be used on site without substantial interaction with the regional grid.

Q2. Do you agree with our guiding principles? Please expand your answer.

There is no consideration here of the need to create a community consensus for the Energy Transition, or of the need for Sector Coupling to make the transition at least cost.

When our prosperity will depend on generating and transferring large amounts of renewable electricity there are two problems:

1. When massive reinforcements of the grid are unavoidable, the "Day2" question, of how to quickly maximise the utilisation of new capacity, is critical.
2. How to make better use of existing low voltage distribution, which has spare capacity at most times of the day and night and often when renewable electricity is immediately available.

For both of these questions, community energy organisations can provide some solutions:

- Promoting rapid uptake of low carbon technologies in an area that is to have a new local grid upgrade.
- Increasing renewable generation.
- Developing a low carbon community street heating network.
- Using electric heat pumps and thermal storage.
- Reducing energy demand with energy efficiency.
- Shifting demand in time to outside of peak demand periods.

With the forthcoming introduction of Smart Metering with provision for multiple controlled loads at each meter point, and with electricity markets where both price and carbon intensity vary in time, communities must be supported to engage with the time dimension of energy use.

Q3. Do you agree with our proposed scope in relation to this connection review, this includes: • Are there other issues which you consider we should take into account? If so, please explain why. • Are there any connection areas we should remove from the scope of our review? If so, please explain why.

Without explicit consideration of building heating demands, energy time of use, and of the need to build community consensus for the generation and transfer of large amounts of renewable electricity, the review is likely to be less effective.

The final size of the power system will depend on the nature of space heating provision, and especially on the extent of application of piped heat networks. In general, piped street networks can result in a smaller and more economic electricity system overall, but will need community consensus to proceed economically by connecting most users. e.g. To exploit local geology or waste heat, or to install a single large turbine or large solar system with limited export, but producing heat for sharing.

In every case, to limit final costs to and beyond 2050, there is a need to build a community consensus and commitment to generating and transmitting large amounts of renewable electricity for energy applications much larger than those traditionally supplied by the power sector.

Q4. Do you consider the current ‘partially deep’ connection boundary in NI appropriate? Please explain your rationale further and provide evidence.

No. Electricity unit costs are overloaded with energy security and environmental costs, and the net effect of existing policy is to prevent connections that would increase this valuable and needed revenue stream.

Q5. Do you consider a shallow connection boundary to be appropriate in the NI context? Please explain your rationale further and provide evidence. If so, which of the following connection types should have a shallow connection boundary; -Demand only -Generation only -Demand and Generation -An alternate connection type (for example Domestic/Non-Domestic connections) Please explain your rationale further.

Yes. A shallow connection boundary or even an explicit local LCT connection subsidy is appropriate, especially after some examination and online publication of local heat and transport demands, geothermal and renewable generation opportunities, and with support to communities in resolving likely final grid requirements. This especially related to any heat provision via piped networks and the need to maximise the use of the grid to transfer renewable electricity.

As far as possible, connection charges should reflect actual costs; any subsequent mitigation should be separately shown in order to achieve optimal system capital and operating costs (evidence: various World Bank and United Nations studies)

In housing areas there will be a large need for increased capacity for EV charging and heat pumps which could justify very low or even zero connection costs for renewable generation nearby. i.e. The later network revenues from EV and heating demands can repay some earlier costs, especially if community campaigns are funded to encourage takeup. Otherwise new

grid capacity could remain underused for decades, increasing the cost of the Energy Transition.

Experience in other countries should be examined for effects on community energy provision.

Q6. Do you consider a shallow-ish boundary to be appropriate in the NI context? Please explain your rationale further and provide evidence. If so, which of the following connection types should have a shallow-ish connection boundary; -Demand only -Generation only - Demand and Generation (for example Domestic/Non-Domestic connections) -An alternate connection type Please explain your rationale further.

A bigger contribution to reinforcement costs is appropriate where renewable power generation is not benefitting adjacent communities energy provision directly. This is likely to apply to bigger windfarms.

Q8. Please provide evidence on the potential impacts on energy affordability in NI if reinforcement costs were socialised further? What would the impact on energy affordability be in NI if household bills were to increase per annum by; 1-3% 4-7% 7-10%

The incomes of local communities should be considered when assessing the benefits and prioritisation of grid provision. i.e. The benefits of a project can be considered to be doubled if the households receiving that benefit had half the average NI income. This might bring a community renewable energy generation or heat network project to the front of a connection queue.

