NORTHERN IRELAND ELECTRICITY Ltd

RENEWABLE INTEGRATION

STATUS REPORT

January 2014

1. INTRODUCTION

The electricity network in Northern Ireland (NI) is facing an unprecedented demand for the connection of renewable generation. To date, 531MW of large scale (>5MW) wind and an estimated 50 to 60MW of small scale (<5MW) renewables has connected to the network. At present the Transmission network, in particular, cannot provide, on an unconstrained basis, for the all of this connected generation. Without intervention the degree of constraint will continue to increase as further generation connects to the network over the next 10 to 12 years. To meet the DETI renewable target of 40% by 2020 SONI estimate that a total of approximately 1,600MW of renewable generation is required.

NIE's response to this challenge has been to develop a coordinated network development plan incorporating a range of measures designed to increase the capacity of the transmission network to accommodate renewable energy over the coming years.

This report details the status of the various projects associated with these measures.

2. PROJECT CATEGORY

The development of the NI transmission network to facilitate the connection of renewable generation has been divided into six categories.

2.1 Short Term Plan (STP)

The STP focused on increasing the capacity of the existing 110kV network by using Dynamic Line Rating[1] techniques combined with selective up-rating. This involved a research and an implementation phase. This work has been completed. In addition, a number of Special Protection Schemes, which disconnected or reduced wind output during certain contingencies, were introduced.

2.2 Medium Term Plan (MTP)

The MTP is a series of projects designed to reinforce the 110kV network to increase capacity and to remove bottlenecks.

2.3 Renewable Integration Development Project (RIDP) and Network 25

The RIDP is a project established in 2007 by the all-island Licensees, NIE and EirGrid and strongly supported by the other NI Licensee SONI. It has reviewed the network capacity limitations in the north and west of Northern Ireland and the north west of the Republic of Ireland, against the level of renewable generation expected to seek connection there by 2020. The level is aligned with the NI and RoI governments' targets to have 40% of electricity from renewable sources. RIDP has identified the issues which will arise due to the connection of renewable generation and has considered a large number of solution schemes. All involve new extra high voltage, 275 and 110kV infrastructure and the uprating of some existing circuits. The RIDP has now reached the end of Phase 3 – after consideration of the technical performance, stakeholder and environmental performance and the cost for each candidate scheme and arrived at a preferred scheme option.

It is intended that RIDP should proceed to phase 4 construction on the basis of taking forward on an individual basis each of the discrete elements of the preferred scheme. Prior to this however NIE, in conjunction with SONI, is preparing a transmission development plan for the

[1] Dynamic Line rating is the application of a variable rating to an overhead line based on environmental conditions.

whole of Northern Ireland (Network 25) supported by an associated Strategic Environmental assessment.

2.4 Generation Cluster Infrastructure

To facilitate the connection of renewable generation to the electricity grid NIE will group or "cluster" generators (generally onshore wind farms) so that they will share transmission network infrastructure. In each case this involves the construction of a 110/33kV substation, connection to the 110kV network and 33kV generation connections. There are expected to be at least 5 cluster substations developed before 2020.

2.5 North South Interconnector (NSI)

The proposed interconnector will require the construction of a new 275/400kV substation and a new 400kV overhead line between Turleenan (Dungannon) and Woodland (Meath). NIE has responsibility for development of the section from Turleenan to the RoI border. Following submission for Planning Approval in Northern Ireland in December 2009, a Public Inquiry commenced (and was adjourned) in March 2012. An updated planning application was submitted in April 2013 and is currently with the DOE for consultation. The recommencement date of the Public Inquiry is unknown at this stage.

2.6 Large Connections

There are a number of large scale renewable generator connections that will require significant Associated Transmission Reinforcement (ATR) in addition to the connection infrastructure. By application of present policies these associated works are considered "deep" and therefore the costs associated with the ATR work are not attributable to the generator.

3. STATUS OF PROJECTS

Section 4 of this report explains the status of the various Renewable Projects against a number of discrete stages. Each project will progress from the initial identification of a potential network overload or voltage irregularity on the transmission network to the implementation of a suitable reinforcement scheme. The stages in the process are described below.

