Northern Ireland Electricity Networks

FACILITATION OF ENERGY STORAGE SOLUTIONS

Innovation Project

September 2020

Contents

1. Background

Increasing levels of intermittent renewable generation, growing demand and low carbon technologies present significant challenges to the Northern Ireland distribution network. Managing network constraints is becoming increasingly challenging on the distribution network, with thermal capacity one of the most prevalent, as power flows at times of peak demand exceed the network's capability. The voltage level also causes constraints and maintaining voltages within statutory limits with the existing voltage control techniques is increasingly challenging.

The problem is exacerbated due to the connection of distributed generation *(DG)* which introduces voltage rise. In addition, intermittent renewable generation and variable demand affected by embedded DG *(such as solar PV)* has reduced the predictability of load and generation cycles. If unacceptable network conditions are experienced or expected to occur then these will necessitate modifications to the network to safely and efficiently meet the existing demand and any anticipated growth. The previous approach has been to reinforce the network, but this is costly and often takes a considerable amount of time.

Energy Storage Solutions *(ESS)* can absorb or release energy and therefore can provide a deferral of network reinforcement, allowing the accommodation of further demand or generation which would otherwise be constrained by thermal capacity. ESS can also play in the System Services market helping to balance demand and generation.

The integration of ESS into the Northern Ireland electricity network could therefore provide:

- Deferral of network reinforcement allowing the accommodation of further demand or generation which would otherwise be constrained by thermal capacity.
- System services to provide ancillary services for whole system benefits.
- The ability to avoid generation curtailment, if applicable.

In addition storage can be modular and potentially re-locatable, and offers a more reliable response in contrast to demand response solutions.

Enhancing the ability of the network to accept energy storage can help meet net-zero targets and it is therefore important that it is appropriately supported and its integration in the distribution system is considered.

2. Project Summary

The Facilitation of Energy Storage Solutions *(FESS)* project will set the framework to enable the integration of cost effective Energy Storage Services *(ESS)* to NIE Networks' network and will prepare the transition of integrating ESS into business as usual *(BaU)* practice.

Although technical aspects of the installation of ESS have been addressed and continue to be researched through Great Britain *(GB)* projects and by developers, integration within NIE Networks' regulatory and business structures is required for the realisation of ESS benefits to the distribution network in NI.

ESS is likely to require income streams from distribution services, ancillary services and operation in the wholesale market so a cost-effective solution can be achieved. As well as a detailed review of NIE Networks' policies, legislation and regulatory documents, the FESS project will provide stakeholders and energy storage providers an opportunity to provide their views on the current energy storage market and to indicate what barriers are currently present which are preventing greater volumes of energy storage in NI.

The project will enable the integration of ESS onto NIE Networks' electricity network via:

- Review of current legislation, regulatory documents and NIE Networks' own connection policies, to identify barriers to deployment.
- Development of efficient and effective solutions to these barriers that will encourage the deployment of energy storage solutions.
- Definition of distribution network services through the identification of the needs of the network that can be solved with suitable ESS technologies.
- Preparation of generic technology agnostic ESS requirements.

3. Objectives

The key objectives of the FESS project are to:

- Perform a market evaluation of ESS providers in NI.
- Identify potential use cases for ESS in NI.
- Identify barriers to the wider deployment of ESS in NI.
- Develop solutions to the identified barriers and consult on the proposed changes.
- Consider feedback from the consultation and implement the solutions.

4. Method

FESS focuses on the objectives above to define the steps to allow competition for the deployment of ESS on NIE Networks' network based on lessons learned from previous ESS projects. The project involves a number of key tasks which are explained below.

4.1 Technology Assessment

Initially, a detailed review of similar projects in GB and internationally will be conducted. This will include, for example, technology characterisations and specifications, communication systems, storage duration and frequency of operation. Additionally, research will review how other jurisdictions treat energy storage i.e. connection principles, commercial arrangements, and regulation, etc. A review of the TSO system services market to assess the ability to stack services will also be completed

High level technology research covering a wide range of energy storage solutions will be carried out to gain awareness of the relevant technologies, along with a review of previous examinations of the commercial and business aspects of their connection and operation. This technology assessment will be technology neutral to evaluate the potential benefits of the various technologies on a consistent basis and to allow for open competition between technologies and suppliers; and will feed into the development of the potential use cases.

