

Written Evidence received from the Institution of Engineering and Technology for the Northern Ireland Affairs Committee's inquiry into the electricity sector in Northern Ireland (ENI0022)

The [Institution of Engineering and Technology](#) (IET) is an international organisation with over 160,000 members which acts as a voice for the engineering and technology professions. Our primary aim is to provide a global knowledge network between business, academia, governments and professional bodies, promoting ideas which enhance the positive role of science, engineering and technology for the society and the economy of the future. The IET is very active in the province, with over 1700 IET members as well as an active Engineering Policy Panel which is composed of a panel of experts drawn from academia, professional bodies and industry. This submission has been prepared on behalf of the Engineering Policy Group Northern Ireland with input considered from the IET Energy Policy Panel.

Executive summary

- The electricity sector in Northern Ireland is in a period of rapid change with a major transition from traditional carbon producing generation towards renewable sources of energy.
- The intermittent nature of wind power in particular poses challenges at an operational level and also in planning future investment not just in power generating facilities but also in inter-connectors.
- The electricity system in Northern Ireland works within an “all island” framework and also in the context of wider EU and international carbon reduction targets.
- High electricity prices generally but particularly for large users are a major problem for the local economy.

1. What challenges does the Executive face in meeting its target for renewables to contribute 40% of electricity supply by 2020?

- 1.1 Although Northern Ireland has [achieved the target](#)¹ of producing 20% of its power from renewable sources by 2015, reaching a 40% target in just over four years will require careful planning and investment choices. While the energy and electricity systems in the province are in the early stages of a major transition to decarbonisation the main impacts of this are likely to be felt beyond 2020.
- 1.2 Challenges in energy delivery are often viewed in the context of a trilemma of delivering sustainable energy at an affordable price while promoting both short and long-term energy security. Notwithstanding the considerable global volatility in energy prices in the past 15 years, within Northern Ireland there are specific challenges in relation to: issues of affordability which include questions of pricing as well as subsidies; the resilience of the system and; in balancing competing interests.
- 1.3 *Pricing*: The ultimate challenge is to deliver electric power at a competitive price with a fair balance struck between consumers and large users. Island electricity systems tend to have higher costs than larger systems, owing to higher unit plant costs, fewer choices of fuel and renewable resources, and the need to carry more reserve as a proportion of total capacity.

¹ <https://www.economy-ni.gov.uk/articles/electricity-consumption-and-renewable-generation-statistics>

According to the magazine Utility Week, domestic electricity prices in Northern Ireland tend to be around 10 per cent higher than those in the rest of the UK. A contributing factor to the higher price in relation to Britain is that wholesale electricity prices in the all-Ireland Single Electricity Market (SEM) are 20% higher than the equivalent GB market. Coupled with a low wage economy, the result is that [fuel poverty in Northern Ireland](#)² is worse than any other region in the United Kingdom.

