FlexTech Response to Consultation

A Flexible Technology Integration Initiative

14/7/2020

Supported by

Disclaimer

EirGrid as the Transmission System Operator (TSO) for Ireland, and SONI as the TSO for Northern Ireland make no warranties or representations of any kind with respect to the information contained in this document. We accept no liability for any loss or damage arising from the use of this document or any reliance on the information it contains. The use of information contained within this consultation paper for any form of decision making is done so at the user's sole risk.

Executive Summary

In 2019, EirGrid and SONI as part of the EirGrid Group, spent significant time developing our strategy for the future and considered in detail what we do, why we do it and how it could be even better. Based on this look to the future, it is clear that in order to deliver on our ambition of 70% renewables by 2030 and a pathway to net zero carbon emissions by 2050, it is imperative that we work in a more collaborative and dynamic manner with industry, ESB Networks, NIE Networks, regulators in both Ireland and Northern Ireland as well as other key stakeholders.

The concept of the **FlexTech Integration Initiative** is to facilitate that very important collaboration. Our intent is to foster greater cooperation and transparency as we collectively solve the challenges associated with renewable integration and deliver the flexibility the All-Island power system will require when operating above 90% SNSP operational limits.

In September 2019, we published our first FlexTech consultation paper. The focus of this consultation was to gain an understanding of industries perspective on key challenges and what industry believes are the priorities for the future. Based on this feedback, together with ESB Networks and NIE Networks we have developed a framework of priorities which we commit to focusing on over the coming years. This framework is a multi-year programme of activity focusing on short, medium and long term strategic priorities across Hybrids, Storage, Demand Side management, Large Energy Users and Small Scale Generation & Renewables.

In delivering on this framework, industries participation will be facilitated through bi-annual forums, annual consultation, direct engagement at a working group level and enhanced participation through the advisory council (currently the DS3 Advisory Council).

Unfortunately, as a result of the Covid-19 pandemic it is not possible to hold physical forums, therefore it is our intent to hold online forums until further notice.

We understand that our response to this consultation has taken some time, however, this is reflective of the need to appropriately consider the issues in conjunction with our partners in ESB Networks, NIE Networks as well as regulators in both in Ireland and Northern Ireland. Now that our priorities are identified and agreed we will endeavour to respond in a more efficient manner. In tandem with setting out our priority areas we have made a concerted effort to provide detailed responses to the issues raised.

Finally EirGrid, SONI, ESB Networks and NIE Networks would like to take this opportunity to thank you for your support and input into this process to date and look forward to working with you in transforming the power system for future generations.

Contents

1 Introduction and Background

1.1 The FlexTech Initiative

The FlexTech Integration Initiative is being co-ordinated by EirGrid and SONI with the support of ESB Networks and NIE Networks. The aim of the initiative is to break key barriers across a broad spectrum of technical, operational, commercial, regulatory, and market challenges to facilitate the integration of renewables. In doing so, the objective is to maximise the opportunity for effective use of new and existing technologies to meet the needs of the future power system.

It is recognised that enhanced engagement across the sector is required to help make this happen. The FlexTech Integration Initiative will provide a comprehensive platform through which the System Operators engage with one another, the regulators and industry and to maximise this potential.

1.2 Purpose of this Paper

In June 2019, the inaugural FlexTech Integration Initiative industry forum was held. At this forum we outlined our view on the key challenges and barriers to renewable integration. In September 2019, a consultation paper was published setting out a series of related questions based on the key themes of the FlexTech structure and five key technology areas of:

- Hybrids,
- Demand Side Management,
- Storage,
- Large Energy Users,
- Small Scale Generation & Renewables.

The objective of the consultation paper was to gain stakeholders' perspectives on the key challenges industry face and what they believe are the priorities for the future based on but not limited to the above. Following consideration of the feedback received, we are publishing this response to consultation paper. The purpose of this paper is to outline the priority areas identified, the response to consultation and the deliverables of work for each of the working groups over the short, medium and long term.

1.3 Structure of this Paper

- Section 1 provides an introduction to this document.
- Section 2 provides a list of the respondents.
- Section 3 provides a summary of the comments received on the FlexTech structure accompanied by the response.
- Section 4 provides a summary of the comments received on the Hybrid Working Group accompanied by the response.
- Section 5 provides a summary of the comments received on the Storage Working Group accompanied by the response.
- Section 6 provides a summary of the comments received on the Renewable/SSG Working Group accompanied by the response.
- Section 7 provides a summary of the comments received on the Large Energy Users Working Group accompanied by the response.
- Section 8 provides a summary of the comments received on the Demand Side Management Working Group accompanied by the response.
- Section 9 provides a summary of the comments received on the Qualification Trial Process accompanied by the response.

2 Responses to Consultation

Two confidential responses and seventeen non-confidential responses were received. The seventeen non-confidential responses came from:

- Bord Gais Energy
- Demand Response Association of Ireland
- Energia
- ESB Generation Trading
- Bord na Mona
- ESB Customer Solutions
- Reactive Technologies Ltd.
- Everoze
- Moyle Interconnector Ltd.
- Piclo
- Aughinish Alumina Ltd.
- Gas Networks Ireland and Ervia
- Innogy Renewables
- Irish Wind Energy Association and Northern Ireland Renewables Industry Group
- Coillte
- Scottish and Southern Energy
- Statkraft

The views of respondents have been summarised and addressed in this paper. A number of respondents provided very specific replies, often reflecting the respondents' particular circumstances.

3 FlexTech Structure

3.1 Overview

At the inaugural forum held in June 2019 the proposed structure and governance of the initiative was set out. The proposed structure was designed to reflect the positive engagement in the DS3 programme and to learn from less successful engagement mechanisms highlighted such as the original Hybrid Working Group set up back in 2017. Through discussion during the forum and feedback received from the consultation it was evident that industry wish to have greater engagement, collaboration and accountability.

To that extent we believe we have enhanced the structure and engagement mechanism while at the same time being cognisant of time and effort constraints on all parties. This structure is described and set out below.

3.2 Summary of key issues identified

While not specifically related to barriers to renewable integration, it is recognised that improvements to the proposed engagement mechanism will help facilitate better outcomes. Through the consultation feedback, engagement with ESB Networks and NIE Networks a number of areas of improvement have been identified. They fall into three primary topics of **Structure, Transparency & Engagement**. The following outlines our intended approach which considers the views of stakeholders. It should be noted that while we have attempted to take account of the feedback received, it has not been possible to address each point of view.

3.2.1 Structure, Transparency & Engagement

Through the consultation feedback it has been identified that industry wish to have greater engagement, collaboration and accountability than proposed at the inaugural industry forum. To that extent, we believe we have enhanced the structure and engagement mechanism. The following highlights where we intend to enhance engagement, collaboration and accountability while at the same time being cognisant of time and effort constraints on all parties.

The Flex-Tech Integration Initiative shall consist of three distinct functions:

1. System Operator Working Groups
2. A TSO/DSO/DNO Task Force
3. Industry Engagement

Figure 1 below illustrates the interaction between the distinct functions and the participants as well as highlighting the planned industry engagement mechanisms.

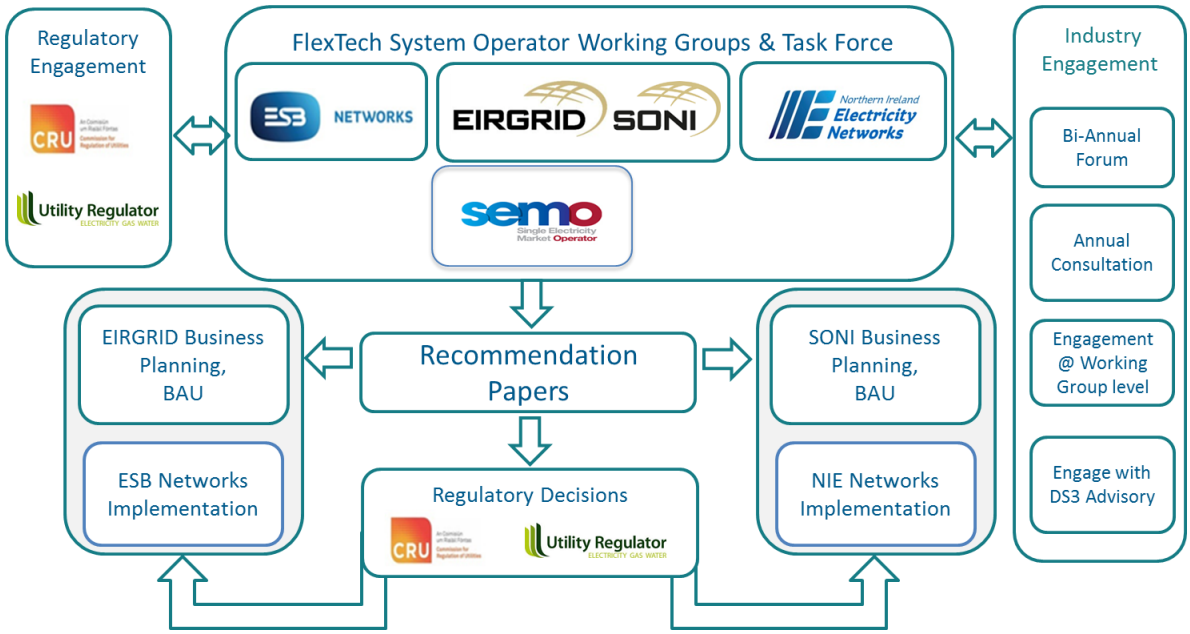

Figure 1- Structure & interaction of distinct functions within Flex-Tech Initiative

3.2.2 TSO/DSO Working Groups and Task Force

The System Operator Working Groups will consist of Working Group Leads from across EirGrid, SONI, ESB Networks and NIE Networks. A Working Group Lead will be appointed under each of the priority areas from each organisation where appropriate. The Working Group Leads will be responsible for identifying and progressing issues within their organisation. The TSO/DSO Task Force will consist of the Work Group Leads along with TSO/DSO representatives from each organisation. The TSO/DSO representatives will be responsible for co-ordinating issues identified under each of the working groups, or which require co-ordination

across the various organisations. The TSO/DSO representatives will also be responsible for ongoing engagement with the regulators.

3.3 Industry engagement

Based on the feedback received, we are setting out our intended engagement mechanisms with industry. Opportunity for industry engagement, collaboration, communication and consultation and is set out below. As illustrated in Figure 2, we intend on holding two forums a year, one in spring and one in autumn where stakeholders will be invited to attend and have their say. We shall hold an annual consultation and engage with the DS3 Advisory on a quarterly basis. From time to time, and as the need arises we shall seek nominations through the DS3 Advisory and FlexTech forums to work with our experts at a working group level on specific topics or issues that would benefit from external input.

Note: it is our intention to continue with an Advisory similar to the DS3 Advisory for the future DS3 programme of work designed to facilitate our 2030 targets.

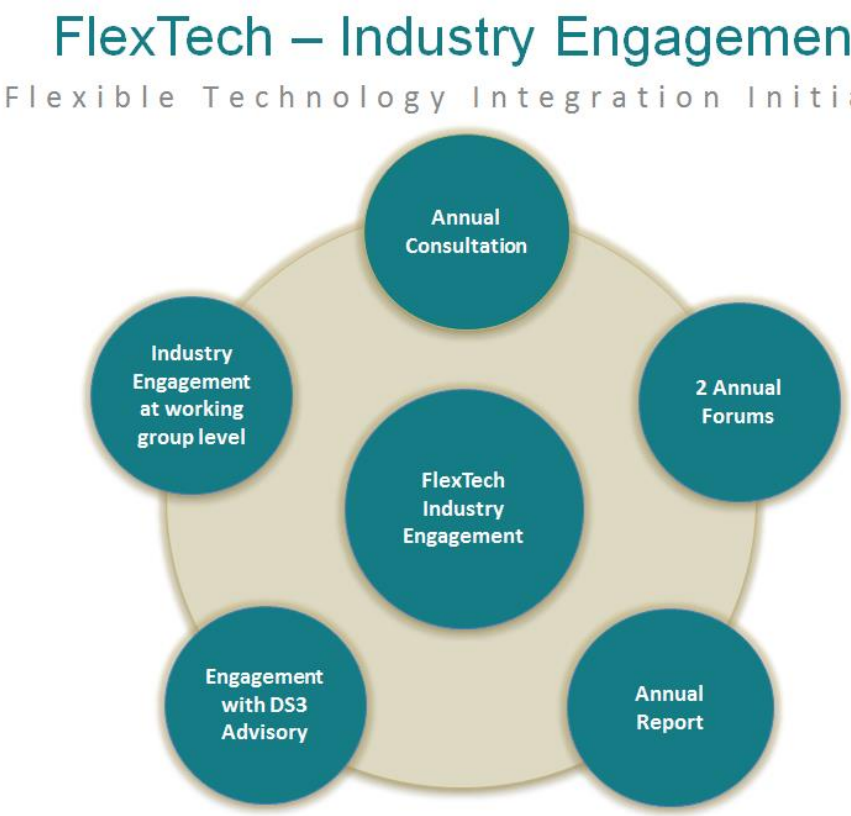

Figure 2 - Enhanced Industry Engagement

3.3.1 FlexTech Industry forums and annual consultation

The Industry Forum shall:

- Provide an open and transparent platform for engagement between system operators, regulators and industry;
- Allow all interested parties the opportunity to discuss the wide range of topics being addressed across all working groups;
- Allow for better understanding of new and existing technologies and the opportunities/issues they may present. .

The forum shall also provide an opportunity for industry representatives to engage with one another, the System Operators and Regulatory Authorities on new and existing opportunities/issues. The forum will not be a decision making or policy formulation body. In order to make real progress, it must be clearly understood from the outset that for TSO related matters EirGrid Group shall be the decision maker with respect to the final terms of reference and the topics for further investigation. ESB Networks and NIE Networks will be the decision maker with respect to the topics for further investigation with regard to the relevant distribution system.

Where issues impact across System Operation, the System Operator Task Force shall seek to agree a way forward and progress solutions. In arriving at our decisions, we will endeavour to address key concerns of industry while not compromising on the overall system need with respect to renewable integration and 2030 policy objectives. It is intended for two FlexTech industry forums to be held each year in the spring and autumn.

At the Spring Forum, we shall confirm the content/priority areas of the Working Groups and associated deliverables for the coming 12 months, outline priorities for the coming 3 years, report on progress to date and publish the response to the previous consultation. Where a need is identified, we shall seek nominations of experts through the DS3 Advisory and industry forums to provide input at a working group level.

At the Autumn Forum, we shall report on progress to date, set out the consultation and proposed priorities for the following year.

We will then publish a consultation document seeking feedback from industry on these priorities. It is our intention to publish an annual report detailing progress made throughout a given year.

3.3.2 Industry Engagement at a Working Group Level

We recognise the need for further engagement with industry at a working group level. This will vary between Working Groups depending on the deliverables in a given year and specific topics. It is TSOs' intention to highlight the need for industry engagement on certain topics at the bi-annual forums and DS3 Advisory Council meetings and seek expressions of interest from external parties to provide such input and expertise. In addition to industry participation, given the broadness of subject matter, this may be supplemented by experts from academia and research.

3.3.3 Quarterly Updates

The DS3 Advisory Council is an established forum for the System Operators to engage with industry on technical issues. The FlexTech initiative will provide regular updates through this forum.

Note: it is our intention to continue with an Advisory similar to the DS3 Advisory for our future programme of work designed to facilitate our 2030 targets.

3.3.4 Annual Report

An annual report setting out the priority areas, 1 and 3 year plans, and progress made, stakeholder interactions and summary of consultation shall be published.

3.4 Other general topics highlighted through the consultation

3.4.1 Overall Goal/Vision

Industry Feedback: Clarity was sought on the goals of FlexTech, one submission stated that the structure needs to include a master plan and that a vision must be in place at the start for what will be achieved at the end.

Response: In line with our published strategy, we are developing a 2030 system vision alongside the future programme to replace DS3 programme that shall ensure delivery of 90% SNSP by 2030. The FlexTech initiative shall form a key

pillar of this broader piece of work. The goal of the FlexTech Integration initiative is to provide a platform of engagement with industry, regulators and System and Market Operators to identify and breakdown barriers to renewable integration and enabling technology. Initially we shall focus on technological, systems, policy, procedural, market and regulatory challenges across five key topics of

- Hybrids,
- Storage,
- Demand Side Management,
- Small Scale Generation and Renewables,
- Large Energy Users.