3.1 Planning and Design

NIE and SONI cooperate to identify those areas of the Transmission network where there are, at present, risks of overload or voltage irregularity or where these are forecast to occur in the future 10 year period.

Detailed electrical studies and economic analysis are then carried out to identify appropriate reinforcement schemes and timescales for their delivery. The processes whereby NIE and SONI cooperate are detailed in the Transmission Interface Agreement (TIA).

3.2 Pre-construction Approval

Pre-construction work is required to develop a project to the stage where a planning application can be submitted, a high level design is completed and an estimated cost calculated with an acceptable level of accuracy. Not all projects (e.g. overhead line re-

conductoring) require a pre-construction stage and may proceed directly to the construction approval stage.

The expenditure associated with a project that requires a pre-construction stage will require initial approval by NIE. An approval paper explaining the case of need and estimated costs of the pre construction work will be submitted to the UR, following NIE approval. The UR will consider the funding request and advise NIE if the application is approved.

3.3 Pre-construction work

When a project has received NIE and the UR's pre-construction approval pre construction work will commence. The pre-construction stage will typically include the following activities:

- Overhead line design
- Substation design
- Civil design
- Earthing studies
- Circuit Routeing (for any overhead lines or cables)
- Environmental Impact Assessment
- Planning application and Environmental Statement
- Public consultation
- Ground investigations
- Obtaining land related agreements
- Land registry
- Procurement / detailed costing

It is proposed that responsibility for investment planning will transfer from NIE to SONI in April 2014. This will cover both the Planning and Pre Construction stages. Work is presently ongoing between NIE and SONI to give effect to this change.

3.4 Construction Approval

As with pre construction, the expenditure require to carry out construction will require initial approval by NIE. A construction approval paper updating the case of need and estimated construction costs will be submitted to the UR following NIE approval. The output of the pre-construction work will be used to provide accurate costs.

3.5 Construction

When a project has received NIE and the UR's construction approval, construction work can then begin. The work will be completed in accordance with the design, programme and budget provided for in the construction approval.

3.6 Completion Report

NIE will carry out a post investment appraisal of the completed project. A completion report, which compares the original objectives of the project against what has been achieved, will be submitted the UR at a suitable time after the work is completed.

4. Indicative Schedule

The following table 1 provide a high description for each project and its present status. Table 2 provides an indicative programme for each of those projects that has been approved for either pre construction or construction.

Table 1 – Project Description

Cat	Project	Description	Status
STP	Dungannon to Omagh A&B Phase 1	Partial up-rating with High Temperature Low Sag (HTLS) conductor and installation of Dynamic Line Rating (DLR)	Complete
MTP	Omagh Main Transformers	Replacement of 2x40/60MVA transformers with 2x63/90MVA	Complete (completion report to be submitted)
MTP	Dungannon to Omagh A&B Phase 2 (Part 1)	Complete up-rating with Invar	Complete (completion report to be submitted)
MTP	Dungannon to Omagh A&B Phase 2 (Part 2)	Divert both circuits to Tamnamore	Construction
MTP	Kells to Coleraine Phase 1	Up-rate Terrygowan to mid-Antrim with HTLS conductor	Complete (completion report to be submitted)
MTP	Kells to Coleraine Phases 2 and 3	Ph 2 - Up-rate Kells to Terrygowan with HTLS conductor, Ph 3 – Up-rate mid –Antrim to Col with HTLS conductor	Construction
MTP	Tamnamore Phase 2	Install a second 275/110kV interbus transformer, Divert second 275kV line into Tam, Divert multiple 110kV lines into Tam, Install 200MVA cable on selected 110kV circuits	Construction
MTP	Tamnamore to Omagh new circuit	Construct a new 110kV single circuit between Tamnamore and Omagh	Pre Construction Work
MTP	Coleraine to Limavady	Complete up-rating with HTLS conductor	Not commenced; timing dependent on network 25
MTP	Coolkeeragh to Limavady	Complete up-rating with HTLS conductor	Not commenced; timing dependent on network 25
MTP	Coolkeeragh to Coleraine	Complete up-rating with HTLS conductor	Not commenced; timing dependent on network 25
MTP	Limavady Substation	Divert the Coleraine to Limavady 110kV lines into Limavady	Not commenced; timing dependent on network 25
MTP	Tamnamore to Creagh	Complete up-rating with Invar	Not commenced; timing dependent on network 25

Table 1 Cont...