- 1.4 The current high cost of electricity in Northern Ireland for large users is a major issue for the manufacturing and engineering sector. This was considered in a [report to the Northern Ireland Executive](#)³ in March 2016. Last year the high cost of energy was cited as a factor in the closure of the Michelin plant in Ballymena. It is also a disincentive in the effort to attract foreign investment to Northern Ireland; investment which is needed to encourage private sector employment to shift the local economy from the current public sector dependency.
- 1.5 Large Energy Users (LEUs) have said that these costs are a major factor in limiting expansion and investment. Electricity pricing is matter of the Northern Ireland Utility Regulator and the price for large users is negotiated between them and their suppliers. While the wholesale price of energy is a large part of the final cost, in the context of an all-Ireland Electricity market, tariffs in Northern Ireland compare unfavourably with those in the Republic of Ireland as there is a different allocation of network costs. In the Irish Republic this allocation favours larger users. While recognising the difficulty in raising prices for the domestic consumer, alleviating the higher cost of energy for larger users in Northern Ireland must be a priority for the new administration in the province.
- 1.6 *Subsidies*: Comparing costs of different modes of electricity generation is difficult. While the [costs of producing renewable energy is falling](#)⁴ when the question of intermittency is taken into account, electricity generation from renewables is generally more expensive than from more conventional power sources, although in relation to conventional power generation the costs to the environment and society of carbon and other emissions must also be taken into account.
- 1.7 As energy projects are long term and expensive, potential investors need policy clarity. Rapid shifts in policy create uncertainty which ultimately mean that the end cost is higher.
- 1.8 *Resilience*: By far the largest proportion of renewable electrical generating capacity in Northern Ireland comes from on-shore wind power. From a technical perspective two features which present particular problems with this power source are: the intermittent nature of wind generated power coupled with the difficulties in storing power. The relatively rapid shift from a grid which traditionally had a limited number of large stable centrally located power generation sources to one which, by contrast, has a multitude of small erratically producing facilities is technically challenging. This shift in the dynamics of power generation has implications for the stability of the grid and the resilience of the system. The [DS3 programme](#)⁵ operated by Eirgrid (for the Irish Republic) and SONI (for Northern Ireland) was established to deal with this problem.

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/468011/Fuel_Poverty_Report_2015.pdf

³ <https://www.economy-ni.gov.uk/sites/default/files/publications/deti/EMAG-Report.pdf>

⁴ http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Power_Costs_Summary.pdf

⁵ <http://www.soni.ltd.uk/Operations/sg/DS3/>

- 1.9 Over time we can expect to see a greater role for demand participation, where the timing of electricity usage is changed dynamically to match available generation, but the impact of this by 2020 is likely to be limited.
- 1.10 To some extent the problem of intermittency can be alleviated by the provision of inter-connectors with Scotland and with the Republic of Ireland. Interconnectors are usually highly reliable in service but cable faults have affected the Moyle inter-connector with Scotland for the past four years and there are also delays with the proposed additional interconnector with the Republic of Ireland. In relation to storage, the new scheme at Kilroot power station to provide the UK's first advance battery based energy storage facility is innovative and will enable some flexibility in the local grid but it provides only 10 MW of interconnected energy storage. The Gaelectric compressed air energy storage scheme in Larne is another cutting edge storage scheme but this is not yet proven technology.
- 1.11 *Balancing interests:* Renewable power generation is an area in which many competing interests have to be balanced. The situation in relation to pricing and subsidies has already been noted. Balancing the long term societal interest in sustainable power resources against local environmental, landscape or aesthetic issues, is another thorny issue. The planning system must take this into account but speedy resolution of these conflicts is in the interests of all parties.
- 1.12 As well as the implications for planning, public messaging around renewables and perhaps development of community based models for this type of construction, together with clear time frames are useful matters to consider. In the context of an all island electricity strategy, the organisational structure and the transparency of competition within that structure as well as the effectiveness of oversight of the regulatory agencies involved are other examples of interests which must be balanced.

2. What steps are required to prevent an anticipated shortfall in generating capacity in the coming years?

- 2.1 Steps are already under way to boost energy supplies in Northern Ireland. [Evermore](http://evermoreenergy.com/),⁶ the local group behind the new bio-mass renewable combined heat and power plant at Lisnahally have indicated that they will apply for planning permission to build a new gas fired power station in Belfast Harbour. New power generation capacity will be needed to cope with growth and also to replace the older generating units at Kilroot and Ballylumford which will be decommissioned in the next five years.
- 2.2 In addition to adding new electricity generating capacity within Northern Ireland, upcoming generating shortages can be tackled by a combination of incentivising demand reduction through greater efficiency of end use, and management of demand peaks through tariff incentives as well as by accessing new sources outside the province. Energy conservation measures (particularly within the built environment), the development of the "smart grid" and the encouragement of large users to generate their own power (either off-grid or via combined heat and power operations) are examples of demand management.
- 2.3 On the supply side, investment in inter-connectors might serve to alleviate the need for some of the additional locally based capacity. It can be asked whether a high degree of reliance on inter-connectors is prudent. There has been a rapid rise in the use of inter-connectors across Europe which matches the rise in renewable power, and allows the impacts of variable wind energy to be smoothed to some degree. In addition to the East West connector between

⁶ <http://evermoreenergy.com/>

Dublin and North Wales completed in 2012, there will also be new connectors between England and France and between Northumberland and Norway.

- 2.4 Increased inter-connection is happening throughout Europe. [Recent studies](#)⁷ have indicated how valuable this is likely to be for the UK although some in Scotland have questioned the wisdom of over-reliance on inter-connectors. In an Irish context, large fossil fuel power plants such as Ballylumford or Moneypoint in the Irish Republic provide security of supply in the medium term but the long term scenario is still unclear.

3. What are the factors underlying higher electricity prices in Northern Ireland, and how can these be tackled?

- 3.1 Northern Ireland has a small electricity grid serving a scattered population, particularly in the west of the province. The lack of economies of scale in supply and the dispersed population are structural disadvantages. Northern Ireland is geographically isolated and has not had good inter-connection with Scotland and the Republic of Ireland. A new North South interconnector has been proposed for some time but because of delays in taking this project forward, in 2015 customers in Northern Ireland were signed up to a £20m upgrade of generating capacity at Ballylumford.
- 3.2 Most of the existing power generating facilities are carbon intensive and with the exception of land based wind power, there is shortage of alternative renewable power sources. Our neighbours in both Scotland and in the Republic of Ireland have hydro- electric power stations, off shore wind farms and also pumped storage schemes. Northern Ireland has none of these. Aside from some long term options in relation to tidal power (still an experimental technology) and the possibility of bio-gas production from waste agricultural products, alternative sources of large-scale carbon neutral renewable power are not obvious.
- 3.3 In common with other energy sectors, the cost of electricity to consumers is determined by a range of factors. These include the cost of fuels on world markets and the cost of investment in generation, networks and supply. The degree to which a particular energy market design promotes effective competition will also effect what the consumer ultimately pays.
- 3.4 In terms of what can be done at a practical level, starting with an in-depth study of the component costs of the typical electricity bill for various categories of user, it should be possible to benchmark this against comparable nations/regions. With these discrepancies highlighted it could be clearer as to what specific actions could then be taken.

4. What steps are required to improve interconnection with the Republic and the GB markets?

- 4.1 The value of interconnectors is [widely acknowledged](#).⁸ Between Northern Ireland and Scotland the main link is via the Moyle interconnector which is owned and operated by Mutual Energy. Cable faults on this interconnector meant that it has been running at reduced capacity (and with reduced revenues) since June 2012. These faults are currently

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505222/080_Poyry_CostsAndBenefitsOfGBInterconnection_v500.pdf

⁸ <http://www2.nationalgrid.com/About-us/European-business-development/Interconnectors/>

being repaired and both cables of the interconnector are expected to be fully operational towards the end of 2016, if all goes to plan.

- 4.2 Joint studies in relation to further interconnection between the Irish Republic and Northern Ireland have been carried out by ESB National Grid (on behalf of the Republic of Ireland) and Northern Ireland Electricity since 2001. In October 2004, the two regulators CER and NIAER recommended that there was a need for a second interconnector. The benefits of increasing the capacity between the two systems include: fuel savings; potential for increased competition; as well as improved security of supply and system stability. An additional interconnector will enable more renewable generator capacity (mostly wind generated) to be connected to the electricity network. The 40% targets for renewable generation cannot be met without this additional connection. It should be noted that the all-Ireland system is already something of a global pathfinder for operating with very high percentages of wind energy.
- 4.3 While there is a interconnector between Tandragee in Northern Ireland and Louth (in the south) power transfers over this interconnector are limited by the risk of system separation. Although there are two 275 kV circuits, they are carried on the same physical structures (i.e. a double circuit line). This creates a potential single point of failure (for example in the event of an aircraft impact or terrorist attack) and hence impacts resilience. Another interconnector is required to increase the transfer capacity between the two systems, thereby increasing greater trade in electrical power. Despite widespread support for the idea from all those involved in the electricity industry both north and south of the border, this project has been subject to years of delay.
- 4.4 Formal planning processes have been in operation since 2015 in both jurisdictions in relation to a proposed new interconnector between Tyrone and Cavan. This new £250 million 400 kV facility is planned to be above ground. Many local residents would prefer to place the cables underground but this is felt to be too expensive. ([this is underlined in an IET study of the issue](#))⁹ First mooted in 2009, the project is unlikely to be completed until 2020.

5. What difficulties arise for Northern Ireland from the need to make UK energy policy work in the context of all all-island electricity market?

- 5.1 Energy policy operates on an international, national, regional and at a local level. The challenge in Northern Ireland is that it also has to make UK policy work in an all-Ireland context.
- 5.2 In Northern Ireland energy policy is a devolved matter and there are commonalities between the two parts of Ireland. Both operate within the EU targets for greenhouse gas abatement and targets for renewable energy (i.e. 40% by 2020). Agriculture is an important activity in the economies both north and south of the border and within that sector of the economy livestock farming is a major element. With agriculture making up 30% of greenhouse gas emissions in Ireland (compared with an EU-average of 10%), decarbonisation of the electricity sector and electrification of the heating and transport sectors is seen by many as the least costly solution to achievement of EU energy policy objectives, particularly the challenging 2050 targets.
- 5.3 While co-operation between two adjacent jurisdictions has potential benefits for both, creating an organisational structure in which to do this is not easy. The electricity system in

⁹ <http://www.theiet.org/factfiles/transmission-report.cfm>

the Republic of Ireland is considerably larger both in terms of installed generation capacity and also customer base than that of Northern Ireland.

- 5.4 Co-operation within the context of a small relatively isolated infrastructure network was formalised in November 2007 when the Single Energy Market (SEM) was initiated. Taking advantage of economies of scale the benefits of SEM are seen in relation to: reduced duplication of function; sharing the cost of fuel diversity; creating a large more open transparent market and; providing a more stable investment environment for both generation and supply.
- 5.5 It was felt that the best way to ensure a competitive framework within a small closed system was to adopt a pool system by which all electricity generated in or imported to Ireland must be sold and from which all electricity must be purchased. By contrast in the rest of the UK the market there is a bilateral trading system.
- 5.6 The next stage in the process is an [Integrated Single Electricity Market \(ISEM\)](#)¹⁰ which is planned for 2017. This new wholesale market must comply with the EU Target Model, the common European Electricity market which seeks to align trading across borders throughout Europe.
- 5.7 Some specific difficulties which might be raised in relation to the all island electricity market might include:
1. Public awareness of the all-Ireland electricity strategy does not seem to be particularly high. Community engagement at a local level is vital for the further expansion of renewable power. More political leadership and debate on wider energy issues is needed.
 2. There are risks that the emphasis on inter-connection might result in Northern Ireland becoming over dependent on the ability to import electricity from the Republic and from Great Britain.
 3. In light of the delays in delivering another North-South interconnector, a joint approach for expediting projects of this nature might be appropriate.
 4. While endorsing the view that competitive wholesale and retail markets are central objectives in relation to an electricity policy for Northern Ireland, the Electricity Association of Ireland has questioned the governance and accountability regime in relation to SEM. They also state that there is an absence of an appropriate appeal mechanism.

8 June 2016

¹⁰ http://www.uregni.gov.uk/uploads/publications/SEM-14-045_I-SEM_HLD_Draft_Decision.pdf