Renewable Generation Status – Q3 2019

NI Connected Renewable Generation Technology

Total c. 1665MW

Wind 1280 MW
PV 251 MW
Biogas 108 MW
Hydro/Tidal 8 MW
Other/Mixed Schemes 18 MW

NI Connected and Committed Renewable

Total c. 1957MW

Wind 1503 MW
PV 309 MW
Biogas 117 MW
Hydro/Tidal 8 MW
Other/Mixed Schemes 19 MW

+ 292 MW to Connect
Transmission Application & Offers

RGLG
3rd December 2019
## Transmission Applications & Offers

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Developer</th>
<th>MEC/MIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applications</strong></td>
<td><strong>Project Name Developer MEC/MIC</strong></td>
<td></td>
</tr>
<tr>
<td>Aught Wind Farm</td>
<td>Aught Wind Farm Limited</td>
<td>37.2MW MEC</td>
</tr>
<tr>
<td>Pigeon Top Wind Farm</td>
<td>Energia Renewables Company 1 Limited</td>
<td>51.6MW MEC</td>
</tr>
<tr>
<td>Islandmagee Gas Storage</td>
<td>Costain Oil, Gas and Process Ltd.</td>
<td>34.75MW MIC</td>
</tr>
<tr>
<td><strong>Offers Issued</strong></td>
<td><strong>Project Name Developer MEC/MIC</strong></td>
<td></td>
</tr>
<tr>
<td>BPS 100MW BESA</td>
<td>EP Ballylumford Limited</td>
<td>100MW MEC &amp; MIC</td>
</tr>
<tr>
<td>Atlantic Hub</td>
<td>Atlantic Hub Property Ltd.</td>
<td>100MW MIC</td>
</tr>
<tr>
<td>Curraghamulkin Wind Farm (also called Dooish)</td>
<td>DW Consultancy</td>
<td>42MW MEC</td>
</tr>
<tr>
<td>Belfast Power Limited</td>
<td>Evermore Energy</td>
<td>489.6MW</td>
</tr>
<tr>
<td>Drumkee Battery Storage</td>
<td>Drumkee Energy Limited</td>
<td>50MW MEC &amp; MIC</td>
</tr>
<tr>
<td>Mullavilly Battery Storage</td>
<td>Mullavilly Energy Limited</td>
<td>50MW MEC &amp; MIC</td>
</tr>
<tr>
<td>KPS 50MW BESA</td>
<td>EP Kilroot Limited</td>
<td>50MW MEC &amp; MIC</td>
</tr>
<tr>
<td>Castlereagh 50MW BESA</td>
<td>Energia Renewables Company 1 Limited</td>
<td>50MW MEC &amp; MIC</td>
</tr>
<tr>
<td>EP Kilroot GT5 and GT6 OCGT's</td>
<td>EP Kilroot Limited</td>
<td>2 x 205MW MEC</td>
</tr>
</tbody>
</table>
Consultation on Connecting Further Generation in Northern Ireland

RGLG 3rd December 2019
The ACAOP process was implemented in June 2016 following consultation with industry. Following the influx of over 1600 MW generation applications to connect to the distribution system:

- Offers issued for connection to the distribution system where there was both transmission and distribution system capacity available without the requirement for further reinforcement on the transmission system.
- With the majority of this transmission capacity* having now been assigned the continuation of this current approach will result in NIE Networks increasingly being unable to issue further distribution export offers.
- Connections Innovation Working Group formed to consider new approach

*with the exception of some remaining firm capacity in eastern areas of the system and at cluster substations
CIWG, ToR

Aim

To consider and as appropriate progress solutions that facilitate the connection of further Distributed Energy Resources in Northern Ireland, which are technically and commercially feasible for the System Operators and for DER developers/operators of both new and existing projects.