Cat	Project	Description	Status
Cluster	Mid-Antrim	Initially 1x60/90 Tx with room for 2nd, Looped into Kells – Coleraine portal line	Pre construction work
Cluster	Tremoge	Initially 1x60/90 Tx with room for 2nd, Looped into Dungannon – Omagh B	Pre construction work
Cluster	Gort	Initially 1x60/90 Tx with room for 2nd, Looped into new Tamnamore – Omagh 110kV cct	Pre construction work
Cluster	Altahullion/Limavady	Initially 1x60/90 Tx with room for 2nd.	Pre construction work, however work has stopped, cluster will not proceed, completion report to be submitted
Cluster	Drumquin	Initially 1x60/90 Tx with room for 2nd, 110kV line to new switching site at Dromore	Updated Pre- construction approval submitted in Dec 13
RIDP	Phase 1 - Scope	Establish the scope and assumption. Carry out technical analysis to determine the issues	Complete
RIDP	Phase 2 – Technical analysis	Develop reinforcement options. Complete detailed electrical analysis of option. Recommend a number of technically feasible solutions	Complete
RIDP	Phase 3 – Non technical analysis	Environmental analysis of options. Stakeholder consultation. Recommend a preferred option.	Complete (completion report to be submitted)
RIDP	Phase 4 – Construction	Divide the preferred option into a series of distinct projects. For each project carry out a detailed design and costing exercise, obtain necessary approval and consents and construct	Not commenced; timing dependent on network 25
Network 25	Preparation of Network 25 strategy	Preparation of a strategy document that sets out the transmission development requirements out to 2025. Also the carrying out of an associated Strategic Environmental Assessment	Commenced
Conn	600MW offshore WF - East Coast	Connection and ATR	Not commenced, although some feasibility work ongoing
Conn	200MW offshore tidal - Torr/Fair Head	Connection and ATR	Not commenced, although some feasibility work ongoing
NSI	400kV Interconnection	Construction a new 400kV overhead line between Turleenan (Dungannon) and NI/ROI border.	At PAC
SSG Small Scale Generation	33/11kV Prmary Substation Transformer Investment	Work at 33/11kV primary substations to cater for impacts of small scale generation.	Work at a number of primary subsations is now approved. Design and procurement is underway

Table 2 Indicative Programme for projects that have been approved for either pre construction or construction

Cat	Project	2009				2010				2011				2012				2013				2014				2015				2016				2017			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
STP	Dungannon to Omagh A&B Phase 1																																				
MTP	Omagh Main Transformers																																				
MTP	Dungannon to Omagh A&B Phase 2 (Part 1)																																				
MTP	Dungannon to Omagh A&B Phase 2 (Part 2)																																				
MTP	Kells to Coleraine Phase 1																																				
MTP	Kells to Coleraine Phases 2 and 3																																				
MTP	Tamnamore Phase 2																																				
MTP	Tamnamore to Omagh new circuit																																				
Cluster	Magherakeel																																				
Cluster	Mid-Antrim																																				
Cluster	Tremoge																																				
Cluster	Gort																																				
RIDP	Phase 1 - Scope (2007 - 2008)																																				
RIDP	Phase 2 – Technical analysis (2008-2011)																																				
RIDP	Phase 3 – Non technical analysis																																				
Network 25	Network 25																																				
SEA	Strategic Environmental Assessment of Network 25																																				

Design / Planning
pre-construction approval
Pre-construction work
Construction approval
Detailed design/Construction work
Completion Report

Note re Gort:- Gort pre construction was included as part of the medium term opex allowance

Note re Small Scale Generation; Work at 33/11kV primary substations to cater for impacts of small scale generation - Programme of work is being developed