In considering the above, the TSOs recognise that a collaborative and co-ordinated approach with industry, regulators and System and Market Operators is required to address many of the associated barriers to renewable integration and facilitator technologies. We also recognise that many of the challenges we face are relevant at a European level and the learning from the FlexTech initiative shall feed into the EU-SysFlex project.

FlexTech will identify solutions for implementation within EirGrid & SONI as well as putting forward regulatory recommendations for change. The System Operator Task Force will work collaboratively to put forward collective recommendations (where agreed) for implementation across the sector and to the relevant regulator. The FlexTech Integration Initiative is co-ordinated by EirGrid & SONI supported by ESB Networks and NIE Networks.

3.4.2 Determination of priority areas

Industry Feedback: Clarity was sought with respect to identification of priority areas.

- If the annual consultation will determine which issues are progressed first?
- How the priority issues are determined by the System Operators?

In assessing the feedback and developing the priority areas we shall be cognisant of the view of industry. However it in itself will not explicitly determine which issues are to be progressed first. The TSOs and DSOs will need to assess and determine suitability, deliverability and overall benefit.

3.4.3 Milestones

Industry Feedback: Industry sought clarity on the project Milestones.

Response: Programme milestones shall be published on an annual basis as part of the response to consultation.

3.4.4 Clarity on roles

Industry Feedback: Respondents sought clarity on the roles of the regulators, EirGrid, SONI, SEMO, ESB Networks and NIE Networks within the initiative. One submission highlighted the possible need in their view for the involvement of the Distribution and Transmission Asset Owners. A number of responses stressed the need for the FlexTech Initiative to be adequately resourced and prioritised to ensure effective delivery.

3.4.5 Governance

Industry Feedback: There were a number of queries relating to the governance of the FlexTech Initiative. Many respondents felt the DS3 structure had been successful in the past and this model should be reused. Some responses sought accountability (both to RAs and industry) on scope, priorities and deliverables.

Other responses included:

- If the annual consultation will determine which issues are progressed first?
- How the priority issues are determined by the System Operators?
- How the new developments within the various strands will be coordinated within the overall structure?
- How participants within the various work-streams will be informed of new developments?

There was a suggestion that a set of principles and objectives should be set as a minimum to provide criteria that all parties can point to and understand when trade-offs have to be made in prioritising issues. Another submission suggested the development of an overall board consisting of system operators, regulatory

authorities and elected industry representatives to strategically map out the development of Flex Tech.

One submission outlined that given the pace of change in both technology and business models, we strongly advocate adopting an agile, flexible governance approach, which can respond rapidly to issues as they emerge.

3.4.6 Existing Frameworks

Industry Feedback: Some responses outlined the need to maintain existing frameworks (T&SC Committee, Grid Code Review Panel and quarterly industry meetings) and request clarification as to how these frameworks will interact with the wider FlexTech structure. It is clear that FlexTech will cut across numerous market segments, however it is not clear if formal and approved interfaces are in place to facilitate change across these areas e.g. DS3 and the SEM arrangements.

Response: Where there are existing frameworks in place to efficiently and effectively address issues these mechanisms will be utilised or referred to in the first instance.

3.4.7 Investment Signals

Industry Feedback: A number of responses sought for the initiative to provide better certainty in terms of investment signals for developers.

Response: Where a system need is identified through the DS3 programme, SEMC approval will be sought to ensure the appropriate investment signals are in place to fulfil the needs within the appropriate timelines.

3.4.8 Holistic Approach to Technical, Commercial and Market Issues

Industry Feedback: One submission noted a concern that FlexTech will be focusing only on technical issues and it was noted that a more holistic approach was required. Another submission suggested considering the need for additional task forces to consider commercial issues and market arrangements as the focus of the System Operator Task Force may end up too technically focused.

Response: It is not the intention of this initiative to be limited to technical issues, this can been seen through examination of the priority areas identified for 2020/2021.

3.4.9 Document Control and Programme Management

Industry Feedback: One submission felt consideration should be given to implementing proper document controls on new publications and cataloguing within the EirGrid Document Library to ensure easy access to relevant FlexTech documents. One submission suggested that FlexTech would benefit from implementing bespoke programme management and reporting structures, based on forecasting and forward-looking modelling with metrics that could be updated and reported on regularly to industry.

Response: All related documents for public consumption will be published on the relevant website. Programme management of the FlexTech Initiative shall be co-ordinated by the EirGrid Group Innovation team. Appropriate programme management process and tools shall be applied.

3.4.10 Congestion Management

Industry Feedback: One submission noted the issue of congestion management and felt it had not been sufficiently addressed within the Consultation Paper.

Response: It is recognised that transmission congestion management is a challenge for renewable integration. There is on-going work being progressed by the EirGrid/SONI Near Time team to develop a congestion management tool. An update on this work will be provided to industry later this year. Smart solutions for congestion management are also currently being examined.

In addition technical analysis in system scarcities (of which congestion management is expected to feature) is currently being considered in the EU-SysFlex Project. This shall inform the future programme relating to 90% SNSP. Mechanism to deal with congestion and adequate remunerations are also been considered under the Clean Energy Package which the RAs will be consulting on and which we will take into consideration.

3.4.11 QTP Budget

Industry Feedback: One submission noted that no budget was provided for the Qualification Trial Process (QTP). It was suggested that the budget should be provided in order to give views on activities that could be trialled under QTP.

Response: Addressed under Section 9 of this document.

3.4.12 Additional Priority Areas

Industry Feedback: Additional recommendations noted: Consideration of additional strands for thermal generation, interconnectors, delivering zero-carbon system services. Grid access- connection policy, infrastructure upgrades and non-wire alternatives to network build-out.

Response: The Working Groups for 2020/2021 have now been finalised however these will be reviewed and revised in 2021/2022 based on system needs.

3.4.13 Open Networks

Industry Feedback: One submission suggested developing a structure similar to the Open Networks Forum in the UK.

Response: Thank you for this suggestion, we will continue to monitor the progress of the Open Networks Forum as it progresses and take any learning we would deem useful to the FlexTech Initiative. It should be noted that both ESBN and NIEN are represented on the Open Networks Steering Group.

3.4.14 Co-ordinated Approach across Work Streams

Industry Feedback: One submission noted that there are over-lapping areas across the various work streams e.g. visibility and monitoring and therefore propose a technology neutral approach where possible to avoid duplication of effort.

Response: The purpose of bringing all of the work streams together under the single umbrella of the FlexTech Initiative is to ensure a holistic approach and avoid a duplication of effort. However, it is also recognised that each of the technologies identified behave in a specific manner and therefore bring their own

set of opportunities/challenges which need to be addressed in a focussed manner.

4 Hybrid Working Group

4.1 Overview

Industry has expressed an interest in developing hybrid sites or hybrid units at both new and existing connections. Hybrids present opportunities for both System Operators and developers through maximising the use of existing infrastructure and increased diversity factors improving security of supply. While it is possible to seek and obtain a connection for a hybrid site or unit and connect to the system, there are certain issues that, if addressed, could unlock further potential for these developments and make hybrids more appealing. The SO's are also committed to maximising the use of transmission and distribution infrastructure.

4.2 Proposals set out in the Consultation Paper

The following priority areas were proposed within the Consultation Paper:

- Investigate possibility of increasing installed capacity limit beyond 120% of MEC,
- Investigate viability of 0 MW MEC units with an allowance to trade MEC between units behind the same connection point,
- Explore the technical and communication challenges of prioritising, dispatching and scheduling hybrid plant for System Services, and
- Investigate mechanism to allow multiple separate legal entities to share a single connection point.

In order to remove barriers associated with these priority areas, we have set out short, medium and long term deliverables for this Working Group. Those deliverables are presented below, together with industry feedback, under the headings "Technical/Operational", "Commercial/Regulatory" and "Market".

4.3 Detailed Review of Industry Feedback

4.3.1 Technical/Operational

Multiple responses from industry dealt with the technical and operational aspect of hybrid units and hybrid sites. A clear definition of hybrid sites is necessary. Another concern is whether conventional hybrid sites will be considered like renewable sites. Issues with integration of Demand sites, Autoproducers, Electrical Vehicles (EV's) were also brought forward. There is a need for clarity in the boundaries between the different working groups, especially Demand Side Management. Finally, the previous hybrid group was mentioned in the responses as there was a fear that the work previously completed would be lost.

The following actions dealing with the Technical and Operational issues will be considered.

- In the short term, we will focus on the definition of hybrid site or unit which needs to be clear and exhaustive. We will engage with the Storage working group to ensure Hybrid interests are addressed in the Grid Code Work stream and in the in Modes of Operation Work stream.
- In the long term, we will consider the role of Hybrids in the power system of 2030.

The following provides a summary of the comments received regarding the Technical and Operational queries and our intended approach which considers the views of stakeholders.

4.3.1.1 Definition of Hybrid Plant

Industry Feedback: A number of responses highlighted the need for a clear definition of a hybrid connection.

Response: The System Operators have developed the below definition which will inform the work of the FlexTech initiative.

1. A Hybrid Site to be any project that has multiple **power generating modules** which utilise multiple primary energy sources or technology types in generating/**storing electricity** and are electrically connected behind a single defined Connection Point to a licensed System Operator.

2. A Hybrid Unit is a single **power generating module** which utilises multiple primary energy sources or technology types in generating**/storing electricity** and are electrically connected behind a single defined Connection Point to a licensed System Operator.

4.3.1.2 Previous Hybrid Working Group 2017-2018:

Industry Feedback: A number of responses expressed frustration at the collapse of the Hybrid Working Group and the perceived lack of engagement with industry in the interim period. Similarly a number of responses reiterated the need for this initiative to be adequately resourced. The consultation responses also emphasised the need for industry engagement to progress the wide ranging issues associated with the deployment of hybrid plant. One submission sought "*to see the detail in full of all issues and solutions (technical, legal and regulatory) which were previously examined by the 'All Island Hybrid Sites Working Group' established in September 2017 (and / or others) as summarised in this current consultation document in order that we can meaningfully contribute to the progression of the proposed priority areas and corresponding solutions*".

Response: The previous Hybrid Working Group was disbanded due to an ineffective structure. The FlexTech initiative has been developed based on learnings from the Hybrid Working Group. While there may have been a perceived lack of engagement with industry on these issues the SOs have been engaging to develop this structure and find an effective and efficient way to move forward. There are now resources appointed to work on FlexTech from across the TSOs' in Ireland and Northern Ireland with the ability to progress opportunities and issues as they arise. In Ireland, due consideration will be given to the Climate Action Plan, in developing our priority areas under CAP Action 18 and the FlexTech initiative. The work undertaken by the Hybrid Working Group has informed the scope and structure of the FlexTech initiative.

4.3.1.3 Demand Sites/ Autoproducers

Industry Feedback: Two responses felt that sites which combine demand with generation/storage should be included in the vision for Hybrid sites.

Response: Demand sites and/or Autoproducers are not currently within the remit of Hybrid Working Group. The revised definition of a hybrid unit/site will be published later in 2020. Sites with a demand element will be handled through the Demand Side Management Working Group.

4.3.1.4 Conventional Hybrid Sites

Industry Feedback: One submission raised a concern that the focus of the hybrid work stream is on renewable hybrid connections only. They expressed the opinion that there is merit and indeed benefits to be realised through hybrid conventional sites. For example a hybrid CCGT and battery site could offer the system a lower minimum generation level at night where the CCGT unit was being used to charge the battery. It could also offer black start capability on site.

Response: The focus of the FlexTech initiative is to maximise the capabilities of new and existing technologies in order to realise the ambition of decarbonisation. Therefore while there may be a perceived focus on renewable technologies, where there are capabilities associated with conventional plant to be recognised to assist in reaching this ambition, they may be considered as part of the FlexTech initiative.

4.3.1.5 EV Charging

Industry Feedback: One submission felt that "*Behind the meter EV charging points could be considered in this work stream*."

Response: EV charging is not currently considered under the remit of the Hybrid Working Group. However, EirGrid Group is currently running a trial on aggregated residential services which are inclusive of EV charging. Behind the meter flexible capability is addressed within the DSM Working Group.

4.3.1.6 Storage

Industry Feedback: It was noted "*with regards to storage, we would hope that any rules / considerations from the Hybrid Working Group are considered in tandem with ongoing work and outputs from the Storage Working Group*."

Response: All working groups within the FlexTech initiative will be working in tandem. Where common themes are identified, they shall be drawn out and considered across the working groups to ensure optimum solutions are identified.

4.3.2 Commercial/Regulatory

Several submissions from the industry dealt with the commercial and regulatory aspect of hybrids. Better understanding the flexibility capabilities is necessary as there are different types and technologies of hybrids. There is a need for maximising the use of existing assets taking into account that transmissions network is not always prepared for all connections to be used to be maximised simultaneously. New and existing sites for hybrids should be considered on the same page.

The following actions dealing with the Commercial and Regulatory issues will be considered.

- In the short term, we will focus on two actions, assessing options for multiple legal entities to share a single connection point and reviewing of over-install. In addition, we will consider the trading of MEC.
- In the medium term, we will focus on locational assessment of over install limits for all technology types. We will also assess opportunities to minimise curtailments/constraints through the use of hybrid plant.

The following provides a detailed summary of the comments received regarding the Commercial and Regulatory queries and our intended approach which considers the views of stakeholders.

4.3.2.1 Increase in Over-install limit/Trading of Export Capacity

Industry Feedback: A number of responses discussed the idea of trading Export Capacity and increasing the over-install limit. The majority of these responses focused on the provision of increased flexibility in how the grid capacity and a facility's MEC are utilised. Many developers felt that it would be more appropriate that a developer makes the decision on the suitable level of over-install based on what is viable due to site conditions and technology installed etc. Some responses also suggested that any flexibility offered to hybrid generation facilities should also be offered to facilities with units of the same technology type.

Response: The SOs' recognise the various opportunities that exist with an expansion in the number of hybrid plants to the system and increased flexibility around export capacity. These advantages may include an increase in diversity

factor, a levelling of the generation curve and/or an increased capacity factor. Some but not all of these advantages may arise from the development of facilities with units of the same technology types for which it may not be suitable to offer the same level of flexibility. This consideration will be assessed as a medium term priority.

Similarly, while the SOs agree that increased capacity factor and maximising the use of existing assets is in the interest of all stakeholders, the transmission system is not designed for all connections to simultaneously avail of 100% of their export capacity. A certain capacity factor has been assumed in assessing the deep reinforcements for new connections and any changes to this capacity factor may drive additional reinforcements in order to avoid excessive constraint. Therefore the TSOs do not feel it would be appropriate for developers to make the final decision on over-installation without guidance and engagement from the SOs.

4.3.2.2 Climate Action Plan:

Industry Feedback: Two responses recommended that the action areas noted within the Climate Action Plan should also form part of the priority areas and outcomes/decisions from the FlexTech initiative should align in both policy and timelines for delivery.

Response: Due consideration will be given to the Climate Action Plan, in developing our priority areas. Hybrids are a deliverable under the CAP Action 18: FlexTech is providing a platform to develop Hybrids in parallel.

4.3.2.3 Private Networks

Industry Feedback: One submission highlighted the need for consideration of private networks and how they will facilitate evolving hybrid projects. Another submission queried how connections featuring private wires would be managed in terms of fault level, harmonic contribution and voltage rise. This same submission sought clarification as to how the System Operator is going to manage applications for connection and the running arrangement of hybrid sites given for example, different fault level contributions, different thermal requirements etc.

Response: For Ireland, Action 22 of the Climate action plan relates to private networks. This action is being led by the Department of Communications, Climate Action and Environment, the System Operators will provide any support required.

4.3.2.4 Connection Access

Industry Feedback: One submission sought to understand if flexibility capabilities are to play a role in the management of the grid connection queue.

Response: Please see response to "Connection Offer Process" under Storage Section 5.3.2.3. The connection access process will continue to be managed through ECP in Ireland. Non secured access connections for generators (as a form of flexible generator connection) were consulted upon in late 2019. The consultation paper is here. In Northern Ireland SONI and NIE Networks are required to offer a connection on request, subject to certain exemptions, and to so within 90 days unless NIAUR gives an extension of time. Neither SONI nor NIE Networks can unduly discriminate between applicants for connection when making the offer of connection.