Initial area of investigation

• The technical feasibility of allowing distribution connections to be made on a potentially permanent basis with zero FAQ

• The commercial viability for DER operators of new and existing projects
  • Constraint/curtailment information and forecasting;
Existing ACAOP Process – Offers only where Firm Capacity exists

Applicant 1
- Distribution Capacity
- Bulk Supply Point (Transformer) Capacity
- Transmission System Capacity (Firm Access)
- Distribution Offer Provided if All Above Tests Are Met

Applicant 2
- Distribution Capacity
- Bulk Supply Point (Transformer) Capacity
- Transmission System Capacity (Firm Access)

X

X
Key Considerations

- Generators that have their output dispatched down due to curtailment are not compensated for their reduced output
- Curtailment is carried out pro rata on an all island basis
- No Grandfathering exists for curtailment – i.e. incumbent generation is not protected from curtailment
- Increases in the amount of uncontrollable generation i.e. SSG export and zero export likely to contribute to increasing levels of curtailment for LSG
- Reduction in overall system demand would likely contribute to increasing levels of curtailment for LSG
Consultation Options

- **Approach 1: Maintain Status Quo** - Maintaining the existing ACAOP process

- **Approach 2: NIE Network Issues Non-Firm Market Access Distribution Offers for Large Scale Generation (5MW and above)** – Offers issued provided there is transformer capacity

- **Approach 2A: NIE Network Issues Non-Firm Market Access Distribution Offers for Large Scale Generation (5MW and above) within an agreed MW limit** – Offers issued provided there is transformer capacity and within an agreed total RES limit
Key points from technical studies

- Constraints will increase particularly if generation locates in the west
- Constraints improve if the network is reinforced or if demand increased in the constrained area
- Curtailment is not paid for or grandfathered
- In particular at times of low system demand if SONI control room can’t switch off uncontrollable generation this can impact on system stability and also increase curtailment of large scale generation
- New SSG export applications may need to be made controllable following further review

- Applicant 1:
  - Distribution Capacity
  - Bulk Supply Point (Transformer) Capacity
  - Distribution Offer Provided if All Above Tests Are Met

- Applicant 2:
  - Distribution Capacity

Note: The diagram shows the requirements for Distribution Offer. Applicant 1 meets all requirements, while Applicant 2 does not meet all requirements.
<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIE Networks will be able to issue a significant volume of distribution offers</td>
<td>Could lead to a high volume of applicants. This could have a significant impact on curtailment and constraints on both new generators and those generators already connected</td>
</tr>
<tr>
<td>Distribution connection offers will be issued regardless of location (i.e. east and west) provided bulk supply point capacity is available.</td>
<td>Absence of new energy policy presents uncertainty around the approval of further system reinforcements</td>
</tr>
<tr>
<td>Greater parity between applicants to SONI for transmission connections and NIE Networks for distribution connections</td>
<td>Applicants will still be refused due to lack of capacity at distribution level or transformer capacity at transmission level</td>
</tr>
<tr>
<td>Industry can maintain momentum with delivering controllable generation projects ahead of new Energy Policy</td>
<td></td>
</tr>
</tbody>
</table>

Applicant 1
- Distribution Capacity [✓]
- Bulk Supply Point (Transformer) Capacity [✓]
- Within limit of Total Agreed MW Release [✓]
- Distribution Offer Provided if All Above Tests Are Met [✓]

Applicant 2
- Distribution Capacity [✓]
- Bulk Supply Point (Transformer) Capacity [✓]
- Within limit of Total Agreed MW Release [✗]
- Distribution Offer Provided if All Above Tests Are Met [✗]
## Approach 2A

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIE Networks will be able to issue a significant volume of distribution offers</td>
<td>Offers issued may increase the impact on curtailment and constraints on both new generators and those generators already connected.</td>
</tr>
<tr>
<td>Distribution connection offers could be issued with consideration to some additional defined criteria e.g. location (i.e. east and west)</td>
<td>Applicants will still be refused due to lack of capacity at distribution level or transformer capacity at transmission level</td>
</tr>
<tr>
<td>Greater parity between applicants to SONI for transmission connections and NIE Networks for distribution connections</td>
<td>This limit may be reached quickly if they are large MW transmission applicants apply.</td>
</tr>
<tr>
<td>Industry can maintain momentum with delivering controllable generation projects ahead of new Energy Policy</td>
<td>Uncertainty in managing the risk or lost opportunity in predicting a potential new RES-E target.</td>
</tr>
<tr>
<td>Limit provides some longer term protection around the level of constraint and curtailment level experienced</td>
<td></td>
</tr>
</tbody>
</table>