4.2 Market Evaluation

Market evaluation will aim to understand the size of the existing market within Northern Ireland and the appetite for participation. This will include a survey of storage providers, including those already offering services to SONI, the TSO, to determine their eagerness to participate and the likely volume of energy storage available.

4.3 Network Constraints

NIE Networks will perform network studies to identify existing constraints on the network where ESS could prove to be a solution, using information provided in the technology assessment. Future constraints will also be identified and the benefit that can be derived from ESS quantified.

4.4 Potential Use Cases

Potential use cases for energy storage in Northern Ireland will be identified. Examples include, but are not limited to, the use of energy storage to help with thermal constraints, voltage constraints, harmonics, reactive power compensation etc. Storage technologies are suitable for many different applications, providing great flexibility to the network.

A study of each energy storage application and potential use cases will inform NIE Networks of the typical requirements of such an installation and will determine the initial capacity, durations and frequency of the ESS operation. Consideration will be given to what should happen should the ESS fail to provide the required service. Engagement with the TSO will inform of system services requirements, allowing ESS service providers to stack services to provide revenue.

4.5 Identify Barriers

There may be barriers to ESS deployment on the Northern Ireland electricity network including legal, regulatory and NIE Networks' policy. This task will involve reviewing the current regulatory framework and assessing the necessary changes to allow the benefits of energy storage to be realised within the distribution network.

There will be a review of NIE Networks' internal connection policy, as at present energy storage is required to 'queue' for a connection in the same way a generator would. This will need to be reviewed to determine if energy storage can jump the queue or have a separate queue, in order to relieve the constraints on the network and allow further connections of demand and generation. Assessment of EU codes for any barriers to ESS deployment will be included in the task to identify all key barriers to energy storage deployment.

NIE Networks will identify the potential legal and regulatory barriers that may affect the successful deployment and utilisation of ESS on NIE Networks' distribution networks, these barriers can reduce the commercial viability of storage by increasing risk or reducing revenue potential. A key driver for the viability of ESS is its ability to provide multiple services. However, opportunities for a single ESS asset to provide multiple services may be limited depending on the regulatory framework, market characteristics and rules. Resolving this potential issue would increase the viability of ESS deployment.

4.6 Develop Potential Solutions

NIE Networks will identify potential solutions and consider modifications to address the issues identified in Section 4.5, with the aim to create an appropriate framework which enables the deployment of ESS. This will include assessing which policies are suitable for facilitating energy storage and which need updated, and proposing any legislation developments necessary.

The policies, legislation and arrangements identified will need to be modified to address these barriers, which will involve engagement with the Utility Regulator, SONI and other stakeholders. Through engagement, consideration shall be given to conflicts and synergies of the ESS providing services by multiple contracts. Engagement with stakeholders will capture the benefits of energy storage and overcome any issues that would impede the successful deployment of ESS in the NIE Networks' system for distribution network services.

NIE Networks will issue a consultation on the proposed changes to legislation and policy to develop the framework for energy storage deployment. This will enable industry to provide their views on NIE Networks' framework.

4.7 Transition into Business as Usual

The transition to BaU within the FESS project will implement the updated proposed solutions following the consultation, updating policies and specifications, and providing training and support to staff. In addition, NIE Networks will carry out dissemination of project learning involving up to 3 events.

In summary, the transition to BaU will comprise of:

1. Implementation of the results from the consultation and final solutions. This will include updating policies and specifications and providing recommendations where appropriate.
2. Provide NIE Networks' staff with appropriate and sufficient training and support.

6. Project Timeline

Q2 2020

START DATE

Q1 2021

CONSULTATION ON PROPOSED SOLUTIONS

Q3 2021

EXPECTED COMPLETION