. Prioritisation of any specific type of connection ahead of others in Northern Ireland would require changes to this framework. New versus Existing Sites

Industry Feedback: One submission stated that "*there should be no presumption that existing sites could be enabled to manage 2+ technologies more easily compared to new sites*" and sought further analysis as to which technologies (or what would be used to justify the choice) make the best combination for future hybrid sites and why.

Response: We will consider all forms of both new and existing sites. Separately we welcome a better understanding of the flexible capability of technology combinations proposed by industry. This could potentially inform future Qualification Trials to prove capability.

4.3.3 Market

A number of responses from the industry dealt with the market and how hybrids would fit in the operational and market arrangements, relevant codes, policies and/or regulatory guidance, the Network Use of System Charging and metering arrangements. There were as well issues regarding prioritising, dispatching and

scheduling of hybrids. There is a request for a framework to facilitate and incentivise investment. Incentives and barriers to the integration of renewable energies should also be examined.

The following actions dealing with the Market issues will be considered.

- In the short term, we will focus on setting up QTP for Renewable Hybrid Plant.
- In the medium term, we will focus on the Grid Code, Distribution Code, Network Charging, Operation and Market implications for Hybrid plants.
- In the long term, we will consider the role of export capacity in the power system of 2030.

The following provides a detailed summary of the comments received regarding the Market queries and our intended approach which considers the views of stakeholders.

4.3.3.1 Existing Operational and Market Systems:

Industry Feedback: Multiple responses sought clarity on how hybrids would be integrated into existing operational and market arrangements, relevant codes, policies and/or regulatory guidance, Networks Use of System Charges and metering arrangements.

Response: This will be explored by the SOs in the medium term. However, given the number of possible configurations which may make up a hybrid plant it is unlikely there will be a new set of codes, policies etc. for hybrid plants/sites. The more likely scenario is that consideration will be given to a number of test configurations and how the existing codes/policies may apply. Where additions/amendments to existing codes are identified as required for the facilitation of hybrid sites/plants these will be progressed through the existing channels.

4.3.3.2 Incentives and Barriers

Industry Feedback: One submission recommended for the group to identify which charges, levies, locational signals etc. are positive incentives to integrate renewable power and which are barriers.

Response: The future programme to replace DS3, which is due to be launched towards the end of 2020, will be examining system needs out to 2030 and the associated incentives. Also the Commission for the Regulation of Utilities issued a call for evidence at the end of 2019 to consider what other measures could be used to achieve an effective future connection policy. Responses to that consultation are being considered by the CRU.

4.3.3.3 Prioritising, Dispatching and Scheduling Hybrid Plant

Industry Feedback: One submission stated "*in relation to the proposed priority area of exploring the challenges regarding prioritising, dispatching and scheduling hybrid plant for System Services, we would suggest that this should also be addressed via the QTP process.*"

Response: Issues around prioritising, dispatching and scheduling will be explored in the medium term. However given the number of possible configurations which may make up a hybrid plant it is unlikely there will be a priority/dispatch and scheduling classification for hybrid plants/sites. In the short term, consideration will be given to a number of test configurations and how the existing policies may apply. Where additions/amendments to existing policies are identified these will be progressed through the existing channels.

4.3.3.4 Investment in DS3

Industry Feedback: One submission stated, "*There needs to be a framework to facilitate and incentivize investment; DS3 needs to allow for multimode operation and variable volume service provision*."

Response: This is not within the remit of the Hybrid Working Group but will be addressed through the future programme to replace DS3.

4.4 Deliverables

Figure 3 below presents the deliverables of the Hybrid Working Group for the short, medium and long term. The areas focus on the breaking down barriers across a technical, operational, commercial, regulatory, and market challenges to facilitate the integration of renewables. In doing so, the objective is to maximise the opportunity for effective use of new and existing technologies to meet the needs of the future power system.

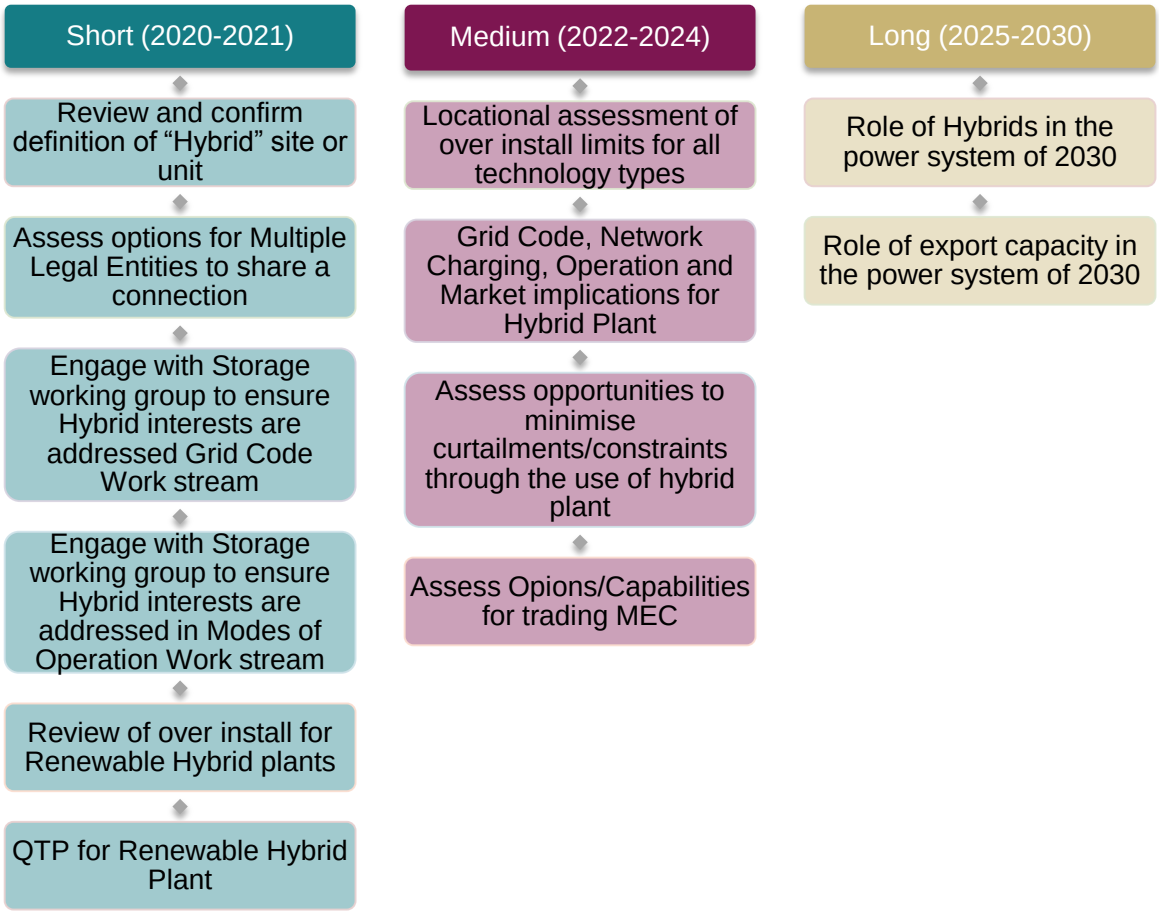

Figure 3 - Hybrid Working Group Deliverables

5 Storage Working Group

5.1 Overview

Storage Technology, given its ability to reduce RES curtailment and provide service availability without generating, has the potential to play a major role in both the energy and system services market over the next 10 years and beyond. The 'FlexTech Consultation 2019 Paper' published on 30th September 2019 outlined a number of issues experienced by EirGrid, SONI and the DSOs for storage units. These included the Mode of Operation, Prioritisation of Grid Access, Grid Capability for Fast Response and Grid Code / Distribution Code.

5.2 Proposals set out in the Consultation Paper

The following priority areas were proposed within the Consultation Paper:

- Investigate a mechanism for identification of, and appropriate treatment of, various modes of operation
- Review of Grid Code/ Distribution Code for Storage
- Strategic consideration to be given to the prioritisation of grid access
- System Operator Task force to assess impacts of fast response services on Distribution Systems

In order to remove barriers associated with these priority areas, we have set out short, medium and long term deliverables for this Working Group. Those deliverables are presented below, together with industry feedback, under the headings "Technical/Operational", "Commercial/Regulatory" and "Market".

5.3 Detailed Review of Industry Feedback

5.3.1 Technical/Operational

Numerous responses from industry dealt with the technical and operational aspect of storage. There is a common need for clarity regarding the scope of the Storage Working Group and how it relates to the other areas; particularly, whether 'small scale storage' sits within Storage, DSM or Renewable / SSG working group.

Specific consideration should also be given to the role of storage on Demand Sites (including DSUs). Finally, Grid Code / Distribution Code for Energy Storage need to be revised.

The following actions dealing with the Technical and Operational issues will be considered.

- In the short term, we will focus on reviewing and confirming the scope of the Energy Storage working group and clarifying the interactions with other areas, such as DSM and Hybrid sites.
- In the medium term, we will socialize and progress the Transmission and Distribution Code modifications through their respective Review Panels to cater for enduring solutions to Energy Storage technology.
- In the long term, System and Market Operational Tools & Protocols for BESS (enduring optimal solution) will be rolled out.

The following provides a detailed summary of the comments received regarding the Technical and Operational queries and our intended approach which considers the views of stakeholders.

5.3.1.1 Scope of FlexTech Storage Technology

Industry Feedback: Stakeholders seek clarity on the scope of this working group and how it relates to the other areas, specifically Hybrids and Renewable / SSG. This is to ensure that the proposed priority areas for each working group are suitable. Particularly in regards the review of Grid Code / Distribution Code for Energy Storage, there is a request for:

- Clarity on the objective of the Energy Storage Working Group and more specifically on the Transmission and Distribution Code requirements for the various types of storage technologies.
- Alignments with the Hybrid and Renewable / SSG working groups to ensure proposed changes are coherent and consistent.
- It is also recommended that a review of the T&SC, Capacity Market and SEMOPx codes is included, considering the interactions between these documents and the Transmission and Distribution Codes.

- Recommendation that ‘small scale storage’ is considered under the DSM or Renewable / SSG working group.
- Specific consideration should be given to the role of storage on Demand Sites (including DSUs). Some stakeholders have the view that this is by far the largest volume and fastest growing area of battery storage currently in Ireland.
- Some stakeholders noted that storage may also help reduce curtailment via large scale storage on hybrid sites and may also help to manage micro-storage in the form of EV’s and electric heating via DSU’s. It is noted that this working group cannot be reviewed in isolation, and the priorities under this working group need to include considerations, such as use on hybrid sites.

Response: Where appropriate, the FlexTech Working Groups will seek to provide clarity on what’s in or out of scope and will provide clear definitions as applicable. There will be interactions with other Working Groups such as DSM and Hybrids and clarity will be provided on what constitutes ‘small scale’ generation be it storage or other. This is a priority for the coming year.

Definition of ‘small scale’ will be defined under Renewables/ SSG working group. This may result in interactions between Storage / SSG and DSM working groups.

Review of Grid Code / Distribution Code:

- The FlexTech Energy Storage working group will clarify the objective of any Grid Code / Distribution Code review in consideration of all types of storage technologies. It is however expected that the majority of the updates required will focus on the inclusion of non-synchronous storage technologies such as Batteries.
- It is recognised there is a need for alignment with the Hybrid and SSG working group to ensure proposed changes are coherent and consistent.

A review of the T&SC, Capacity Market and SEMOPx codes in line with a review of the Grid / Distribution Code is also envisaged considering the interactions between these documents.

5.3.2 Commercial/Regulatory

Several submissions from the industry dealt with the commercial and regulatory aspect of storage. There is a need for clarity on how BESS would work at a Hybrid site and on the dispatch and operation rules. As well as how power-to-gas technology could be the key for the security of supply.

Some of the submissions proposed that storage should be incentivised in System Services. There is a need for a clear analysis on the volume and type of all system services that will be required by the grid to meet anticipated renewables growth. In addition future volumes, markets and system services are deemed as priority areas. It should also be considered how storage can influence network congestion and reinforcements rather than just a system service provider.

Additional responses proposed that priority is given to Grid Access for projects that help resolve network issues and the facilitation of renewables. Currently, whilst all projects are subject to the same rules for Grid Access, it is proposed that this be reviewed.

The following actions dealing with the Commercial and Regulatory issues will be considered.

- In the short term, we will focus on three different publications. The TSO will prepare and publish a Strategy on System and Market Operational Tools & Protocols for Battery Energy Storage Systems (BESS). This should consider impacts to TSO and DSO systems. We will also publish a Guidance Note on any Interim Approach in line with above Strategy. Finally, we will publish BESS signal lists and associated testing procedures (in-line with any Interim Arrangements). A strategy on Transmission and Distribution Code updates (in recognition of interim requirements and EU Network Code timelines) will also be developed in the short term.
- In the medium term, we will scope and detail specifications for System and Market Operational Tools & Protocols for BESS (enduring optimal solution).

- In the long term, we will focus on the review power-to-gas technology and network / policy requirements. We will also continue to monitor and review the capabilities of longer duration storage and the potential to address network problems such as congestion.

The following provides a detailed summary of the comments received regarding the Commercial and Regulatory queries and our intended approach which considers the views of stakeholders.

5.3.2.1 Operating Protocol & Commercial Arrangements

Industry Feedback:

- Requests for simulations showing the issues caused by storage from a TSO perspective. For example, specific studies on suitable sites for alternative energy storage such as hydro storage, compressed air storage and even power-to-gas which has the potential to bring carbon-free gas into the existing gas network.
- Concerns have been raised with the proposal that BESS projects may only be allowed to 'charge' on foot of a Dispatch Instruction. Clarity is sought on how this would work at a 'Hybrid Site'. This should also consider how BESS technology can be facilitated in the day-ahead market for the purposes of recharging.
- Rules regarding how BESS units will be dispatched will impact how often they need to be recharged is required. As the recharging cycle could impact the expected asset lifetime, this could increase the cost of providing services.
- Ultimately storage is a flexible asset which has the ability to provide different services to the market. It will provide these services based on what it is incentivised to do under the commercial market arrangements.
- Consideration should be given to longer term / seasonal storage of energy to underpin security of supply. Sector coupling between gas and electricity networks may help avoid system curtailment and allow bulk storage of energy on the system, such as the use of power-to-gas technology.
- Noting the current volume capped and volume un-capped arrangements, the absence of future market signals (post 2023) has been raised as a concern. It

is recommended that future volumes, markets and system services are included in the priority areas.

- There should be a clear analysis on the volume and type of all system reserve services that will be required by the grid to meet anticipated renewables growth and to meet ’70 by 30’ targets. A recent ‘zero carbon’ study by Baringa forecasts there would be significant system cost savings if reserve requirements were met by zero carbon technologies such as energy storage.

Response: As noted in Section 3.4.1 we are developing a 2030 vision alongside the future programme to replace DS3shall ensure delivery of 90% SNSP by 2030. This will include the provision of further analysis and simulations along the lines of DS3. This analysis will guide further discussion with industry on barriers and proposed mitigations, such as the development of new products or locational signals for specific technologies.

The FlexTech Energy Storage Working Group also welcomes further engagement with industry on a range of energy storage technologies such as hydro, compressed air and power-to-gas. The latter may lead to more focussed industry engagement however it is expected that this is an area to watch over the coming years rather than being a priority area at this time.

The FlexTech Energy Storage Working Group will also work with industry stakeholders to develop an approach for the operation of BESS in both system and market operations (the latter based on target markets as advised through the industry forum). Interim measures are also to be made available for BESS projects seeking connections in advance of future optimal arrangements being in place. It should also be noted that any interim arrangements being put in place at short notice should not be considered enduring and that retrospective application of final arrangements will be required of all parties connecting in the near term. This may also require units to be re-registered in associated markets to ensure overall compliance.

A priority for this year (2020) is an update to the existing *‘Integration of Batteries Implementation Note’* to provide further guidance on Grid Code requirements and functionality. It is also a priority for 2020 to carry out a review of the Trading and Settlement, Balancing and SEMOPx codes to help clarify market operational

requirements for battery units (refer also to section 5.3.3). It is noted that this will require engagement with industry representatives to come up with a solution that is workable for all stakeholders.