[Logo: Northern Ireland Electricity Networks and SONI]
Next Steps

<table>
<thead>
<tr>
<th>Key Milestones</th>
<th>Proposed Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation Release</td>
<td>December 2019</td>
</tr>
<tr>
<td>Consultation Workshop</td>
<td>Mid-January 2020</td>
</tr>
<tr>
<td>Consultation Close</td>
<td>February 2020</td>
</tr>
<tr>
<td>Decision Paper</td>
<td>Spring 2020</td>
</tr>
</tbody>
</table>
## All-island Dispatch Down in Numbers

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>Q1-Q3 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispatch Down Energy</td>
<td>700 GWh</td>
<td>694 GWh</td>
</tr>
<tr>
<td>Increased emission</td>
<td>350 kt CO²</td>
<td>377 kt CO²</td>
</tr>
<tr>
<td>% of Total Energy/Emissions</td>
<td>2%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Lost Revenue</td>
<td>€50m</td>
<td>€53m</td>
</tr>
<tr>
<td>Curtailment %</td>
<td>4.2%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Constraint %</td>
<td>2.5%</td>
<td>4.2%</td>
</tr>
</tbody>
</table>

![Graphs showing dispatch down, emission, and revenue losses by region](image)
Update on TDPNI

RGLG - 2 December 2019
Transmission Development Plan NI 2019-2028

• Out for consultation until 19 December
• Updated version of TDPNI 2018
• Includes long list of projects SONI think may be required in next 10 years
• Project list also included in SONI price control
• To be consulted on by UR in early 2019 before finalisation
• Projects will be advanced individually and some will be dependent on future energy policy
Tomorrows Energy Scenarios
Northern Ireland
Statutory and Licence Framework
Licence change - TDPNI

• **Condition 40**
  - Reasonable endeavours to prepare and publish a TDPNI
  - Form approved by authority
  - Existing and forecast supply and demand
  - Publicly consulted relevant stakeholders

• **Content**
  - Reinforcement requirements over next ten years
  - Includes projects already approved
  - Timeframe and estimates for projects in next three years
  - Reasonable number of future scenarios

• **Strategic Environmental Assessment**
  - By default no less than once in five years with environmental appraisal report intermediate years.
Scenarios within TDPNI

• Current TDPNI is based on pre-established demand forecast

• Several projects included, as long list of options, to reflect uncertainty around renewables targets

• TDPNI 2019-2028 mainly update of dates, costs, further information etc.

• TDPNI 2020-2029 will begin to consider scenarios
Purpose of TES

- Identify long-term needs on the electricity transmission grid.
- Inform the energy and climate policy debate, focusing on the electricity system.
- Enables decision making where uncertainty exists with analysis techniques such as "least worst regret".
TESNI Development Cycle

1. Prepare scenario framework and storylines
2. Consult on draft scenarios with stakeholders
3. Incorporate feedback and build dispatch models
4. Build grid models
5. Final scenarios publication
6. System Needs Assessment publication

- 2020
- Early 2020

Consultation
Publication
Current phase
Setting the scene for scenarios
Climate Change Act 2008

- Advice
- Amendment
- Action

SONI
Recent achievements and future ambitions for renewable electricity by 2030

NOTE: SCOTLAND have a target of 100% Renewable Electricity by 2030

NOTE: UK figure includes all low carbon generation types
Scenarios
Overall Energy Slide Explainer