To meet legal mandates we need to rapidly slow the accumulation of CO2 emissions by quickly increasing the amount of renewable electricity generated and by installing low carbon heating provision. Delay in building community consensus for renewable generation and for low carbon heat provision thus has a considerable opportunity cost and a higher cost of meeting carbon budgets later.

Displacing the import of fossil combustion fuels and capital investment in energy systems will have a positive economic and employment effect that will improve energy affordability. Early capital investment can thus have an ongoing return to offset billing. Not all this investment need be in the power system. e.g. Heat networks can be externally funded, could attract carbon offset funding and allow grid upgrades to be funded elsewhere when power is not needed for individual air source heat pumps.

Q9 Can NIE Networks differentiate between RP6 allowances, RP7 business plan connection requests and how these differentiate and have been factored into the analysis that has been done on potential reinforcement connection costs analysis NIE Networks have completed?

New and separate support for community energy provision, for example, outreach and demonstration of low carbon heat network and thermal storage technologies that have wide scope for replication, especially with forthcoming Smart Metering of home power and heat related loads, can be more visible within regulated cost allowances.

Flexible connections could be deliberately promoted to use capacity off-peak to support EV rollouts ahead of capacity upgrades, or to support the use of thermal storage alongside big electric heat pumps.

Q10 Do you think that a developer led or plan led is the best approach for the future development of connections in NI? Please explain your answer.

This is too simplistic.

There is a case for planning to determine the likely need for EV charging provision, and a case for both community consensus building and advance planning for low carbon heat provision. The use of predominantly individual air source heat pumps rather than some high or low temperature heat networks can lead towards a very expensive and underused power system.

Heat networks generally have more constant heat provision that supports people with a disability or those dependent on pensions, and promotes healthier ventilation rates.

Rural settlements without gas connections should be targetted to displace oil and coal heating, and to encourage EV use for longer commutes, to maximise carbon savings.

Grid capacity upgrades should be accompanied by community promotions to take up any new capacity installed, to repay investments earlier within kWh unit/ usage charges.

It is also important to address the issue of when electricity is used, and using electricity to displace fossil heating fuel use, and communities can help address this.

i.e. To develop uses for existing grid capacity before upgrades and to have investments ready to ensure that any new higher voltage capacity is used to transfer more kWh units that can 'repay' up front costs.

Q11 Do you think the current 3- month timeframe for SONI and NIE Networks to issue a connection offer is appropriate? Please explain your answer.

Electric power is a critical supply, very few modern facilities work without it.

It may be appropriate to aim to have very short timeframes for smaller connections, say one month, while recording average approval times for larger connections over one month weighed by the capacity of connection.

Q12. If our legislation facilitated it, should obtaining planning permission be a pre-requisite in order to receive a grid connection? Please explain your answer.

Not generally. It has been possible for other development types to proceed without permission, but at risk of planning enforcement action later.

There are considerable delays in planning systems, leading to additional costs. e.g. High costs in a recent ROI onshore wind energy competition were attributed to these. There may be a

case for a class of provisional connection offers that are issued subject to planning permission, but also to NIEN resource constraints and delay, with the provision that say 70% of this class of offers will be connected within a particular and longer time period. This could reduce consumer costs overall by allowing grid reinforcement plans to be sequenced better.

Q13. If our legislation facilitated it, do respondents consider any other issues associated with the current queue process? Or that a different approach to managing the connection queue, would result in quicker connections? If so, what would that be? Are there any lessons to be learned from other jurisdictions?

No comment.

Q14. Do you have any other information relevant to the subject matter of this Call for Evidence that you think we should consider?

A simple measure of the effectiveness of support given to promoting sustainable community energy provision is the annual average of grid capacity used to transfer renewable electricity.

Consideration of the interaction of electricity networks and community heating networks is more advanced in other jurisdictions. e.g. Abstracts from a recent Smart Energy conference in Denmark indicate active consideration of how to cut emissions at least cost overall.

<https://vbn.aau.dk/da/publications/book-of-abstracts-9th-international-conference-on-smart-energy-sy>

Q15. Please list any connection issues you have raised in order of priority. Please explain your reasoning behind your priority.

The achieved grid capacity factor for transfer of renewable electricity is a key concern, whether for new or existing capacity, as most future energy supplies will be sourced from this.