The SOs also agree that there is a need to work closely with the Hybrid Working Group to provide guidance on an operational protocol for Hybrid sites and to consider opportunities to facilitate their optimisation with respect to local constraints or curtailment.

5.3.2.2 Grid Development

Industry Feedback: Storage may also be used beyond the current scope of system services and considered as a means of helping manage network congestion. The Storage work stream as written appears to be a system service working group rather than a useful energy sink or useful energy provider. Another respondent highlighted the potential for enabling competition in network reinforcements, therefore allowing industry to help resolve technical issues, enabling 'non-wire' solutions (such as storage) and helping to expedite connections.

Response: We will work with the relevant stakeholders to consider how storage may be used to help resolve technical issues (such as congestion management) and enabling of 'non-wire' solutions (such as storage) to expedite connections. With specific regards to BESS, there appears to be a focus on 'half-hour' batteries, which are considered to be mainly interested in system services, and two-hour batteries that may operate in day ahead or ex-ante energy markets. In the review of arrangements under the T&SC, Capacity Market and SEMO-PX codes and in the development of optimal arrangements, both system service and energy provision will be taken into account.

Longer duration batteries seem to be in the R&D phase of development however; in the medium to longer term there may be opportunities to further consider this technology and how it may be used to address congestion on the network.
The TSOs are currently undertaking a set of studies to identify the technical scarcities for 2030, of which network congestion is one. Please see Section 3.4.10 of this report. There are various smart/market-based solutions to address

network congestion issues being considered at present, including investigating the potential for a DSO flexibility market.

Lack of transmission capacity in Northern Ireland has resulted in the issuing of refusal to connect notices to distribution generation applications in recent times.

Additionally, following the NIE Networks DSO evolution consultation process, consideration is being given to taking a “smart incremental” investment approach to network reinforcement in Northern Ireland.
This investment approach will still require significant conventional reinforcement: in general, smart or market-based solutions will be installed to defer traditional.

At distribution level**,** ESB Networks have commenced an innovation project to trial a system-scale non-wire flexibility solution that will address network constraint issues through procurement of market-based solutions. The trial will look to avoid or defer network investment or to bridge the construction gap where investment has already been planned. Learnings from this innovation trial will be used to develop future policy regarding non-wire alternatives.

5.3.2.3 Connection Offer Process

Industry Feedback: The prioritisation of Grid Access has been recommended for projects that help resolve network issues and the facilitation of renewables.

Some stakeholders identified the possibility that questions around the prioritisation of Grid Access could be considered under the CRU’s review of the Enduring Connection Policy (ECP-2).

It was also noted that at present, all projects are subject to the same rules for Grid Access. It is questioned if this is appropriate for projects delivering only ‘fast acting reserve services’ and a suggestion that this could lead to wasteful network development. One respondent asked, *“Is there a need for an MEC for units that export for a maximum of 20 minutes, where it is within overload capabilities of the Grid?”*

Response: EirGrid & ESB Networks continues to engage with the CRU on their decision for ECP-2. Any determination made by CRU in respect of prioritisations for specific technologies will then be implemented by EirGrid & ESB Networks through the Connection Offer Process. In Northern Ireland SONI and NIE

Networks are required to offer a connection on request, subject to certain exemptions, and to do so within 90 days unless UR gives an extension of time. Neither SONI nor NIE Networks can unduly discriminate between applicants for connection when making the offer of connection Prioritisation of any specific type of connection ahead of others in Northern Ireland would require changes to this framework.

We recognise the need to consider technologies on their merits and to ensure that bespoke capabilities are taken into account in order to avoid a risk of wasteful network development. We are open to working with stakeholders to better understand how new and existing technologies could be used to support Ireland's decarbonisation goals.

5.3.3 Market

A number of responses from the industry dealt with the market and there were several queries regarding Public Service Obligation Levy. There was one query on how demand charges are calculated in line with the CRU decision (CRU-19-034). In addition, industry felt that Network tariffs should not discriminate against energy storage, and should not create disincentives for participation in demand response or represent an obstacle to improving energy efficiency. Finally, the potential impacts of Fast Response services on the Distribution System should be examined.

The following actions dealing with the Technical and Operational issues will be considered.

- In the short term, we will consider a review of the T&SC, Capacity Market and SEMOPx codes. Finally, in line with CRU’s 2019-2021 Strategic Plan, we will support a review of the network tariff structures, in consideration of Energy Storage technology.
- In the medium term, in line with the UR strategy 2019-2024, we will support a review of the network tariff structures, in consideration of Energy Storage technology.

The following provides a detailed summary of the comments received regarding the Market queries and our intended approach which considers the views of stakeholders.

5.3.3.1 Public Service Obligation (PSO) Levy (CRU-19-034)

Industry Feedback: In line with CRU decision (CRU-19-034) which determined that commercial storage would only be considered a final customer of electricity for its house load for the purposes of calculating the applicable PSO, confirmation is sought on how demand charges are calculated.

With reference to the EU's Clean Energy Package under Regulation (EU) 2019/943, some stakeholders noted that Network tariffs should not discriminate against energy storage, and should not create disincentives for participation in demand response or represent an obstacle to improving energy efficiency. A request is made to include a review of network charging as a priority area also.

Response: It is noted that industry welcomes the publication of the information paper by Commission for Regulation of Utilities (CRU) which clarifies the arrangements regarding the apportioning of the PSO levy to commercial storage units. Further investigation is required to determine a suitable approach to demonstrating that the house load MIC as set out in a unit's connection agreement is not being exceeded.

A request to include a review of network charging in both Northern Ireland and Ireland as a priority area has been noted. Industry have requested that this incorporates technologies such as Storage, DSR, Large Energy Users and Hybrids and that it should be included as a priority work area under the FlexTech initiative. It should be noted that the Utility Regulator in their draft Corporate Strategy 2019-2024[1] and CRU's 2019-2021 Strategic Plan both include a review of Network Tariffs. As such, this request has been accepted as an activity under the Storage Working Group and is currently proposed as a deliverable in the medium term, but this will be reviewed in accordance with the UR and CRU timelines.

[1] Protecting consumers, today and tomorrow.

5.3.3.2 TSO/DSO Collaboration

Industry Feedback: Noting previous concerns around the impacts of Fast Response on the distribution system, one respondent noted that response times can be delayed.

It is recommended that the System Operator taskforce considers this to formulate an optimal balance and to ensure the development of the most cost effective and fit for purpose storage projects.

Response:

It is the intention for the System Operator taskforce to further consider the impact of Fast Response services on the Distribution System. To fully assess this requires DNO/DSO studies supported by academic research. A priority for 2020 is to develop a terms of reference for this suggested System Operator taskforce and develop a detailed proposal on how this issue can be further explored.

ESB Networks Response:

ESB Networks have investigated the potential impacts of Fast Response services on the Distribution System. On the basis of this analysis, ESB Networks have made some augmentations to planning criterion to account for rapid voltage changes from coincident swings from export to import and vice-versa on BESS.

Going forward, ESB Networks expects that the need for fast acting system services sourced from the distribution system will increase. To enable this in a manner that preserves local network security and performance, ESB Networks has established the “Active System Management” programme, to implement the operational control capabilities and service designs needed. (Pending the availability of funding, through the Price Review process). These developments will be subject to coordination with the TSO, consultation with industry, and the approval of the RAs as appropriate.

NIE Networks Response:

The impact of fast services on the distribution system (voltage fluctuations) may in the future be managed using new Network Management System tools such as

the Network Capacity Allocation Platform currently under development by NIE Networks.

5.4 Deliverables

Figure 4 below presents the focus areas of the Storage Working Group for the short, medium and long term. The areas focus on the breaking down barriers across a technical, operational, commercial, regulatory, and market challenges.

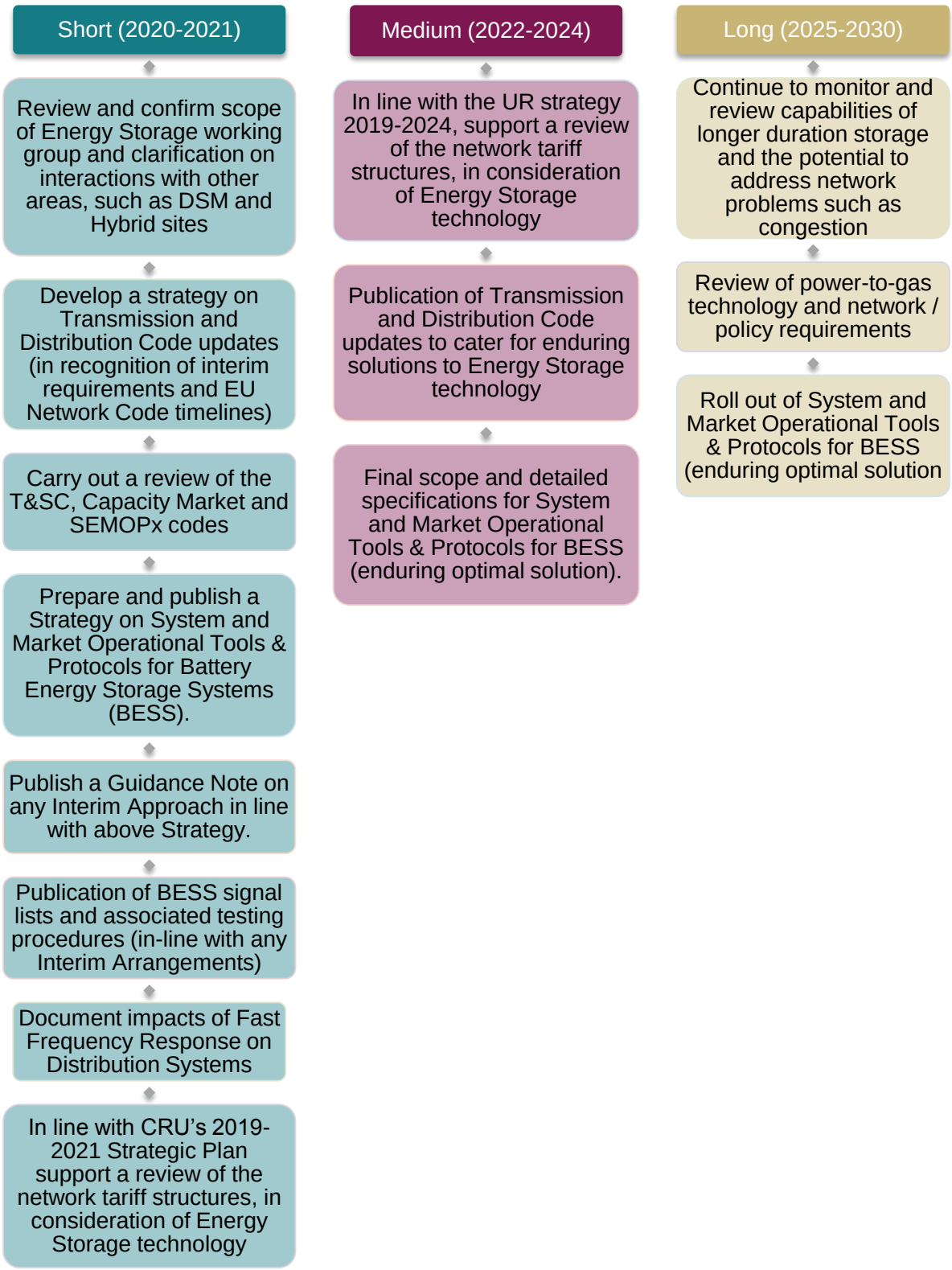

Figure 4 – Storage Working Group Deliverables

6 Renewable/SSG Working Group

6.1 Overview

Maximising renewable generation is key to meeting 2030 targets. As such, addressing barriers associated with repowering and congestion, and maximising the provision of System Services from new and existing renewables are major priorities for 2030.

While increased levels of small scale and micro generation present opportunity they present new challenges in terms of visibility and controllability. As outlined in the 'FlexTech Consultation 2019 Paper' published on 30th September 2019:

SONI is facing a major challenge in terms of managing the impact of embedded **uncontrollable small scale (<5MW)** and **micro generation (<11.04kW three phase and <3.68kW single phase)**. This generation is mostly made up of wind and solar technology. As this generation is uncontrollable, it cannot be curtailed, which results in a changing system demand profile and adds a complexity to demand forecasting. SONI is currently scoping the work required to fully understand the impact and risk of connecting further uncontrollable small-scale generation. Once this scope of work is finalised, a timeline for delivering the work will be established and this will inform any policy measure that will have to be implemented to manage this risk.

Ireland has very little of this type of generation at present but the 2019 Climate Action Plan states "The Government strongly supports enabling people to sell excess electricity they have produced back to the grid". At present, we do not forecast solar energy or the impact of micro generation effectively but we are working to address this issue in Northern Ireland and to proactively seek a solution for Ireland before the challenge presents itself.

Further consideration needs to be given to the risks and opportunities associated with micro generation.

6.2 Proposals set out in the Consultation Paper

The following priority areas were proposed within the Consultation Paper:

- Investigate mechanisms for improved forecasting of demand with high levels of micro generation
- Investigate mechanisms for improved visibility and controllability of distributed energy resources
- Review testing procedures and signal lists for Small Scale Generation (1-5MW) in Ireland
- Engage with industry to understand opportunities associated with repowering

Having taken industry feedback on board, we have revised the priority areas for the Renewable and SSG Working Group as follows:

- **Visibility & Controllability of SSG:** Consideration needs to be given to the expected performance, controllability and visibility of small-scale generation (< 5 MW). We will consider protocols and standards developed in other jurisdictions as part of this area.
- **Repowering** is likely to soon become a significant factor in the wind industry. Engagement across industry, System Operators and regulators will be needed to ensure repowering can be effectively facilitated to the maximum of its potential.
- **Maximising System Services from renewables:** Provision of system services from renewable generation is key to meeting our 2030 targets.
- **Congestion Management:** limiting the level of constraints by reinforcing the existing network and maximising its use through dynamic and non-wires solutions is seen as key to continued development of RES. See Section 3.4.10 for information on our approach to this.
- **Modernise telecommunications protocols:** streamline telecommunications between sites and SOs, reducing costs and improving scalability. This should include smarter ways of monitoring and addressing any signalling issues. This is currently being progressed through QTP 2019 and other avenues.

In order to remove barriers associated with these priority areas, we have set out short, medium and long term deliverables for this Working Group. Those deliverables are presented below, together with industry feedback, under the headings “Technical/Operational”, “Commercial/Regulatory” and “Market”.

6.3 Detailed Review of Industry Feedback

6.3.1 Technical/Operational

Several responses from industry dealt with the technical and operational aspect of renewables and small scale generation. Those responses can be summarised as follows: There are several definitions of SSG across the codes and SOs publications, and these should be harmonised. A request that connection processes for micro / SSG / LSG connections would be segregated. A recommendation to add two priority areas: repowering and the aggregation of system services from small scale generation or distribution system connected generation.

The following actions dealing with the Technical and Operational issues will be considered.

- In the short term, the objective of the working group will be clarified. This includes reviewing and confirming the scope of Renewables & SSG working group and clarification on interactions with other areas, such as DSM and Hybrid sites. Different categorisations will be evaluated with a view to harmonising definitions or providing clarity where harmonisation is not practical. In addition, two position papers will be developed, first on the feasibility of contracting System Services from smaller Renewables/ SSG, and second on Repowering. Finally this working group will contribute to the 2030 vision.
- In the long term, Enduring Solutions will be implemented in the Control Rooms.

The following provides a detailed summary of the comments received regarding the Technical and Operational queries and our intended approach which considers the views of stakeholders.

6.3.1.1 Scope of FlexTech Renewables and Small Scale Generation

Industry Feedback: Aggregation of System Services from small scale generation or distribution system connected generation (aggregation of PPMs, similar to DSUs).

Response: As a priority area we will review the feasibility of this suggestion (or alternatives). Where there is overlap between this area and the works progressing under the Demand Side Management Working Group these shall be aligned accordingly. As with DSM, any new aggregation processes as described above will need to have a DSO/DNO screening element to them. This will be required in order that the any network impact attributable to such co-ordinated activation can be assessed.

Industry Feedback: Some respondents commented that there has been little engagement around repowering and it should be given a higher priority.

There are also suggestions that the Repowering Priority Area should be expanded, noting that there is uncertainty over how connection charges would be applied and the impact that repowering may have on firm access.

Expand the repowering priority area to examine the available grid capacity, barriers to increasing capacity, how to maximise services, licences, environmental permits *etc*. Repowering should be a top priority given little to no progress has been made to date.

Response: These issues will be considered under the repowering priority area. However, for some barriers identified by stakeholders in relation to *e.g.* permitting, it is not envisaged that this working group will have a major role to play in addressing these. Industry engagement will be required to help determine a prioritisation of the repowering barriers identified and to develop a programme to address these. The development of a programme to break down the barriers to repowering will be an action for Q2-Q4 2020.

Although not raised through the consultation responses, the TSOs are aware that the EU regulation 2019/943 on Priority Dispatch could have implications in the area of Repowering. Article 12 of this regulation states: "*Priority dispatch shall no longer apply to such power-generating facilities from the date on which the power-generating facility becomes subject to significant modifications, which shall be deemed to be the case at least where a new connection agreement is required or where the generation capacity of the power-generating facility is increased*". The TSOs have already engaged with the RAs to discuss the higher

level implications of this regulation. Further clarity on how this regulation will be implemented in SEM is expected to be gained through a SEM Committee consultation during Q2 – Q3 2020. The outcome of the SEM Committee consultation process will inform this working group.

For units connected to the either distribution system: If the repowering causes a change in fundamental characteristics of the plant the generating unit must be compliant with the prevailing code. NIE Networks are acting proactively in this space for SSG, through communications issued to SSG owners in January 2020 highlighting the need to engage with NIE Networks when repowering.

Industry Feedback: A key objective is "*Maximising System Services from renewables*", however the key priority areas fails to identify any path to achieving this.

Response: As noted in section 3.4.1, we are developing a 2030 vision alongside the future programme to replace DS3that shall ensure delivery of 90% SNSP by 2030. This will include the provision of further analysis and simulations along the lines of DS3. This analysis will guide further discussion with industry on barriers and proposed mitigations, such as the development of new products or locational signals for specific technologies.

6.3.1.2 Definitions / Categorisation

Industry Feedback: Stakeholders also indicated the importance in the uniformity of SSG definitions. The Consultation Paper states that under the FlexTech Initiative SSG is defined as <5MW whereas under ECP SSG are those generators between 11kW – 500kW.

Response: Further to the feedback above, NIE Networks define SSG as greater than 3.68kW (single-phase)/11.04kW (three-phase) and less than 5MW. Microgeneration is a subset of Type A generation as defined by the European Network Code on the Requirements for Generators (RfG). In Ireland and Northern Ireland generators ≥800 W and <100kW)should be capable of ceasing active power output within 5 seconds of receiving an instruction at an input port (equipment as specified by the DSO/DNO may be required to make this facility operable remotely).

The need for clarification and uniformity is accepted and will be a priority action for 2020. The Renewable / SSG working group will clarify on what's in or out of scope and will provide clear definitions as applicable. Connection Offer Process

Industry Feedback: Review ECP and the requirements for projects <500kW. It is recommended to segregate the processes for micro / SSG / LSG connections.

Response: Please refer to section 5.3.2.3.

6.3.2 Commercial/Regulatory

Numerous submissions from the industry dealt with the commercial and regulatory aspect of Renewables and Small Scale Generation. First of all, there is a concern in including both renewables and SSG in the same Working Group. In addition, there is a need for clarity on offshore and hybrid offshore sites and on how they will be considered. There also are recommendations for the State to undertake a Total System Cost of Abatement analysis to identify the most cost effective, scalable, carbon free generation technologies to deliver energy decarbonisation.

The lack of grid capacity (constraint and congestion) is likely to be the most significant barrier towards achieving ambitious RES-E targets by 2030. There are suggestions for the use of dynamic and 'non-wire' alternative solutions as a means of maximising the use of the transmission and distribution systems, these solutions being implemented in parallel with traditional reinforcements, not as an alternative.

Locational scalers for SSRP should be reviewed to incentivise windfarms' investment in reactive power services, and industry would support a new service to provide reactive power below DMOL for renewables.

The following actions dealing with the Commercial and Regulatory issues will be considered.

- In the short term, we are progressing work to streamline telecommunications with sites in Ireland.

The following provides a detailed summary of the comments received regarding the Commercial and Regulatory queries and our intended approach which considers the views of stakeholders.

6.3.2.1 Non-Wires Alternatives for constraints and grid capacity

Industry Feedback: There is support for the use of dynamic and non-wire alternative solutions for maximising the use of the transmission and distribution systems. These solutions should be implemented in parallel with traditional reinforcements of new lines/upgrades in order to accommodate further renewable generation capacity over an enduring period.

Response: (Please refer also to sections 3.4.10 and 5.3.2.2).

We will work with the relevant stakeholders to identify and consider non-wire solutions to help resolve technical issues (such as transmission congestion management). The TSOs are currently undertaking a set of studies to identify the technical scarcities for 2030. It is most likely that network congestion products and solutions will be required. To minimise network reinforcements, maximisation of the existing grid capability to manage congestion will be done through System Services congestion products and smart grid solutions/ devices.

Non secured access connections for generators (as a form of flexible generator connection) were consulted upon by ESB Networks in late 2019[2].

Any such activities will require close co-ordination with DSOs as they too will be increasingly expected to procure and activate Flexibility. These interactions will drive the need for various platforms through which overlaps and conflicts are resolved. At distribution level ESB Networks and NIE Networks are working on projects which will deliver the network visibility upon which such platforms can be built.

Industry Feedback: Confirmation that this working group includes renewables and does not focus purely on SSG. Some consider the focus should be on larger scale, perhaps under a separate working group for renewables > 5MW). Others

[2] https://www.esbnetworks.ie/docs/default-source/publications/public-consultation-on-the-smarter-hv-and-mv-customer

have suggested that micro-generation should be a separate priority area, in line with the Climate Action Plan (within which micro-generation is a priority)

Response: Where appropriate, the Renewable / SSG working group will clarify what's in and out of scope and will provide clear definitions as applicable. This is a priority for the coming year (refer also to section 6.23.1).

At present, this working group includes both renewables and SSG; however the need to further segregate the scope will be monitored throughout 2020. Whilst these currently fall within the scope of one working group, this does not prevent focus groups addressing some of the more distinct challenges.

As part of this action, confirmation of an agreed approach to addressing the barriers to micro generation will also be provided (be this through a FlexTech or other working group).

Industry Feedback: Whilst offshore is not currently included in these working groups, it is recommended that the FlexTech Governance arrangements should note developments in this area as it could influence/impact the FlexTech outcomes. Similarly, clarity is sought on how hybrid offshore sites will be considered. Some of the working group (such as offshore and SSRP) may not be suitable for the FlexTech programme and may benefit from being progressed via separate forums.

Response: The above comments are noted. The Renewable / SSG working group will continue to monitor developments both in terms of offshore initiatives and the hybrid working group. The scope of the working groups will be evaluated for relevance over time. Where the need arises for additional/ alternative working groups, this will be considered.

Industry Feedback: It has been recommended by some stakeholders that the State undertake a Total System Cost of Abatement analysis to identify the most cost effective, scalable, carbon free generation technologies to deliver energy decarbonisation. To be meaningful this must include the total costs imposed onto the system over the long term including all grid connections, back-up capability, system integration costs *etc*.

Response: As SO's, we are happy to contribute to such initiatives following direction from the relevant Government Departments or Regulatory bodies.

6.3.2.2 Grid Development

Industry Feedback: Some stakeholders identified the lack of grid capacity is likely to be the biggest block towards achieving ambitious RES-E targets by 2030. It is highly likely that constraint and congestion will be the biggest issue to exporting renewable generation to the grid over the next decade rather than curtailment. 'Non-wire' solutions to resolving network constraints should be seen as complimentary to new or upgraded grid, not as an alternative.

There needs to be a focus via an industry forum such as FlexTech on ensuring new network infrastructure projects (long lead deliverables), are delivered to cater for the increasing amount of renewables.

Response: The TSOs are currently undertaking a set of studies to identify the technical scarcities for 2030, of which transmission network congestion is one. Please see section 3.4.10 of this report.

It is expected that a blend of technical solutions will be required to help achieve 2030 targets and it is unlikely that these can be achieved without the need for grid development. However, to better optimise the solutions, the TSOs will continue to work with ESB Networks and NIE Networks to consider how non-wire solutions may be used to help resolve technical issues (such as congestion management).

Noting the request for a specific forum to engage with industry on grid infrastructure projects, the TSOs agree to carry out a review of any existing mechanisms that may already be in place to determine if these are fit for purpose looking out over the next decade.

Due to lack of transmission capacity in Northern Ireland has resulted in NIE Networks issuing refusal to connect notices to distribution applications in recent times.

NIE Networks and SONI are currently going through a consultation process to determine industry appetite for providing Distribution Generation Offer with Non-Firm Market Access for applicants 5MW and above.

Additionally, following the NIE Networks DSO evolution consultation process, NIE Networks are taking a “smart incremental” investment approach to network reinforcement. This investment approach will still require significant conventional reinforcement: in general, smart or market-based solutions will be installed to defer traditional reinforcement, not eliminate it.

Industry Feedback: Industry would welcome an indication of how much additional renewables can be integrated onto the system using non-wire methods. Providing the renewable industry with accurate, long-term forecasts for network constraints, together with effective short to medium term solutions using non-wires alternatives, will be a critical element in ensuring continued renewable development in a cost-effective manner as we enter into an auction based method for financial supports.

TSOs Response: As noted above, we are developing a 2030 vision alongside the future programme to replace DS3programme that shall ensure delivery of 90% SNSP by 2030. This will include the provision of further analysis and simulations along the lines of DS3. This analysis will guide further discussion with industry on barriers and proposed mitigations, such as the development of new products or locational signals for specific technologies.

6.3.3 Market

Numerous responses from the industry dealt with the market aspect of renewables and small scale generation, and especially how to improve visibility and controllability. A major issue brought forward is the increasing difficulty to forecast demand requirements of the grid with the increasing levels of micro-generation. In addition, controllability requirements at the micro-generation level would increase costs and barriers for new micro-generation. The visibility of SSG could potentially be improved in a cost effective manner by implementing internet protocols. Finally, simplifying and clarifying testing processes would be beneficial not just to wind farms, but to other technologies.

The following actions dealing with the Market issues will be considered.

- In the short term, we will initiate a benchmarking exercise to leverage experience from other jurisdictions on the issue of visibility and controllability of distributed energy resources. Developments on the SEM

17-010 Decision review will also be monitored. SONI is currently scoping the work required to fully understand the impact and risk of connecting further uncontrollable small-scale generation, with the aim of inform any policy measure that will have to be implemented to manage this risk.

- In the medium term, we will review the forecasting mechanisms and DSO Dispatch protocols for micro-generation. We will also review the Grid Code, Distribution Code, Capacity Market Code and Trading and Settlement Code.

The following provides a detailed summary of the comments received regarding the Market queries and our intended approach which considers the views of stakeholders.

6.3.3.1 Visibility & Controllability

Industry Feedback: Respondents accepted that it will be increasingly difficult for the TSO and DSO to forecast demand requirements of the grid with increasing levels of micro-generation and that they will need increasing visibility of type and location of micro-generation, stakeholders would have concerns if the TSO/DSO looks to bring controllability into this section of the market.

Controllability should not be a requirement for “small scale micro-generation” as a matter of order. Mandating controllability requirements at the micro-generation level would add significant costs and barriers to the roll out of micro-generation (potentially solved via aggregation of micro-generation).

Response: The process for connecting and recording micro-generation in NI is detailed in NIE Networks Greater Access to the Distribution Network in Northern Ireland Recommendations Paper[3] section 4.4. Forecasting of demand and generation is covered under section 4.5. No controllability is proposed for micro generation, and NIE Networks intends to invest in improved monitoring and IT solutions to better forecast network power flows.

A priority for this year for EirGrid is the development of a Guidance Note on the Visibility and Controllability of Micro, SSG and LSG projects in Ireland. This will

[3] https://www.nienetworks.co.uk/documents/future-networks/greater-access-to-the-distribution-network-in-nort.aspx/

document the dispatch protocols and a vision for a future approach on controllability. It is noted that this will require significant engagement with industry representatives to come up with a solution that is workable for all stakeholders.

In the more immediate timeframe, it should be noted that EirGrid and ESB Networks have developed an agreement to remove the requirement for both a TSO and DSO RTU on 1-5 MW PPM sites in Ireland. During 2020, technical design will be progressed, the use of a single RTU will be trialled, and corresponding procedures will be updated as appropriate. The potential to move to a direct serial connection can be progressed as part of this work.

Industry Feedback: Consideration of internet protocols for communication with SSGs may offer a cost effective mechanism to improve the visibility of these assets.

Response: This is noted and will be considered as part of the action identified above. Cyber security will be an important factor in consideration of internet protocols for communication.

Industry Feedback: Industry welcomes the priority area which will investigate testing procedures and signal lists for SSGs (1-5 MW) connected to the Ireland power system. Simplifying and clarifying testing processes would be of benefit not just to wind farms, but to other technologies.

Response: Following the preparation of a Guidance Note on the Visibility and Controllability of Micro, SSG and LSG projects, the TSOs will work to update procedures and signal lists to align.

Industry Feedback: Recommendation to look to other jurisdictions (*e.g.* Australia) to help with the development of appropriate protocols and standards for maintaining visibility and controllability.

Noting UK experience where DNOs are installing ‘Generator Constraint Panels’ (GCPs) for gens in excess of 499kW, it is recommended that this is also considered in Ireland as an export limitation mechanism.

Response: Noted and accepted. An appropriate level of benchmarking will form part of the programme of activities for 2020.

Industry Feedback: Noting the SEMC decision (SEM-17-010) on the ETA basis of supplier charging sets out a preference to transition from net to gross charging for suppliers at some point post January 2020. Were this position to be given effect to would likely result in a significant number of de minus generator registering in the market, providing a facility to communicate with a large number of small units in advance of this decision being implemented.

Response: Streamlining telecommunications is being examined under another key area, and we welcome this observation in relation to the timing of solutions identified.

6.4 Deliverables

The short term targets identified below are either

a) pieces of work that can be completed within the next two years to break down barriers identified by the SOs or stakeholders, or

b) Key actions identified to enable us address these barriers and achieve the longer term goal of 90% SNSP by 2030.

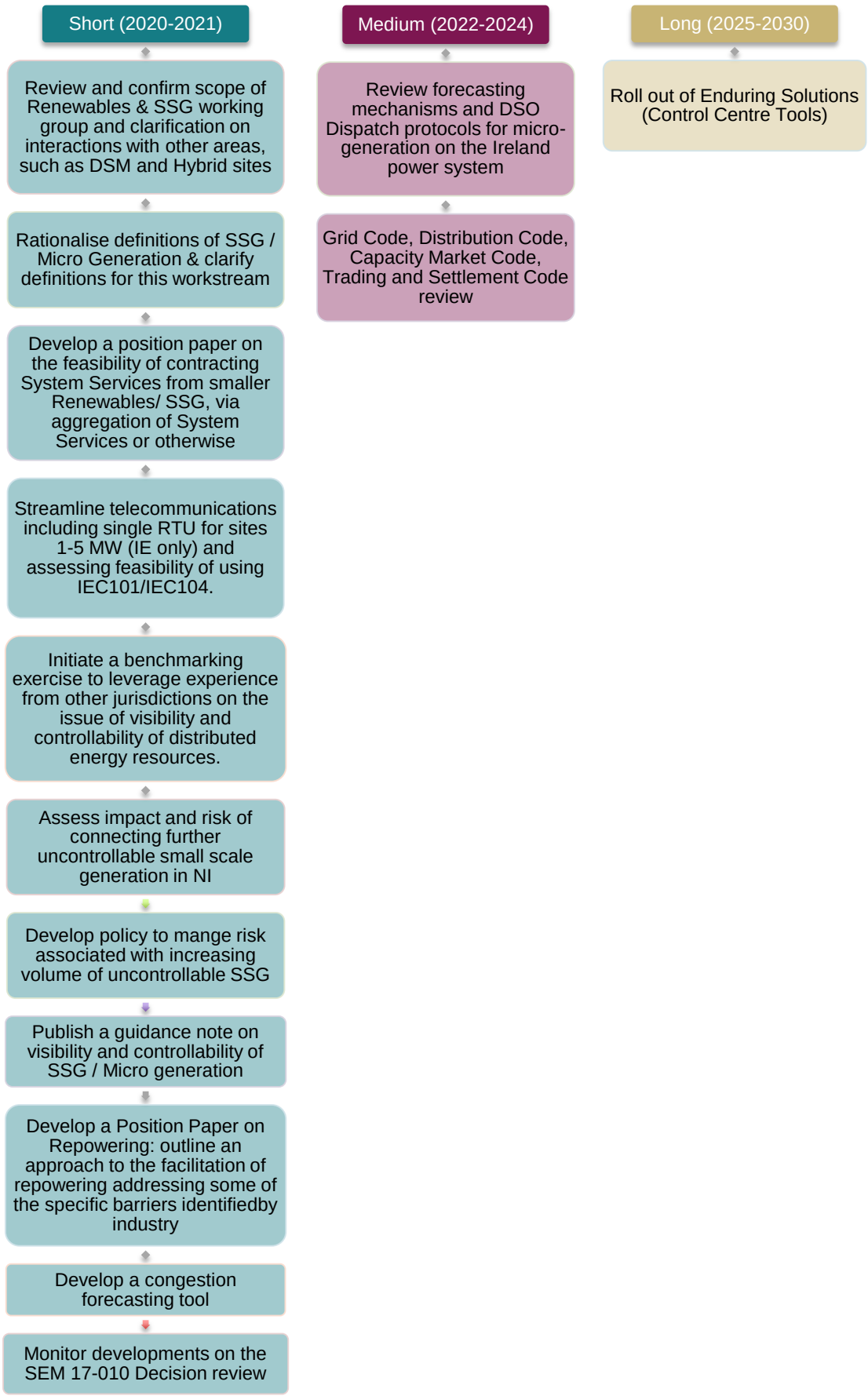

Figure 5 – Renewable/SSG Working Group Deliverables

7 Large Energy Users Working Group

7.1 Overview

The demand forecast in Ireland is heavily influenced by the expected growth of Large Energy Users. The 2018 All Island Generation Capacity Statement shows that demand from large energy users could account for 31% of all demand by 2027 (Median Demand Scenario). Many of these customers have protection in the form of uninterruptible Power Supplies (UPS) and on-site back-up generators, which they can switch to instantaneously during a system event.

Issues may arise where large demand customers switch over to UPS during a fault and do not return to their normal demand profile. This could cause a power imbalance once the fault has been cleared. Consideration must be given to how such issues may be prevented.

These sites also have major potential to act as fast acting reserve, providing system services. The System Operators need to proactively engage these users to further attract them into the system services market and ensure the capabilities of the back-up generation are in line with system requirements from the design stage.

Currently demand customers can only participate in the system services market through an aggregator. Consideration should be given to the scale of the large energy users and whether it may be more appropriate for them to participate directly in the system services market. Due to the scale of some of these sites, it may be beneficial for the TSOs to have direct interactions with these units.

7.2 Proposals set out in the Consultation Paper

The following priority areas were proposed within the Consultation Paper:

- Proactively engage with Large Energy Users to investigate appetite for participation in System Services market,
- Carry out analysis to assess suitability for large scale users to be controlled directly or through an aggregator, and

- Examine changes that may be required to Grid Codes, Distribution Codes and/or Network Codes.

In order to remove barriers associated with these priority areas, we have set out short, medium and long term deliverables for this Working Group. Those deliverables are presented below, together with industry feedback, under the headings “Technical/Operational”, “Commercial/Regulatory” and “Market”.

7.3 Detailed Review on Industry Feedback

7.3.1 Technical/Operational

Numerous responses from the industry dealt with the technical and operational aspect of LEUs. The scope of the Working Group should be clear and precise; including the use of existing connection of LEU as a hybrid unit. Stakeholders asked for templates for LEU to reduce the carbon content of the grid and help integrate renewable power. Another issue deals with flexible demand connection LEUs that may require an alternative source of power generation. A higher level of curtailment could occur as LEUs install their own fossil fuel generation plant.

The following actions dealing with the Technical and Operational issues will be considered.

- In the short term, we will develop a clear definition for LEUs and we will examine the LEU’s capability switch to back up supply instantaneously during a system event, and the implications this might have on the TSO/DSO.
- In the long term, we will engage with appropriate authorities to assist, where appropriate, in influencing fuel sources for back up.

The following provides a detailed summary of the comments received regarding the Commercial and Regulatory queries and our intended approach which considers the views of stakeholders.

7.3.1.1 Conventional Hybrid Sites

Industry Feedback: One submission raised the point that this work stream should consider the use of the existing connection of large energy user as a hybrid unit.

Response: The function of the Hybrid Working Group is to facilitate additional hybrid connections. See response under Section 4 Hybrid Working Group.

7.3.1.2 Templates for LEU'S

Industry Feedback: One submission sought the FlexTech group to produce templates for large energy users to follow which would help reduce the carbon content of the grid and help integrate renewable power

Response: This does not fall within the current remit of EirGrid and SONI as TSO and Market Operator.

7.3.1.3 Flexibility of the Gas System for Demand Side Management

Industry Feedback: One submission noted how the flexibility of the gas system can be utilised as an enduring solution and while awaiting an electricity grid connection.

Response: This does not fall within the current remit of EirGrid and SONI as TSO and Market Operator.

7.3.1.4 Back-Up Generation Fuel Source

Industry Feedback: One submission raised the point that LEU's with a flexible demand connection may require an alternative source of power generation. It was suggested that when aggregated up, there is potentially a significant portion of demand which renewable generation is unable to access. This LEU demand met by on-site fossil fuel generation is counted towards the TER (Total Energy Requirement). A number of other responses noted concerns around large scale LEU's installing their own fossil fuel generation plant on site and how this could lead to higher levels of curtailment. Another submission suggested that EirGrid and SONI investigate the interest/possible level of uptake for CHPs at these large sites.

Response: As per the Data Centre Connection Offer Policy and Process paper, the TSO is open to exploring on site generation options with LEUs provided they meet certain requirements. Please also refer to DSM section 8.3.1.4.

7.3.2 Commercial/Regulatory

A number of submissions from the industry dealt with the commercial and regulatory aspect of large energy users. Currently LEUs need to go through an aggregator to provide system services, simplifying this process and allowing the LEU to contract directly with the TSO is an important issue to be explored. This could help incentivise LEUs to provide such services. There should be options for large scale energy users to be dispatchable under market rules. In addition, LEUs should not be limited to system services but should be widened to incorporate energy, capacity and system service markets. Several responses also raised concerns around private wires/networks; the technical, policy, and regulatory challenges to allow for private wires between LEU's and renewable generation should be addressed. Finally, a mechanism to allow multiple separate legal entities to share a single connection point should be examined.

The following actions dealing with the Commercial and Regulatory issues will be considered.

- In the medium term, we will carry out an analysis to assess the suitability for large scale users to be controlled directly by the TSO or through an aggregator. We will also examine the Role of Private Wires in the power system of 2030 (subject to direction form relevant regulatory bodies and/or government departments).

The following provides a detailed summary of the comments received regarding the Commercial and Regulatory queries and our intended approach which considers the views of stakeholders.

7.3.2.1 TSO Contracting directly with LEU's

Industry Feedback: One response raised concerns on the prospect of the TSO contracting directly with LEUs for system services. Another response suggested encouraging LEU's to have fast acting generation, synchronised to the grid, which could act as back up to more intermittent renewable sources.

Response: As outlined in the Consultation paper, the TSOs' recognise that currently demand customers can only participate in the system services market through an aggregator. However considering that the 2018 All Island Generation Capacity Statement shows that demand from Large Energy Users could account for approx. 31% of all demand by 2027 (Median Demand scenario) it may be necessary to reconsider this arrangement, Due to the scale of this demand it would be beneficial for the SOs to have direct interactions with the LEU's. This issue will be explored by the SOs in the next 12 months.

7.3.2.2 Flexible Maximum Import Capacity

Industry Feedback: Submissions were received which relate to flexible Maximum Import Capacity and the fact that commercial arrangements need to be considered. There was a suggestion that this should include options for large scale energy users to be dispatchable under market rules and whether this should be DSU or MEC connected generation. A number of submissions also noted that LEU'S should not be limited to system services but should be widened to incorporate energy, capacity and system service markets.

Response: The TSOs will engage with LEUs to clearly communicate the benefits associated with engaging in the various markets in terms of both monetary value and enabling further renewable integration.

7.3.2.3 Private Wires/Networks

Industry Feedback: A number of responses raised concerns around private wires/networks. One submission suggested the LEU working group could address the technical, policy, and regulatory challenges to allow for private wires between LEU's and renewable generation.

Response: For Ireland, Action 22 of the Climate action plan relates to private networks. This action is being led by the Department of Communications, Climate Action and Environment, the System Operators will provide any support required.

7.3.2.4 Multiple Separate Legal Entities to Share a Single Connection Point

Investigate a mechanism to allow multiple separate legal entities to share a single connection point. This would allow scope for energy service models, whereby third parties own a large energy user's energy infrastructure, provide the

energy to the site, provide back up and manage the provision of services back to the grid.

Response: See response under Section 5 Hybrid Working Group.

7.3.3 Market

A number of responses from the industry dealt with the market related issues. Existing priority area for participation in the System Services market should be expanded, and locational scalars explored. In addition, numerous responses mentioned that the CPPAs target of 15% of electricity demand by 2030 is to be met by renewable sources contracted under CPPAs. In this context, the use of private wires could enable direct access to large-scale renewable generation for LEUs. Finally, the direction from the CRU to EirGrid to issue connection offers to any should be considered. This is valid for every applicant that is successful in the upcoming T-4 capacity auction 2022/2023 and located within the Dublin region Level 2 Locational Capacity Constraint.

The following actions dealing with the Commercial and Regulatory issues will be considered.

- In the short term, we will proactively engage with large energy users to investigate their appetite for participation in System Services market.
- In the medium term, we will examine the changes that may be required to Grid Codes, Distribution Codes and/or Network Codes and review T&SC modifications.
- In the long term, we will focus the market evolution for LEUs and the provision of enhanced system flexibility from LEUs in the power system of 2030.

The following provides a detailed summary of the comments received regarding the Commercial and Regulatory queries and our intended approach which considers the views of stakeholders.

7.3.3.1 Constraint Area Node List

Industry Feedback: One response referenced the direction from the CRU to EirGrid to issue connection offers to any applicant that is successful in the upcoming T-4 capacity auction 2022/2023 and located within the Dublin region

Level 2 Locational Capacity Constraint area. This submission noted that not all nodes from the specified area were listed on the published node list.

Response: This direction was issued by the CRU for the 2022/23 and 2023/24 T-4 Capacity Auctions. In the direction issued in October 2019 the letter states 'that beyond the 2023/24 T-4 Capacity Auction there should be increased certainty in the capacity market and therefore the CRU does not currently anticipate requiring these arrangements beyond the forthcoming auction'.

The direction letter from October 2019 can be found here. The nodes that are listed in the Level 2 Locational Capacity Constraint Area for the Capacity Auctions are the result of the application of the methodology as outlined in the SEM Committee Decision paper SEM-17-040 available here.

7.3.3.2 Locational Scalars

Industry Feedback: One response suggested expanding on the existing priority area for participation in the System Services market and investigates if the System Services market could also be used to incentivise location. Another response suggested that SOs should consider colocation of large-scale energy users near large scale generators for network investment costs to be deferred. This submission also suggested the use of locational scalars to encourage colocation and assist with deferring some level of network investments as a result.

Response: The DS3 System Services Agreement defines locational scalars as "*means a multiplicative factor which adjusts the payment for a given DS3 System Service to reflect a Providing Unit's geographical location*". The System Services locational scalars are currently not intended to incentivise or disincentives development in a given region.

Climate Action Plan 2019 Action 20 seeks measures to be taken to ensure that large demand connections are regionally balanced to minimise grid reinforcements.

EirGrid and SONI developed a policy on flexible demand and other measures for data centres last June which is available at here.

EirGrid and SONI will continue to engage with the CRU on all further efforts to address this action. ESB Networks as the DSO has implemented the above policy document into the connection offer for its distribution connected LEU customers.

7.3.3.3 Corporate Power Purchasing Agreements (CPPA's)

Industry Feedback: A number of responses raised CPPAs target of 15% of electricity demand by 2030 is to be met by renewable sources contracted under CPPAs. The respondent's outlined how the use of private wires could enable direct access to large-scale renewable generation for Large Energy Users.

Response: This relates to action 29 of the Climate Action Plan. Responsibility for this action lies with SEAI and DCCAE. The SOs will engage on this issue as required.

7.4 Deliverables

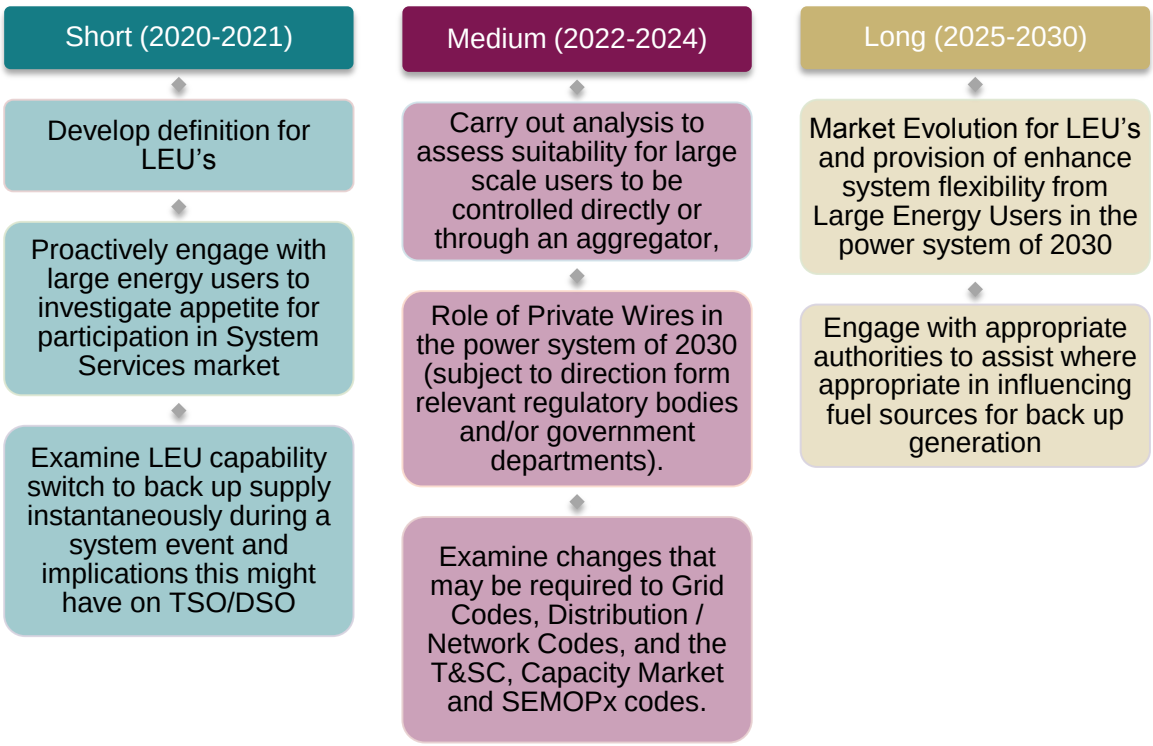

Figure 6 – Large Energy Users Working Group Deliverables

8 Demand Side Management Working Group

8.1 Overview

Demand Side Management (DSM) is an inherently flexible resource which has a huge potential to provide flexibility to the power system. Industry has expressed an interest to further develop DSM through growth and expansion in the existing Demand Side Unit (DSU) and Aggregated Generator Unit (AGU) models and through potential new resources, particularly at residential level. DSM presents significant opportunities for additional value chains to be added for system operators in terms of operational flexibility, while simultaneously potentially providing new and evolved commercial models for aggregators, suppliers and potentially third-party contractors whom may be required in order to grow the industry at scale at the residential level. From an end customer's perspective DSM has the potential to deliver financial incentives, choice and efficiencies in terms of how their energy is controlled and managed.

While DSM has been around in various forms for many decades, it is still in its infancy in terms of participation in energy and System Services markets. While the DSU and AGU models continue to grow, delivering ever increasing volumes to the Capacity and to a lesser extent the System Service markets, there is a physical limit to the number of available industrial and commercial sites which can be aggregated under these current models.

The vast majority of this resource is currently made up off industrial and commercial customers, and while a large proportion of this is delivered through the reduction of imported energy to the sites, some sites provide this demand response simply by providing a net demand reduction through the use of running behind the meter non-renewable back-up generators.

While there remains some further growth potential in the industrial and commercial demand response market, in the short to medium term this market is likely to saturate. Long term growth will require further evolution under a business as usual scenario.

There has also been continued growth in recent years in terms of DSM participating in the System Services markets, primarily providing frequency response and ramping margin services. Coupled with this, DSM has continued to grow in terms of Capacity market participation, acquiring increasing volumes in all recent auctions.

While value remains in this form of DSM, the industry as a whole needs to evolve to enable and facilitate the aggregation smaller flexible sites, including residential customers. Residential level DSM can potentially provide greater levels of flexibility to the system through the aggregation of inherent flexibility loads and / or indeed through the exploitation off thermal or electrical storage potential in some of the technologies which will likely be aggregated at this level. Processes such as refrigeration, and air conditioning, heating technologies such as heat pumps, the charging of electric vehicles and the staging of operating cycles of domestic appliances can all offer huge potential in terms of demand side participation. This type of flexible DSM participation also has the potential to go beyond simple participation System Service and Capacity markets to potentially provided energy arbitrage opportunities in the balancing market.

The DSM working group aim's to address both the current challenges faced by industry in the provision of flexibility in the shorter-term through the existing DSU and AGU model, while also simultaneously progressing upon the challenges of participation of new opportunities for DSM including that at a residential level in the medium and long term timeframes.

8.2 Proposals set out in the Consultation Paper

The following priority areas were proposed within the Consultation Paper:

- Assess the current registration arrangements for DSM participation in the energy, Capacity and System Service markets,
- Examine the current end to end Control Centre Integration of DSM, in terms of forecasting, scheduling and dispatch,
- Progress upon actions required in order for DSU to comply with the Capacity Remuneration Mechanism (CRM) state aid decision
- Review of the current performance monitoring processes and develop improved processes as appropriate,

- Examine the appropriateness of current metering and data provision requirements of aggregators,
- Engage further with all stakeholders to better understand the impact of activation of System Services on the distribution system,
- Review the current processes around engagement, impact and utilisation of DSOs issued instruction sets,
- Engage with DSOs to progress upon the use of instruction sets and associated processes.
- Subject to RA / Price Review Approval, progress distribution network visibility and deploy a Network Capacity Allocation Platform as to increase the granularity and frequency of Instruction set issuance.
- Review the current commissioning and testing arrangements of aggregators,
- Examine the current telecommunications requirements,
- Review of the current Grid Code requirements.

In order to remove barriers associated with these priority areas, we have set out short, medium and long term deliverables for this Working Group. Those deliverables are presented below, together with industry feedback, under the headings “Technical/Operational”, “Commercial/Regulatory” and “Market”.

8.3 Detailed Review of Industry Feedback

.Nine responses were received from industry in relation to the DSM working group including a joint response from DRAI who represent most of the DSU and AGU aggregators registered in the SEM.

8.3.1 Technical/Operational

Several responses from the industry dealt with the technical and operational aspect of DSM. There is a need to define Demand Side Management and specifically what types of DSM are targeted in this Working Group. The overlap and relation between the different Working Groups should also be clarified, and issues concerning the prioritisation should be considered. The Grid Code and Distribution Codes(s) needs to be reviewed for DSM, particularly in the context of facilitating growth at residential level. In addition, the electrification of residential

heating will likely form a large part of residential DSM in the longer term; hybrid heat pump/gas boiler technology is thus an option to be considered. The use of fossil fuelled (non-renewable) back-up generators was also brought forward; it is felt that zero carbon DSM should be prioritised.

Finally, market systems and grid control systems should be further developed to accommodate more complex bids and dynamic technical unit details considering the changing nature of DSM technologies.

The following actions dealing with the Technical and Operational issues will be considered.

- In the short term, we will define DSM and its sub components (DSU, AGU, Res Dem, Res Storage, and Micro Grid).
- In the medium term, we will develop an enduring solution for Compliance with State Aid. We will also implement Grid Code and T&SC modifications to enable for Residential Demand participation.
- In the long term, we will comply with SEM19-074 (Clean Energy Package) requirements and also facilitate large scale commercial Residential Demand side aggregators in SEM.

The following provides a detailed summary of the comments received regarding the Technical and Operational queries and our intended approach which considers the views of stakeholders.

8.3.1.1 Definition of DSM

Industry Feedback: One response noted that the Working Group would benefit from definition of what types of DSM are specifically being targeted.

Response: We believe there is flexibility still to be unlocked in all areas of Demand Side Management. We do not wish to specifically target one type or one area of demand response over another. We do however acknowledge that different forms of DSM may need to be treated somewhat differently to others to enable aggregation to occur. This is particularly true at residential level. In acknowledgment of this, one of the first deliverables in the DSM working group will be to determine clear definitions for the various Demand Response areas and the challenges associated with each.

8.3.1.2 Grid Code

Industry Feedback: One response noted that the Grid Codes and the Distribution Codes will need to be amended to accommodate residential level DSM and indeed industrial or commercial sites with short duration interruptible load. The response noted that the current Grid Code requirements for DSU demand sites are designed for large industrial plants and back-up generators to provide capacity market services. Another response aired caution regarding Grid Code modifications, noting the infancy of residential DSM. The response stated that risks would arise if Grid Code requirements are brought in too early which would lock down potential room for further innovation.

Response: The SOs acknowledges industries view regarding changes to the Grid Code's. Further to this the TSOs accept that the current Grid Code requirements for DSU require review, particularly in the context of facilitating growth at residential level. A review of the current Grid Code requirements for DSM will be conducted as part of FlexTech DSM Working Group. The timing and introduction of any proposed modifications will take into account industries concerns regarding locking down potential room for further innovation and the needs of industry and the System Operators.

8.3.1.3 Hybrid DSM technology

Industry Feedback: One respondent noted that Hybrid Heat Pump/Gas Boiler technology is an option that should be considered in the retro-fitting of existing oil boiler homes.

Response: The SO's acknowledge that the electrification of residential heating will likely form a large part of residential DSM in the longer term. This will of course take many forms and hybrid heat pump / gas boiler technology may be included in this. The SO's envisage that future DSM models, designed to facilitate residential DSM would be sufficiently flexible to enable aggregators aggregate numerous technologies under a singular model, including hybrid heating systems.

8.3.1.4 Use of fossil fuelled back up Generation

Industry Feedback: A number of responses noted that a large percentage of DSM at present is provided by non-renewable back-up generators providing a net

demand response though behind the meter generation. Further to this another respondent noted that zero carbon DSM and other forms of zero carbon service provision technologies should be prioritised over fossil fuel-based system service providers when the two can be directly substituted.

Response: Aggregators currently operating in the SEM can provide demand response through demand reduction, net demand reduction through the use of behind the meter generation or indeed a combination of the two. Such units provide flexibility to the Capacity and DS3 System Service markets and the aggregation of sites with non-renewable back-up generators form a large part of many aggregator's current portfolios. The TSOs note the impacts which compliance with the clean energy package may have on DSU, particularly in relation to capacity market participation where non-renewable back-up generators are currently used. While the TSOs wait further developments in this space, we believe that the aggregation of industrial and commercial sites will evolve going forward and non-renewable back-up generators may likely be replaced with renewable generators and / or energy storage assets. Compliance with the Clean Energy package for the industry will be taken into account in the detailed planning of the working group. Prioritisation of zero emissions technologies over other sources falls outside the remit of the FlexTech project.

8.3.1.5 Crossover with other working group

Industry Feedback: A number of responses noted that there are likely overlaps between work streams, particularly between Small-Scale Generation (SSG), storage and DSM. One response also noted a concern that the focus of FlexTech appears to focus on DSM behavioural change rather than clarity on Hybrid, storage and controllability of small-scale generation.

Response: The SOs acknowledges that there will be a level of cross over between the Working Groups and will work to harmonise and appropriately delineate these where possible while acknowledging that the time lines and priorities may differ from working group to working group. The SO's would like to reassure industry that the focus of FlexTech is to unlock and obtain additional flexibilities across a range of new and evolving technologies and is not specifically centred on DSM or behavioural change within DSM.

8.3.1.6 Control Centre and Market Integration

Industry Feedback: One respondent noted that market systems and grid control systems will need to be further developed to accommodate more complex bids and dynamic technical unit details considering the changing nature of DSM technologies, making reference to the EDIL system as an example.

Response: The TSOs acknowledge the merits of this view and will look to develop and evolve current tools and systems where issues have been identified or where tools or processes are deemed not suitable to facilitate the technical or commercial characteristics of units, including that of new or evolved models of DSM.

8.3.1.7 Prioritisation of issues

Industry Feedback: The DRAI provided their views on prioritisation of the issues proposed in this consultation. Further to this they also noted that they had concerns as to how the issues will be prioritised, noting that it is important that the progression of DSM issues previously identified do not become delayed through the inclusion in the broader initiative.

The prioritisation of issues from the DRAI perspective is as follows:

1. Improved performance monitoring processes
2. Review of commissioning and testing arrangements
3. Improve current registration arrangements Joint market registration issue;
4. Distribution network Impact, improvement in granularity and utilisation of instruction sets
5. Compliance with CRM state aid decision – Interim and enduring solutions
6. Examine the appropriateness of current metering and data provision requirements
7. End Control Centre Integration of DSM,
8. Telecommunications requirements
9. Review of the current Grid Code requirements

Response: We welcome DRAIs feedback regarding the prioritisation of issues and value their contribution towards further developments. The TSOs acknowledge the concerns raised regarding the potential for solutions to existing

known issues for DSM being delayed through inclusion in this broader initiative. Where possible resolution of such issues will be prioritised. While this is the case, it is also necessary to take a medium to long term view to ensure the maximisation of DSM potential in terms of meeting system flexibility needs and overall targets.

At distribution level NIE Networks and ESB Networks are addressing the granularity of the instruction sets and have agreed a joint use case and are collaborating on this. In NIE Networks this is being achieved through the development of the dynamic Network Capacity Allocation Platform (NCAP)[4] which is discussed in section 4.1.1 of the Greater Access to the Distribution Network in Northern Ireland Recommendations Paper. ESB Networks are actively pursuing this project as part of their innovation strategy and is titled 'Congestion Management and Capacity Allocation using Operational Management System (OMS)'. This is a pre-cursor to part of the ESB Networks PR5 submission to increase visibility and progress National Climate Action Plan.

8.3.2 Commercial/Regulatory

Multiple submissions from the industry dealt with the commercial and regulatory aspect of DSM. First of all, big data can be an opportunity or a challenge and needs to be taken into careful consideration. In addition, demand side flexibility, provided by behind the meter storage at residential level or indeed at commercial and industrial sites, should be examined. Finally, with the increasing workload associated with DSM, outsourcing the testing and performance monitoring of DSM should be considered to facilitate further growth.

The following actions dealing with the Commercial and Regulatory issues will be considered.

- In the medium term, we will consider arrangements for regular DSU-dispatch and address market registration issues regarding conflicting DSU optimisation metrics impacting registrations.

[4] The development of the dynamic Network Capacity Allocation Platform (NCAP) is subject to NIAUR approval of the additional funding during the current Reg. Pricing period

The following provides a detailed summary of the comments received regarding the Commercial and Regulatory queries and our intended approach which considers the views of stakeholders.

8.3.2.1 Big Data

Industry Feedback: One response noted the big data should be seen as both an opportunity and also a concern. They noted that to facilitate further growth, the SOs ability to efficiently accommodate much larger datasets for DSM needs to be prioritised.

Response: The SOs concur that big data management creates both huge opportunities and challenges. The volume of data associated with AGU and DSU and their sub aggregated sites are currently much larger than that of any other unit type operating in the SEM and this will likely grow further into the future.

The challenge of managing this data is significant as there is a realistic potential that the volume of this data will grow exponentially with the introduction of DSM at residential level. The SOs believe that developing the systems and capability to managing this challenge are vital to the continued growth of the industry.

While the introduction of new tools and processes which will ultimately use this data will be progressed under FlexTech, the SOs approach to managing big data more generally falls outside the remit of the programme of work. The use and management of Big Data will form a large part of both the TSO's and DSO's overall IT strategy going forward.

As per section 4.5 (Data Provision) of NIE Networks Greater Access to the Distribution Network in Northern Ireland Recommendations Paper, a SCADA rollout is proposed for any generators greater than 200kW to enable the provision of real-time data, and facilitate the forecasting of distributed generation, enabled through upgraded IT systems.

8.3.2.2 Behind the meter Storage

Industry Feedback: One response noted that demand side flexibility can also be provided by behind the meter storage at residential level or indeed at commercial and industrial sites.

Response: The SOs envisage that behind the meter energy storage will likely form a large proportion of further demand side activity at commercial and industrial sites in the short and medium term. Similarly, behind the meter storage at residential level has the potential to provide opportunities for aggregators in the longer term. There is a potentially a high level of cross over in terms of the potential growth area of DSM and the work that is being progressed under the storage working group. Understanding this cross over and what aspects of storage facilitation may apply to behind the meter DSM storage requires further exploration. This will be actioned as one of the first deliverables of the DSM and Storage working group.

8.3.2.3 Outsourcing of work

Industry Feedback: One response noted the ever increasing workload associated with DSM and the potential for a need to outsource the testing and performance monitoring of DSM to third parties and approved partners to facilitate further growth.

Response: The SO's acknowledge the ever-increasing workload associated with DSM and predict that the volume of workload for the SOs would grow exponentially with the introduction of residential demand side under a business as usual arrangement. There are a number of options as to how this can be addressed including changes to current processes and practices, increased staffing levels or indeed the outsourcing of work such as testing and performance monitoring, type testing of specific devices (e.g. electric vehicle charge points) as well as various combinations of these approaches.

While it is outside the scope of the FlexTech project to explicitly address this issue; the point is acknowledged as a key area which needs addressing in order to facilitate further growth in the industry.
As such proposals will be developed on how to address these issues, specifically in the context of DSM as a deliverable under the DSM working group.

8.3.3 Market

A number of responses from the industry dealt with the market issues. There was a first concern regarding residential demand response; having control and visibility over residential loads is essential for future DSM, and how this will be

achieved is a major issue. Several responses were received in relation to market models for DSM and whether new business models and services should be explored in order to enable further growth in DSM, particularly at the residential level. There are also issues with market registration arrangements as aggregators need to make difficult decisions to best utilise their aggregated sites and jointly participate in the capacity, system service and energy markets. Registration arrangements are even more complicated for residential level demand response.

In addition the residential DSM business model could be considered in EirGrid and SONI's Qualification Trial for Residential Services. The DSU compliance with State Aid requirements should be monitored closely in the context of the enhance performance monitoring process.

The following actions dealing with the Market issues will be considered.

- In the short term, we will review Ops Cert arrangements for DSU and AGU, and review arrangements for facilitations of DSM in other markets and systems. We will verify in the short term the interim compliance of DSM with the State Aid decision. We will also make interim improvements to performance monitoring and implement amendments to enable further DSM participation in Capacity Auction. We will develop a roadmap for Residential Demand side Management.
- In the medium term, we will put in place a Residential Demand Response QTP (Larger Scale and End to End including DSO or DNO). This is subject to PR5 allowance, commencement of wider roll-out of distribution network visibility and congestion prediction capabilities
- In the long term, we will develop a detailed roadmap for Residential Demand response growth.

The following provides a detailed summary of the comments received regarding the Market queries and our intended approach which considers the views of stakeholders.

8.3.3.1 Residential Demand Response

Industry Feedback: A number of responses commented that having flexible control over electric heating and Electric Vehicle's (EV's) is essential for future DSM. Further to this, these responses detailed that metering, control and visibility of smaller Individual Demand Sites (IDS) particularly at residential level and will not likely be the same as that used for larger IDSs and thus validation could be achieved in other ways. Another response noted the importance of consideration being given to the timing and sequencing of the role out of residential DSM.

Response: The System Operators agree that the aggregation of electric heating and EV's will likely form a large part of demand side response in future years and that the sequencing of growth in this space needs careful consideration. We note however that there are potentially a large number of other resources and opportunities at the residential level which could provide flexibility going forward. It is therefore important to ensure that any work or developments made to facilitate residential DSM considers the likely aggregation of electric heating and EV's but also allows for aggregation of other assets such as domestic appliances, lighting, refrigeration etc. The SOs also acknowledge that there is a need to review the arrangements for metering control and visibility to facilitate the commercialisation of demand response from these resources and that a one solution fits all approach may not suffice. The System Operators will look to work closer with industry over the course of this project to progress these issues.

8.3.3.2 Market models

Industry Feedback: A number of responses were received in relation to market models for DSM. The DRAI view the current DSM model a capacity tool, which has in recent years been adapted to provide services in the balancing market. They believe CRM is the foundation of the business model and stress the importance of capacity as a system service, at least in the near term.

On the other side of the spectrum a number of responses believe new business models and services should be explored in order to enable further growth in DSM, particularly at the residential level. Responses included the concept of energy-as-a service for consumers and locational DSM which could play a role in addressing locational issues on both the transmission and distribution system.

Response: The TSOs acknowledge that there is a distinct divergence between the market models utilised by the current aggregators in SEM, which typically aggregate industrial and commercial loads, and a model which may be required going forward to facilitate the aggregation of new demand side resources particularly at residential level. The TSOs acknowledge that a single DSM market model ultimately limits aggregators and that an additional unit type or indeed types may be required to efficiently facilitate different forms of demand side participation in the markets.
The TSOs also acknowledge industry's view regarding the importance of Capacity revenue to aggregator's current business models. The TSOs believe however that in order to fully maximise the efficiency of the power system and indeed the efficiency of scheduling and dispatch, that market participants may need to evolve to maximise revenue streams in multiple markets, particularly in terms of flexibility through the System Service market.

The TSOs are conscious that in order to remain competitive with other flexible resources, DSM as an industry must therefore evolve to rely less on any one, singular revenue stream.

The TSOs will endeavour to develop a DSM roadmap to assist industry with any transitions or modifications to current market models or indeed the introduction of new of new models into the markets.

At distribution level, as part of the Smarter HV and MV Customer Connections project, ESB Networks has recently published a public industry consultation paper where their proposed approach to using demand side response (DSR) and non-wires connections and criteria for assessing their application on the distribution system.
ESB Networks are also running the following innovation projects which are evaluating the capability for DSR to provide solutions for localised congestions issues on the distribution network:

- RESERVE – Customer Flexibility
- StoreNet – Customer Energy Storage
- Smarter HV and MV Customer Connections
- Network Flexibility - Non-wires solution to replace conventional network reinforcement

In Northern Ireland, NIE Networks are trialling local flexibility markets to manage network constraints under the DSR innovation project see here this is also detailed in the Greater Access to the Distribution Network in Northern Ireland Recommendations Paper section 4.3.

8.3.3.3 Qualification trials and Demonstration Projects

Industry Feedback: One response noted that a residential DSM business model could be considered in EirGrid and SONI's Qualification Trial for Residential Services.

Response: The TSOs concur with this view and believe that qualification trials and demonstration projects will form a major part of the work required to bring DSM at residential level to market. This could take the form of a number of individual smaller scale projects focused specifically on a range of singular topics which require resolution but will likely conclude with larger projects focused on demonstrating full end to end demonstration of the model. The SOs will look to work closely with Industry on any such projects.

8.3.3.4 Registration arrangements

Industry Feedback: A number of responses listed concerns with market registration arrangements and noted that the categorisation of units for the provision of system services should be mindful of the various combinations of IDS characteristics and how this can add complexities for demand side participation in other markets. Further to this, one response noted that additional levels of complexities arise in relation to registration arrangements for residential level demand response.

Response: The TSOs acknowledge that the current market registration arrangements have resulted in aggregators needing to make tough decisions as they try to best utilise their aggregated sites and jointly participate in the capacity, system service and energy markets. The TSOs acknowledge that this is a big issue for the industry and one which will likely continue to grow into the future if not addressed. The TSOs are committed to working on solutions to resolve this issue both in the short term and longer term. Investigation to develop solutions will be included in our plans.

8.3.3.5 Performance monitoring

Industry Feedback: Two responses sought clarity on whether the enhanced DSU performance monitoring processes described, were in the context of DSU compliance with State Aid requirements. Another response noted that performance monitoring for DSUs is an area that needs to be addressed such that they can provide flexibility to the market in a measurable way.

Response: There are a number of reasons why enhancing the performance monitoring capability of demand side resources is important, not just for DSM participants but for the overall power system. While DSU compliance with State Aid requirements is of course an important element for industry, the TSOs believe enhancing the performance monitoring capability of all contracted services and performance in relation to dispatch instruction and automated responses is essential to the SOs being able to facilitate further DSM growth. Similarly, it is important for competition purposes that good performing units continued to get acknowledged and remunerated appropriately for their performance, the inverse also being true for poor performing units. Enhanced performance monitoring of performance in terms of dispatch, reserve and ramping provision, forecast accuracy as well as declaration and signal accuracy will be required to ensure this can be achieved.

8.4 Deliverables

The SOs will now develop detailed plans reflecting the feedback and comments provided by industry in this consultation with the intention on developing a programme of work which will see continued progress in terms of continued growth, improved performance and increased flexibility of the DSM resource. This programme will not focus specifically on any one element or area of DSM with an overall ambition of delivering the tools, models and incentives which will see continued growth in the industry looking out to 2030. The high level deliverables which will outline of this programme of work is as follows:

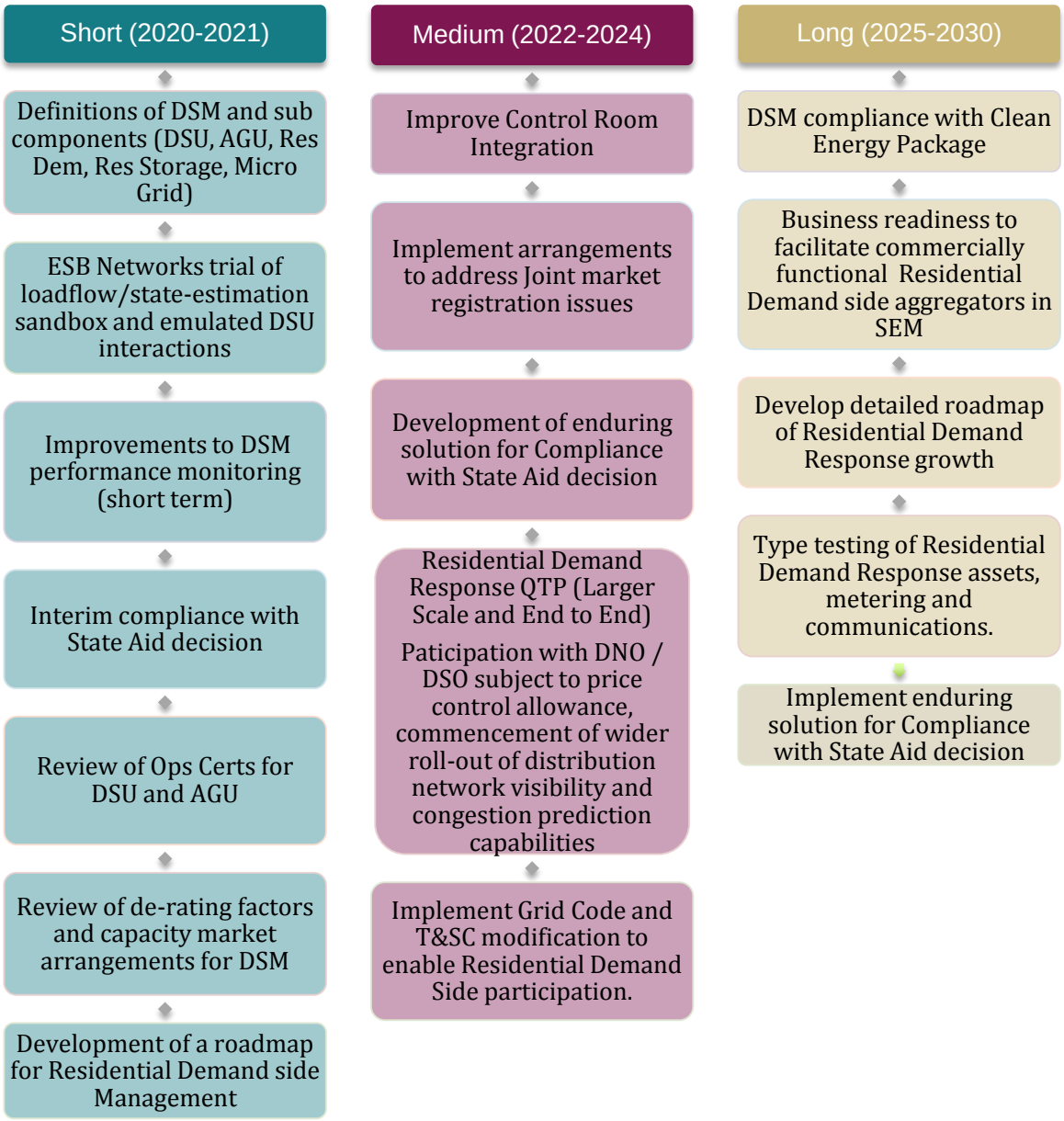

Figure 7 Demand Side Management Working Group Deliverables

9 Qualification Trial Process

9.1 Overview

The QTP is the mechanism through which the TSOs in Ireland and Northern Ireland are managing the transition to a wider portfolio of system service providers. The aim is to identify operational complexities that may be associated with new technologies, or delivery of new System Services. In doing so, the EirGrid and SONI can develop a deep understanding of these complexities and suggest solutions on how to best integrate these technologies at scale on the power system on the Island of Ireland and Europe.

As part of FlexTech, we are expanding the scope of the QTP. We are seeking industries input to identify and inform key areas of focus for upcoming trials. The QTP will provide the technical platform to trial resilience services from new technology and develop solutions to operational complexities.

9.2 Proposals set out in the Consultation Paper

The objective of the consultation paper was to gain stakeholders' perspectives on both new and existing technologies; they believe are the priorities to enabling the further integration of renewables. A summary of the responses received from the industry are discussed below. Overall, the two main themes present in the feedback focused on the QTP – Scope/Structure and Technology categories for possible trials.

9.2.1 Scope & Structure

Industry Feedback: A number of respondents highlighted the Qualification Trial Process (QTP) has been highly effective to enable the adoption of system service provision from technologies that were not previously facilitated through the existing arrangements. One respondent outlined the need got a holistic approach going forward, given the interactions of System Services, Capacity and Energy Markets. Further clarity and communication on the scope of QTP under FlexTech would be welcomed.

Respondents sought clarification of the overall interaction of DS3 and FlexTech was also sought and the total available funding of the programme.

One concern with the inclusion of the QTP under FlexTech is how it will interact with DS3 when its intention is to prove that new technologies and services can provide flexibility to the System Operators. Another respondent raised the limitation of the QTP needing a requirement to be connected to the grid. It was proposed to expand the trials to facilitate the connection and testing of new categories of services providers or demonstration projects. Consideration should also be given to developing a demand turn up product.

Response: The TSO welcomes the feedback on the structure of the QTP, in particular on the structure and limitation to new technologies being connected. This is one area the TSO is investigating and will consider potential extension to the trials going forward to allow for the connection of new technologies. In relation to the scope of the QTP under FlexTech, the TSO is aiming to extend the potential benefit of the trials, such as trialling dynamic MEC. While this is not a DS3 System Services, there may be potential benefits for renewable integration. As such, the TSO view the QTP as a prudent mechanism for identifying the complexities that may be associated.

In relation the trialling of a demand on service, the System Operator has not yet defined demand on as a system services requirement. As such we do not currently see a requirement for a product, rather demand on will be driven by the energy market signals. However, it should be noted we are flexible in delivery of the trials. If a participant is seeking to demonstrate additional capability and potential benefit of their technology, this can be facilitated as part of the QTP trial.

The System Operators recognise the need for further engagement with industry in relation the trialling of new and existing technologies. As System Operator we are open to engaging with industry to identify and breakdown the barriers that exist in facilitating further levels of renewable generation. However, this must be achieved in a prudent and structured manner. In preparation for the development of the trials, stakeholders may submit expressions of interest for participation in the QTP for 2020. The System Operator will consider feedback provided as part of the FlexTech consultation as part of the trial design for 2020.

In relation the budget allocation, the QTP is carried out under e-Tender as such the maximum budget allocation is €443,000. Depending on the trial, the total budget allocation is divided across the number of lots. This will be dependent on a number of factors which may include but are not limited to length of trial and hardware requirements.

9.2.2 Technology Classification

Industry Feedback: A number of respondents support trials of new categories of services providers or demonstration projects for different topologies of hybrid connection. One respondent highlighted the need for clarity whether a hybrid of two qualified technologies need to go through the QTP. A number of different technology configurations were proposed such as solar and wind technologies. A second highlighted technology groups could potentially include pilot / small scale carbon capture and storage facilities and power-to-gas technology which can facilitate sector coupling of gas and electricity systems. It was also suggested to trial existing fast acting OCGT plant acting as a synchronous condenser to provide DS3 System Services. One respondent highlighted that the QTP should be an open and ongoing process that facilitates the integration of service provision that better enables us to reach our decarbonisation goals focussing on Zero-Carbon System Service provision.

Response - As outlined in section 4 of this document, the TSOs' recognise the various opportunities that exist with an expansion in the number of hybrid plants to the system and increased flexibility around export capacity. These advantages may include an increase in diversity factor, a levelling of the generation curve and/or an increased capacity factor. As part of the QTP, the aim is to develop trials arising from needs identified as part of each of the five working groups. This will be assessed as we progress with the initiative, with the view of trialling both flexibility and system service capability of both new and existing technologies. A key theme in the technology classification was that of decentralisation. Small Scale Generation (SSG) and aggregation of the residential sector was highlighted to for possibility of providing flexibility and system services. Especially flexibility reserves to the system with the projected growth of Electric Vehicles.

In relation to two technologies that are considered proven separately. The TSO's would need to consider the interaction of each unit and how it operates to provide system services. Secondly, the configuration of the site will need to be considered and the metering arrangements on the site.

In relation to the residential sector the TSOs' agree on the potential to provide network flexibility and deliver system services. As part of the 19/20 QTP, two residential trials are being currently underway to explore a range of technology capability and operational complexities. The technologies on trials include battery storage, solar and EV's. A link to the 2019/2020 trials can be found here. The trial participates are Energia and SOLO Energy. The aims of both trials are outlined below:

1. To prove aggregated residential electrical appliances as a technology class for the delivery of DS3 system services;
2. To assess the operational complexities of the technology and the impacts this has on current TSO processes and systems;
3. Investigate the barriers to System Services market entry for residential aggregation sites and investigate possible solutions,

Two respondents outlined the potential converter technologies including wind, solar and battery storage should be allowed to participate in the inertia service. The respondents highlighted developments in fast injection of active power using grid forming or virtual synchronous machine algorithms can enable this capability in conjunction with the right hardware infrastructure. This would reduce the need to constrain on fossil fuel plant for the provision of synchronous inertia and provide additional system stability with higher levels of renewable penetration.

The TSO is aware of the development of convertor technologies and capability of grid forming. As part of the MIGRATE project, grid forming technology was investigated in relation to integration of renewable generation into the European power system. Following on for the completion of this project, the TSOs' is assessing the learning and outcomes. The TSOs' may carry out a QTP depending on the level of complexity.

Our stakeholders are central to how we develop future Qualification Trial Process. We are seeking expression of interest to for trials in 2020/2021. In particular in the areas discussed above. If you would like to put forward a trial concept for the next QTP please send us an email at: QtP@eirgrid.com or QtP@soni.co.uk.