EirGrid

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2025 Annual Innovation Report

March 2026

1. Foreword

EirGrid is responsible for balancing electricity supply and demand from the National Control Centre, while also planning for Ireland's long-term electricity needs. We operate the single wholesale electricity market for the island of Ireland (SEM) jointly with SONI via the Single Electricity Market Operator (SEMO).

We have been tasked by Government to deliver a renewable-led electricity system on behalf of the Irish people that can meet the evolving needs of our economy and society and doing so in a cost effective, efficient, safe, reliable and secure manner.

EirGrid also has a new role in offshore including delivering offshore infrastructure on the South Coast of Ireland. Over the next decade and beyond, we'll see considerable changes to the electricity system in Ireland, in a manner none of us have seen in our lifetime.

The way renewable energy is managed and incorporated onto the grid is very different, posing highly complex engineering and technology challenges for everyone in EirGrid and the wider energy sector. Innovation and research will be essential for helping us solve these challenges and ensuring Ireland's economy remains competitive.

Our Innovation and Research Strategy forms an important part of EirGrid's planning and will help us to ensure we can deliver effective and timely solutions for the future. These solutions will facilitate a secure transition to a system powered mainly by our own natural resource, renewables, capable of meeting future demand growth in a sustainable and economic manner. As we continue to work towards the Government's ambition of decarbonising the grid, our work will involve not only strengthening the grid but also evolving it with the support of innovative technologies.

In this report, we've captured the latest progress made on the research projects and Strategic Innovation Programmes EirGrid is currently facilitating. These include critical areas of focus such as clean energy storage as well as green hydrogen, which have a role in supporting wind and solar with firm dispatchable, low-carbon power generation, due to the variable nature of renewables.

Our ambition is to be able to operate the power system where 95% of our instantaneous electricity demand in Ireland can be met by variable renewables like wind and solar at any one time. This is known as the System Non-Synchronous Penetration (SNSP) limit and increasing this will also be pivotal in integrating more renewable energy into Ireland's electricity system. As we continue to integrate more renewable energy sources onto the grid, improving the overall strength and resilience of the grid is also a key focus.

Finally, this report also details the progress made on our CleanerGrid competition which is unlocking the potential, views and enthusiasm of our future leaders across third level institution communities in Ireland since its inception.

Collaboration and knowledge sharing with key stakeholders is fundamental to informing and facilitating our work. And as we move forward, our focus remains on continuing to build and

strengthen relationships, across the energy sector, society and the communities we serve, so that we can enable further innovation as part of our strategic programmes of work.

I'd like to take this opportunity to say thank you for all the valuable feedback that we have received to date and look forward to continued collaboration into the future.

Liam Ryan,
Chief Transformation, Technology and Offshore Officer,
EirGrid Group

2. Executive Summary

Welcome to the 2025 Annual Innovation Report that is published for public awareness. The report outlines our progress in the Innovation and Research area over the period from 1st of January to the 14th of November 2025. This report follows a similar structure to the previous 2023[1] and 2024 Annual Innovation Report[2] documents.

We share the details of the projects we have progressed in 2025 and group them under our nine Strategic Innovation Programmes which are key to our Innovation & Research Strategy[3].

In 2025, six research papers were accepted and published in prestigious journals and we have seven more paper in progress which we expect will be published shortly. We have collaborated with over twenty external bodies and captured over fifty great ideas in our innovation process, which we will evaluate and progress accordingly. This report focuses on thirty-one projects in detail. