Renewables Integration

Status Report

March 2017

Northern Ireland Electricity Networks

SONI

Table of Contents

1. Introduction

This paper has been jointly prepared by SONI and NIE Networks to provide an update on the status of the integration of renewable generation onto the Northern Ireland power system. The focus of the paper is to update interested parties on grid infrastructure developments required to integrate renewable generation onto the transmission and distribution systems.

The structure of this report is set out as follows.

Section 2 provides an update on the Connection Application and Offer Process as well as an update on the levels of renewable generation connected and seeking to connect to the Northern Ireland power system.

Section 3 provides an update on the grid developments on the transmission system that are required to facilitate the connection of renewable generation in Northern Ireland.

Section 4 provides an update on system operation in relation to increasing levels of renewable generation on the power system.

Section 5 provides an update on the individual projects that are being progressed by SONI and NIE Networks.

This section provides a brief overview of the roles and responsibilities of SONI and NIE Networks and how we work together.

1.1. NIE Networks

NIE Networks is the asset owner of both the Transmission and Distribution Systems in Northern Ireland and is regulated by means of a transmission licence and a distribution licence. NIE Networks therefore acts as a Distribution Network Operator (DNO) and a Transmission Owner (TO). The licences require NIE Networks to:

- plan, develop, maintain and operate the Distribution System; and
- maintain the Transmission System.

In their role as DNO, NIE Networks is subject to a statutory duty to connect (with some specific exceptions) and is required to offer terms to customers for new connections, or for modification of existing connections, to the Distribution System in accordance with their distribution licence.

The DNO is responsible for defining the connection arrangements and identifying any reinforcement works on the Distribution System required to facilitate connection to the Distribution System.

The DNO also:

- specifies the terms under which new or modified connections to the Distribution System are to be constructed in a connection offer letter;
- monitors compliance of customers' equipment connected to, or to be connected to, the Distribution System with the Distribution Code and the Electricity Safety, Quality and Continuity Regulation (Northern Ireland) 2012; and
- informs SONI of the requirement for a transmission assessment to facilitate connections to the Distribution System in line with obligations under the Transmission Interface Arrangements (TIA).

1.2. SONI

SONI is the Transmission System Operator (TSO) in Northern Ireland and is regulated by means of a transmission licence. The licence requires SONI to plan, operate and co-ordinate/direct the flow of electricity onto and over the Transmission System.

In accordance with their licence, the TSO is required to offer terms to customers for new connections, or for modification of existing connections, to the Transmission System.

The TSO is responsible for defining the connection arrangements, including any reinforcement works on the Transmission System required to facilitate connection to the Transmission System and Distribution System.

The TSO is also responsible for:

- ensuring that new or modified connections to the Transmission System are constructed in accordance with the terms set out in the accepted connection offer letter;
- ensuring that customers' equipment connected to, or to be connected to, the Transmission System and Distribution System complies with the Grid Code; and
- planning, designing and obtaining consents for any reinforcement works on the Transmission System required to facilitate connections to the Distribution System.

1.3. Transmission Interface Arrangements

The arrangements between SONI and NIE Networks in its role as TO, with respect to the co-ordination of their respective licence obligations, are set out in the Transmission Interface Arrangements (TIA). The TIA also sets out obligations on NIE Networks in its role as DNO relating to distribution connections requiring works to be carried out on the Transmission System.

These arrangements have been in place since the start of the Single Electricity Market (SEM) in 2007 and have been updated to reflect the transfer of the transmission planning function from NIE Networks in their role as TO to SONI on 1 May 2014.

In addition SONI and NIE Networks are required under Article 12 of The Electricity (Northern Ireland) Order 1992 to develop and maintain efficient, co-ordinated and economical electricity Transmission and Distribution Systems.

Therefore the TSO and the DNO must ensure that any modifications or expansions to the Transmission and Distribution Systems are efficient, co-ordinated and economical and this includes grid development to facilitate new generation connections.

2. Renewable Generation

2.1 Connection Application and Offer Process Update

Following a consultation process with industry stakeholders on an Alternative Connection Application and Offer Process, SONI and NIE Networks issued a Decision Paper[1] in May 2016. The Decision Paper outlined SONI and NIE Networks approach to processing connection applications in the more immediate term and in the longer term. These approaches are referred to as Phase 1 and Phase 2 respectively.

The objective of Phase 1 is to release connection offers that will allow for optimal and efficient use of existing grid capacity by ensuring that projects more certain of proceeding are granted access to remaining scarce network capacity. NIE Networks and SONI believe that Phase 1 aligns with important industry views, and our obligations under licence and under legislation. Phase 1 was implemented from June 2016.

The basis of Phase 1 process is to couple the strong support from industry that generation projects with planning permission demonstrate more commitment and are much more certain to connect than those that do not have planning permission with the equally strong support to prioritise the issue of connection offers to applications where there is remaining grid capacity or where the application has minimal impact on the system.

SONI and NIE Networks believe that the approach adopted, which reflects our respective licence and legislative obligations, ensures the most efficient use of remaining capacity on the grid, provides a mechanism which would allow further use of existing capacity through the concept of 'over-installation' and enables a level of 'zero export' projects to connect, all whilst maintaining system security.

Given the responses received by industry, SONI and NIE Networks also proposed an outline approach to deal with the longer term situation, Phase 2, once remaining capacity is utilised in Phase 1. We expect that the capacity released through the Phase 1 process will be in the order of c.200 MW. Importantly, given the industry responses received in support of reintroducing planning permission as a pre-requisite for connection application; the fact that capacity will have been exhausted; and the policy support required from the Department for the Economy (DfE) and the Utility Regulator (UR) for significant further transmission investment; Phase 2 requires significant input from policy makers and other key stakeholders.

SONI and NIE Networks are working closely with the UR on their Review of Connection Policy, and will be working towards finalising the Phase 1 Alternative Connection

[1] http://www.soni.ltd.uk/media/documents/Consultations/Alternative%20Connection%20Application%20and%20Offer%20Process%20-%20Decision%20Paper%2031052016.pdf

Application and Offer Process and, with the input of policymakers, developing an approach for connection applications beyond Phase 1.

2.2 Renewable Generation Status

The electricity network in Northern Ireland is facing an unprecedented demand for the connection of renewable generation. Currently c.18,000 renewable generation connections have been completed in Northern Ireland, comprising of c.950 Large Scale Generation (LSG) schemes (LSG >5 MW) and Small Scale Generation (SSG) schemes (SSG <5MW) as well as c.17,000 micro generators (<16 A per phase). This equates to a total of 1,275 MW of renewable generation now connected in Northern Ireland.

There are a further c.300 LSG and SSG schemes committed to connect. These committed renewable generation schemes total c.490 MW, c.146 MW of which has been offered and accepted through Phase 1 of the Alternative Connection Application and Offer Process. A total of c.173 MW has been offered as part of Phase 1.

In addition to these connected and committed generation schemes, SONI and NIE Networks are considering a further c.330 applications for generation connection, totalling c.1,232 MW, the majority of which will be considered under Phase 2.

Figure 1 shows the levels and types of renewable generation connected, committed and applied to connect in Northern Ireland. More details can be found in Appendix 1 on the growth of renewable generation in Northern Ireland.

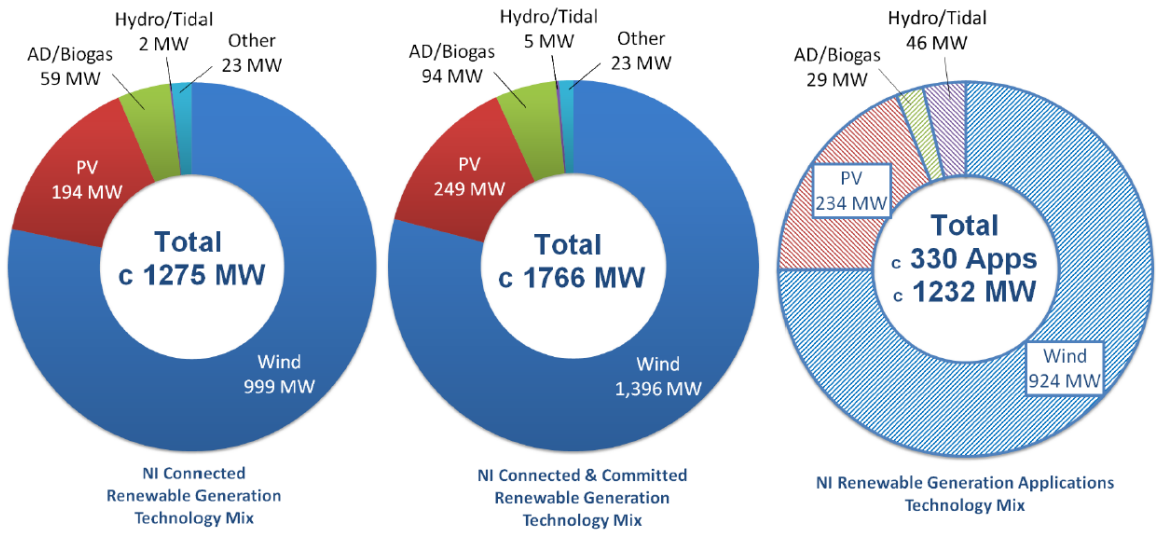


Figure 1: Connections committed and applied renewable generation connections in Northern Ireland

On 9 March 2017, the DfE published an update[2] on the percentage of electricity consumption in Northern Ireland that was generated from renewable sources. This feeds into Northern Ireland's performance against the 2011-15 Programme for Government target which is to "Encourage achievement of 20% of electricity consumption from renewable sources by 2015" and the Executive's 2010-20 Strategic Energy Framework which includes a target to achieve 40% of electricity consumption from renewable sources by 2020.

The report explains that for the 12 month period from January 2016 to December 2016, 25.4% of total electricity consumption in Northern Ireland was generated from renewable sources located in Northern Ireland.

Whilst the closure of the Northern Ireland Renewables Obligation (NIRO) and DfE's 2015 review of the 2020 renewables target raises some uncertainties around the extent and pace of renewables growth in Northern Ireland going forward, it is important to note that even at present the transmission and distribution networks cannot provide, on an unrestricted basis, for all of the connected and committed renewable generation. Whilst there is ongoing development of the transmission system further reinforcement will be necessary to continue to address restrictions as this further generation connects to the network, as shown by Figure 2.

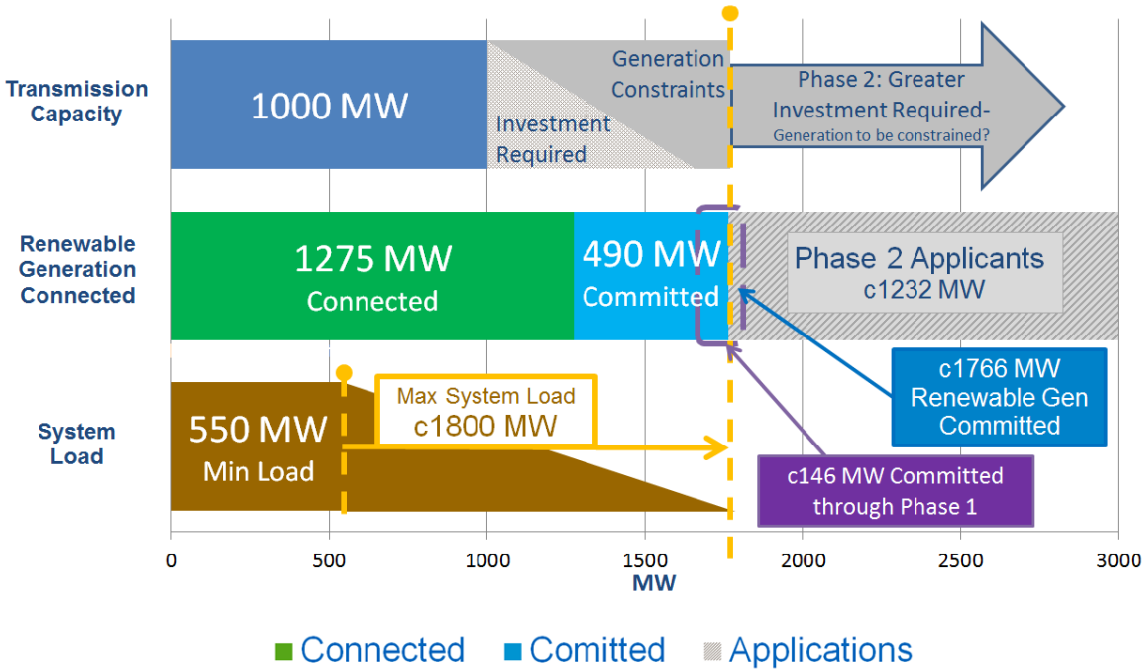


Figure 2: Renewable generation status against transmission capacity and Northern Ireland system demand

[2] https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Issue-6-Electricity-Consumption-and-Renewable-Generation-in-Northern-Ireland-January-2016-to-December-2016.pdf

3. Transmission Projects

3.1 Transmission Development

Whilst the majority of renewable generation is connected to the distribution network, the aggregated power flows impact significantly on the transmission system. The transmission system is required to be planned in accordance with Northern Ireland Transmission System Security and Planning standards[3]. These standards require that the transmission system has the capacity and resilience necessary to cater for the required transmission system power flows, even during certain contingencies such as an unforeseen outage of a transmission circuit or item of plant.

As the level of renewable generation has increased a number of transmission development projects have been completed, or are nearing completion referred to generally as the Medium Term Plan (MTP). These are detailed in Section 5.

Further development will however be required to continue to support the connection of further generation. See Section 5 for more details. Some projects are in the pre-construction stage (see Table 3 in Section 5) and some projects are at the investment planning stage (see Table 4 in Section 5).

3.2 400 kV North-South Interconnector

The proposed interconnector will require the construction of a new 275/400 kV substation and a new 400 kV overhead line between Turleenan (Dungannon) and Woodland (Meath). SONI has responsibility for development of the section from Turleenan to the border of the Republic of Ireland (RoI) and the project is currently in the pre-construction phase.

Following submission for Planning Approval in Northern Ireland in December 2009, a Public Inquiry commenced (and was adjourned) in March 2012. An updated Environmental Statement (ES) and a second planning application was submitted to Department of the Environment (DOE) in April 2013 and, following the transfer of planning responsibility from NIE Networks to SONI in May 2014, all interested parties were formally advised of the change of applicant.

On Monday, 1 June 2015 SONI submitted an ES Addendum to the 2013 submission. Following a subsequent consultation process administered by DOE, the Planning Appeals Commission (PAC) reconvened with the Public Inquiry process, which was divided into two parts. Part 1 took place on the 21 June 2016 and dealt with legal matters in relation to the application. Part 2 which dealt with substantive matters of the

[3] http://www.soni.ltd.uk/media/documents/Projects/Publications/Northern%20Ireland%20TSSPS%20-%20September%202015.pdf

proposal was held from the 22-27 February 2017. It is expected that a final planning decision will be provided towards the end of 2017.

The portion between the RoI border and Woodland is being developed by EirGrid. EirGrid's application to An Bord Pleanála (ABP) was submitted on 9 June 2015. Following a subsequent public consultation process which included a 12 week public Oral Hearing, a decision was granted by ABP on the 21 December 2016. That decision is now being appealed through judiciary proceedings which are expected to be completed by Q4 2017.

When consents have been finally secured for this important project, it will be passed to NIE Networks and ESB Networks for delivery of the construction stage. In order to fast track the construction stage, NIE Networks and ESB have issued design tenders.

3.3 Clusters

Appendix 2 of the NIE Networks' Statement of Charges (SoC)[4] for Connection to their Distribution System sets out the cluster methodology which facilitates the grouping together of wind farm generators so that they share network infrastructure. The methodology allows the DNO to designate a 'cluster' where the capacity of generators within a 10 km radius is greater than or equal to 56 MW. In determining the potential generation capacity of a cluster, different probabilistic weightings are applied to each generator based on their stage of development (e.g. whether or not planning permission has been granted).

The principle behind the cluster methodology is to minimise the environmental impacts of the infrastructure required to connect generators located in the same vicinity; to enable the cost of the transmission works to be shared on a per MW basis between the generators connecting to that cluster; and to allow cluster infrastructure to be progressed in advance of generators applying for connection. Furthermore, the cluster policy aligns with SONI and NIE Networks' legislative and licence obligations to develop the transmission and distribution systems efficiently and in a co-ordinated manner.

Clustered connections generally involve the construction of a 110/33 kV substation, connection to the 110 kV network and individual 33 kV generation connections.

In line with cluster policy, the difference between the total cost of the cluster transmission works and that which is charged to connecting generators is funded by the Northern Ireland customer base.

Due to the contribution from the Northern Ireland customer base, the cluster methodology involves UR approval of the pre-construction costs, and on completion of pre-construction works, approval of construction costs.

[4] http://www.nienetworks.co.uk/documents/Connections/Statement-of-Charges-October-2016.aspx

When NIE Networks, as DNO, have identified the need for a cluster, application is made to SONI for the transmission element of the cluster connection. SONI determines the optimal transmission connection method for the cluster and issues the DNO with an Offer under Section S of the TIA to complete the transmission works for the cluster. The DNO feeds these transmission works and charges into DNO connection offers to generators seeking to connect into the cluster. At a high level, SONI carries out the pre-construction activities and NIE Networks as the TO carries out the construction activities.

The Rasharkin, Tremoge and Gort cluster substations have been constructed and energised. The Gort cluster substation, which is to be looped into the new 110 kV circuit between Omagh – Tamnamore has been energised from Tamnamore only at this point. The section of the circuit from Gort – Omagh is still under construction. SONI and NIE Networks are working through wayleave difficulties with DfE. The section between Gort and Omagh will be completed by July 2017.

The Drumquin cluster has UR construction approval. SONI pre-construction works are in the final stages of completion and NIE Networks has started construction works. Works are expected to complete in March 2018.

NIE Networks as DNO applied to SONI for the connection of the proposed Garvagh cluster to the transmission system and NIE Networks secured UR pre-construction approval in December 2016. SONI is going through internal approval processes and preparing the Offer under Section S of the TIA for the DNO.

NIE Networks as DNO applied to SONI for the connection of the proposed Kells cluster to the transmission system. SONI has established the connection method for the cluster. NIE Networks as TO is currently working on a Construction Offer. NIE Networks and SONI are also considering the status of the generators in the vicinity of Kells.

Initial consideration has been given to clusters at Newtownstewart and Cam, which are located in the West of Northern Ireland. In line with the Phase 1 Alternative connection Application and Offer Process, SONI and NIE Networks have decided to look at these clusters as part of Phase 2 when there is more certainty over investment in the transmission system beyond the 2020 40% renewables target. There is currently no firm transmission capacity in the West.

4. System Operation

3.4 Load Forecasting

SONI and NIE have scoped a PhD project for Queens University Belfast to look at the integration of small scale generation into the Northern Ireland load forecasting process. This project is ongoing with SONI and NIE Networks meeting with the university on a regular basis. The project is currently in the early stages of developing a tool to be used by the SONI Control Centre.

3.5 Integrating Solar Generation

There is currently 84 MW of large scale solar farms connected to the system and 52 MW committed to connect. This is in addition to 110 MW of solar powered small scale and micro generation connected and 3 MW committed to connect. SONI is now in a position to learn how the large scale solar farms operate and impact on the power system.

With a significant proportion of the generation mix coming from solar generation, SONI has been in contact with an Australian solar generation forecast provider who provides solar forecasts for the 700 MW of solar generation in South West Australia which has a peak demand of around 1,800 MW, similar to Northern Ireland.

The Priority Dispatch Hierarchy set out in SEM-11-062 does not currently include solar generation. In December 2016, SONI and EirGrid, as the TSO in RoI, requested that the Single Electricity Market Committee (SEMC) include solar and tidal generation in the hierarchy. In March 2017 the SEMC instructed SONI and EirGrid to treat solar and tidal generation at the same level as wind generation in the priority dispatch hierarchy as an interim measure until the SEMC has consulted with industry on this matter.

At the moment, a fuel type of solar is not included in the Trading and Settlement Code (TSC). For solar to be included, participants seeking to register in the SEM will need to raise a request to modify the TSC for its inclusion.

In the absence of solar as a fuel type being included in the TSC, the SEMC intends to instruct the Single Electricity Market Operator (SEMO) to register solar units with a fuel type of wind until such time as fuel type of solar is included in the TSC.

3.6 Levels of Uncontrollable Generation

SONI is responsible for planning and operating the transmission system safely and securely to ensure a reliable supply of electricity. To ensure that we operate the transmission system in a safe, secure and reliable manner we must manage the frequency at which the system operates; the voltage on the transmission system; and the circuits and equipment that make up the physical transmission system itself.

System frequency is maintained at 50 Hz across the island of Ireland when there is a balance between customer demand and generation supply. SONI is responsible for balancing generation and demand on the system. When these are not in balance, the frequency moves away from 50 Hz.

Voltages on the transmission system are also maintained at 110 kV and 275 kV. These voltages are influenced by the types of generators that are being used and also the nature of customer demands for power. The circuits and equipment that make up the transmission system itself also impact the voltage. SONI is responsible for ensuring that voltages across the transmission system remain within specific tolerances so that the quality of the electricity which is supplied to customers is maintained.

The circuits and equipment that make up the physical transmission system play a key role in delivering power from generators to electricity users. It is possible that a fault may occur and equipment or circuits could become unavailable. SONI therefore must build redundancy into the transmission system. This means that we can deliver a reliable power supply to electricity users.

To manage these three factors in real time, SONI, along with EirGrid, the TSO in Ireland, has created a set of rules for operating the transmission system so that we can meet our duty to operate the transmission system safely and securely and ensure a reliable supply of electricity. These rules are documented in the "Operational Constraints Update" document which is published on the SONI website.[5]

The main concern with small scale generation is that, in general, the power output from these generators is not controlled by SONI. We refer to these generators as 'uncontrollable'. We currently have c.400 MW of uncontrollable generation connected to the system, with a further c.100 MW committed to connect and a further c.100 MW seeking to connect. Uncontrollable generation impacts on our ability to balance generation and demand on the system.

As the level of uncontrollable generation connected to the system grows there will be increasing challenges to maintain security of supply. The two main challenges for SONI are the increasing levels of small scale uncontrollable generation is visibility and control of generation.

SONI has carried out high level studies to assess this issue. The studies have shown that if more uncontrollable generation connects to the system, at times, there is a real risk that system frequency cannot be maintained at 50 Hz, leading to an unstable power system. This was particularly notable at times of low system demand.

To illustrate the issue we can look at an operational rule that SONI must follow in the "Operational Constraints Update" document is that we must have a minimum number of synchronous generation units (typically thermal generation) online at any one time. If the

[5] www.soni.ltd.uk

minimum synchronous generation plus the uncontrollable generation is greater than the electricity demanded by users, then the system frequency will increase as shown in Figure 3. In this scenario, we would normally reduce generation on the system, but if the only generation available to reduce is either required for system security or is uncontrollable, then the frequency cannot be reduced leading to an unstable power system.

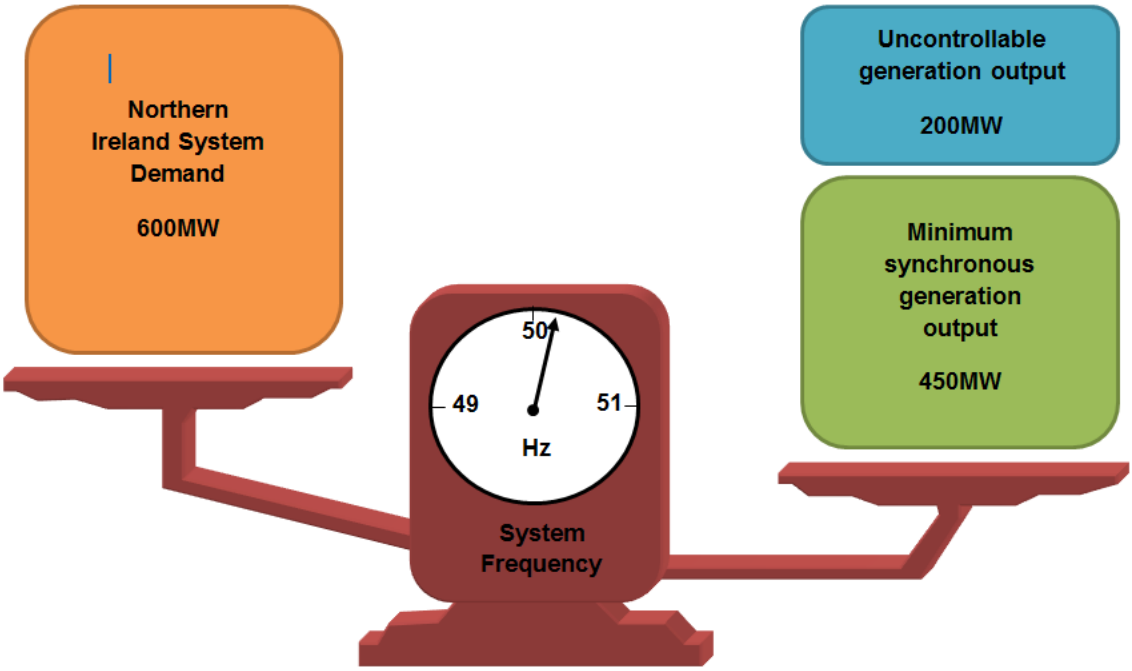


Figure 3: Example to show excess of generation on the Northern Ireland Power System that could lead to system instability (numbers are for illustrative purposes only)

As we are reaching the point where it could be very complex to manage the system with such high levels of uncontrollable generation, it is SONI's intention to request a level of visibility and control of generators down to 1 MW. This would align with the European Network Code "Requirements for Generators".

How we might achieve this has not been fully reviewed however an All Island working group has been established to address the technical and communication requirements for visibility and control of generators less than 5 MW. This group is made up of NIE Networks, SONI, ESB Networks and EirGrid.

Grid Code changes will be required to reduce the controllability limit to 1 MW and any Grid Code modifications for visibility and control of generation sites of down to 1 MW will be subject to consultation and engagement with industry.

5. Status of Projects

6.1. Projects in Construction

Transmission projects in construction are the responsibility of NIE Networks.

Table 1: Transmission projects in construction phase

Category	Project	Project Description	Status
Transmission Dev (MTP)	Omagh Main Transformers	Replacement of 2 x 40/60 MVA transformers with 2 x 63/90 MVA	Complete
Transmission Dev (MTP)	Dungannon to Omagh A&B Phase 2 (Part 1)	Complete uprating with Invar conductor	Complete
Transmission Dev (MTP)	Dungannon to Omagh A&B Phase 2 (Part 2)	Divert both circuits to Tamnamore	Complete
Transmission Dev (MTP)	Kells to Coleraine Phase 1	Uprate Terrygowan to Rasharkin with HTLS conductor	Complete
Transmission Dev (MTP)	Kells to Coleraine Phases 2 and 3	Ph 2 - Uprate Kells to Terrygowan with HTLS conductor, Ph 3 – Uprate Rasharkin to Coleraine with HTLS conductor	Ph2 Complete Ph3 Complete

Transmission Dev (MTP)	Tamnamore Phase 2	Install a second 275/110 kV interbus transformer, divert second 275 kV line multiple 110 kV lines into Tamnamore, Install 200 MVA cable on selected 110 kV circuits	Complete
Transmission Dev (MTP)	Tamnamore to Omagh new circuit	Construct a new 110 kV single circuit between Tamnamore and Omagh	Gort-Tamnamore complete. Tamnamore-Omagh well advanced.
Cluster	Rasharkin (formerly known as Mid-Antrim)	Initially 1 x 90 MVA transformer with space for a second, looped into Kells – Coleraine 110 kV circuit	Complete
Cluster	Tremoge	Initially 1 x 90 MVA transformer with space for a second, looped into Dungannon – Omagh B 110 kV circuit	Complete
Cluster	Gort	Initially 1 x 90 MVA transformer with space for second, looped into new Tamnamore – Omagh 110kV circuit	Complete

Distribution projects in the pre-construction stage are the responsibility of NIE Networks.

Table 2: Distribution projects in pre-construction phase

Category	Project	Project Description	Status
SSG Small Scale Generation	33/11 kV Primary Substation Transformer Investment of £2.3m agreed in October 2013	Work at 33/11 kV primary substations to cater for impacts of small scale generation.	Complete
SSG Small Scale Generation	33/11 kV Primary Substation Transformer Investment- request for further substations	Work at 33/11 kV primary substations to cater for impacts of small scale generation.	Request for further substations was approved by the UR and the works involved have been completed by NIE Networks.

6.2. Projects in Pre-Construction

Transmission projects in the pre-construction stage are the responsibility of SONI.

Table 3: Transmission projects in pre-construction phase

Category	Project	Project Description	Status
Transmission	Voltage Support	Establishment of voltage support at three 110/33 kV substations: Coleraine, Omagh and	Technology confirmed and site investigations

Development		Tamnamore	planned
Transmission Development	Uprating of 110 kV circuit between Omagh and Dromore	Uprating of conductor on existing 110 kV double circuit between Omagh Main and the proposed Dromore 110 kV switching substation	Investigation of uprating options is ongoing
Transmission Development	Uprating of Coolkeeragh/Magherafelt 275 kV circuit	NIE Networks are intending to carry out the asset replacement of the conductors on the 275 kV Coolkeeragh to Magherafelt double circuit due to age/asset condition. The conductors will however be replaced with conductors of higher capacity to increase the rating of the circuit.	NIE Networks has investigated three conductor options all of which would provide for a rating acceptable to SONI.
Cluster	Curraghamulkin (formerly known as Drumquin)	Initially 1 x 90 MVA transformer with space for a second, 110 kV circuit to new Dromore switching substation to be connected into Omagh-Enniskillen 110 kV circuits	UR construction approval granted. SONI pre-construction works are in the final stages of completion and NIE Networks has started construction works.
Transmission Connection	Brockaghboy Wind Farm	Construct a new 110 kV single circuit between Brockaghboy and Rasharkin	SONI pre-construction works are in the final stages of completion and NIE Networks has started construction works.

6.3. Projects in Development

New transmission projects in the investment planning stage are the responsibility of SONI. Asset replacement projects are the responsibility of NIE Networks.

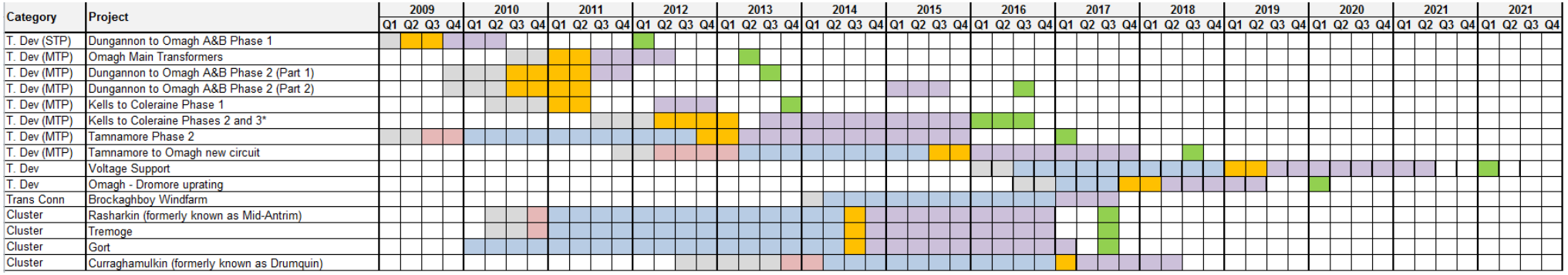
Table 4: Transmission projects in development

Category	Project	Project Description	Status
Transmission Development	Based upon a consideration of a number of generation scenarios a study of the NI transmission system has been completed and number of potential projects have been identified to address, in particular, risks to thermal capacity and phase angle[6]	The following potential projects have been identified:- New 110 kV circuit between Kells and Rasharkin Uprating of Coolkeeragh/Strabane and Coolkeeragh/Killymallaght 110 kV circuits Uprating of Tamnamore to Turleenan 275 kV double circuit New circuit between Magherafelt and Coolkeeragh (optimal voltage to be determined)	Whilst a network wide study has identified the projects listed they require to be progressed on a prioritised basis. The new circuit between Kells and Rasharkin is being taken forward at present. Options for the technology and potential for utilisation of existing assets are being investigated. It should be noted that alongside infrastructure development there may be scope for prudent operational intervention to contribute to the management of the risks that have been identified with respect to phase angle.
Connection	200 MW offshore tidal -	Connection and ATR	Not commenced, Feasibility Study complete. NIE Networks working with developers to try to

[6] For the loss of the Coolkeeragh to Magherafelt 275 kV double circuit significant power flows transfer onto the underlying 110 kV network resulting in a 275 kV phase angle Between Coolkeeragh and Magherafelt that can be in excess of 20^0 during times of high generation. At present there is a limit of 20^0 due to the risk of damage to plant if the 275 kV is reclosed at a higher phase angle

	Torr/Fair Head		progress small scale demonstration project.
North-South Interconnector	400 kV Interconnection	Construction a new 400 kV overhead line between Turleenan (Dungannon) and NI/RoI border.	The Planning Appeal Commission held a Public Inquiry on the 21 June 2016 and from the 22-27 February 2017 in Armagh. It is expected that a final planning decision will be provided by the end of 2017. It is anticipated that construction works will commence in early 2018.
Cluster	Garvagh	Garvagh Cluster 110/33 kV substation is to loop in to the Rasharkin – Brockaghboy 110 kV circuit. Location of the cluster substation will be determine through pre-construction activities.	NIE Networks secured UR pre-construction approval. SONI is going through internal approval process and preparing the Offer under Section S of the TIA.
Cluster	Kells	Kells Cluster 110/33 kV substation is to be a radial connection from Kells Main. Location of the cluster substation will be determine through pre-construction activities.	NIE Networks as DNO applied to SONI for the connection of the proposed Kells cluster to the transmission system. SONI has established the connection method for the cluster. NIE Networks as TO are currently working on a Construction Offer.

6.4. Projects Indicative Schedule



Key
NIE Networks DNO investigation
SONI Transmission Planning
NIE Networks DNO Pre-construction approval
SONI Pre-construction work
NIE Networks TO Construction approval
NIE Networks TO Detailed design/Construction work
NIE Networks TO Completion Report

*NOTE- This work is Outage dependant

Figure 4: Indicative programme for projects that are in the pre-construction or construction phases

6. Appendix 1

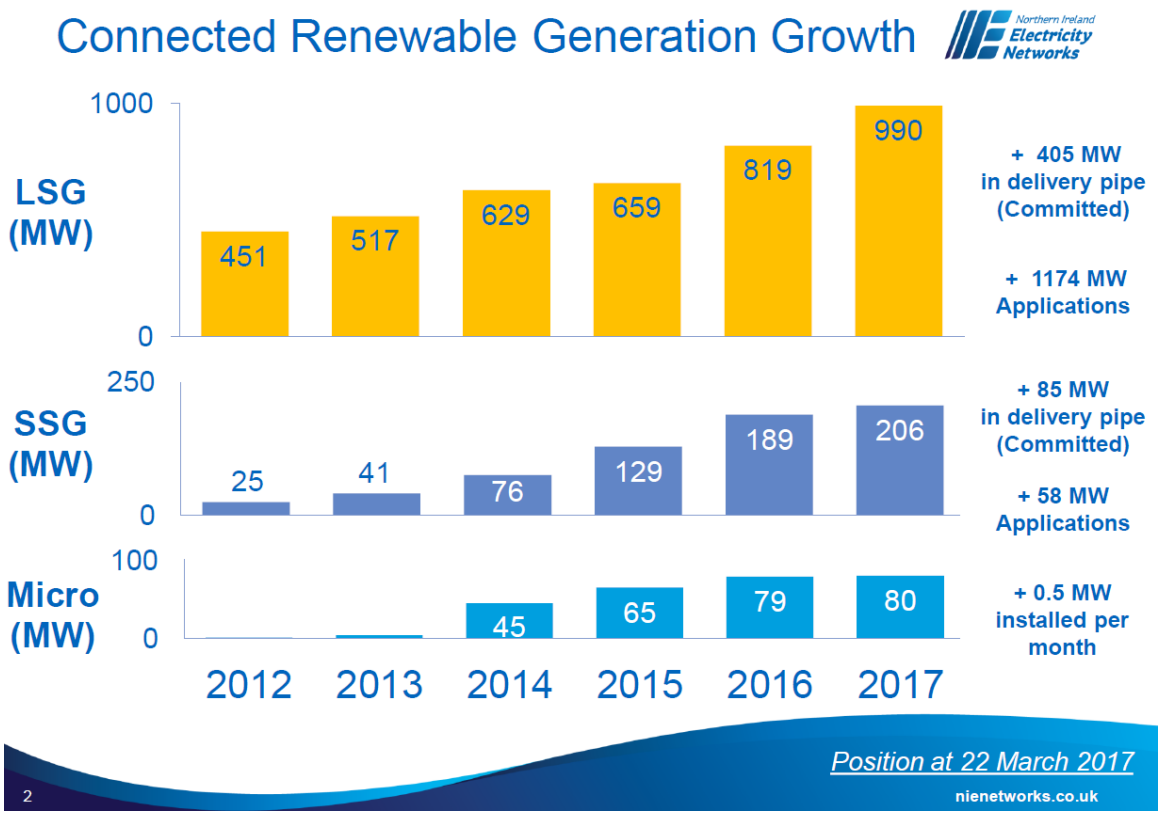


Figure 5: Renewable generation status update