- **Primary Energy Mix**
  - Oil
  - Gas
  - Coal
  - Renewable

- **Reduction in Greenhouse Gas from 1990**

- **Primary Energy Renewable Share**

- **Final Energy Use Mix**
Electricity Sector Slide Explainer

- Installed Capacities 2030
- Renewable Electricity Share
- Generation Output 2030
- Final Energy Use Electricity

Annual Energy (TWh) By Technology
Draft Scenario 1
Least Effort

- **50%** Renewables
- **35%** Reduction in CO2

Restricted growth in **renewables** alongside diversification with growth in onshore wind and solar PV

**Switching away from domestic oil-fired boilers is restricted due to cost**

**Electric vehicles only reach 10% share due to costs and range anxiety**

Disclaimer: These are draft scenarios until consultation process is complete.
Draft Scenario 2
Modest Progress

• **60%** Renewables
• **40%** Reduction in CO2

**Significant decarbonisation in generation** as new policies and cost reductions lead to growth in onshore wind and solar PV

**Domestic insulation improves;** 1 in 4 adopt heat pumps – both driven by new builds and renovations

**Increased demand for EVs** due to positive economy

Disclaimer: These are draft scenarios until consultation process is complete.
Draft Scenario 3
Addressing Climate Change

- **70%** Renewables
- **45%** Reduction in CO2

Diverse renewable generation mix: Growth in offshore wind, tidal, solar PV and onshore wind.
Low-carbon technologies adopted widely
Carbon capture technologies contribute to reduced emissions

Disclaimer: These are draft scenarios until consultation process is complete.
Next Steps and Tools
TESNI Development Cycle

1. Prepare scenario framework and storylines
2. Consult on draft scenarios with stakeholders
3. Incorporate feedback and build dispatch models
4. Build grid models
5. System Needs Assessment publication
6. Final scenarios publication

2020

Early 2020


Consultation
Publication
Current phase
System Needs Assessment

Develop scenarios
- We engage with a wide range of stakeholders during our consultations

Grid model
- We apply our technical planning standards to thousands of simulations

Energy model
- We use optimisation software to simulate future energy production and consumption patterns

Identify needs
- We use the concept of drivers and areas to group needs
System Needs Example

**Driver**
Integration of renewable energy generation

**Need**
Power transfer capacity
Voltage support

For illustrative purposes only
Locations
Council Area Breakdown
Installed Capacity of Connected RES Generation (MW)

Legend
241 - Connected

Connected (all RES-E)
1662 MW
Installed Capacity of Connected RES Generation & Pipeline Onshore Wind (MW)

Connected (all RES-E)
1662 MW
Pipeline (onshore Wind only)
954 MW
{ACC 2040 requires +990 MW}

Legend
241 - Connected (76) - Pipeline
373 (99) Derry City & Strabane
236 (234) Causeway Coast & Glens
241 (76) Mid & East Antrim
46 (96) Mid Ulster
49 (14) Armagh City, Banbridge & Craigavon
46 (96) Fermanagh & Omagh
49 (14) Lisburn & Castlereagh
59 (16) Antrim & Newtownabbey
30 (7) Newry, Mourne & Down
94 (2) Belfast
21 (3) Ards & North Down

Notes: Indicative Pipeline Onshore wind assumptions courtesy of NI RE.
Upcoming Reports

Early 2020

2020
Thank you
LSG RoCoF – Complete

- All LSG sites >5MW have been changed to new RoCoF setting
- 1120 MW changed to 1Hz/s RoCoF setting (including new LSG’s connected during the programme)
SSG RoCoF – Current Status

- 1338 SSG’s (99.6%) have been changed to new RoCoF setting
- 399.4 MW (99.85%) SSG now changed to 1Hz/s RoCoF setting
Total RoCoF (LSG & SSG) – Current Status

- 1406 Generators (99.6%) have been changed to new RoCoF setting
- 1519.4 MW (99.96%) Generation now changed to 1Hz/s RoCoF setting

![Pie charts showing changes complete and not complete](image)

* BioGas includes LFG, CHP, AD & Hydro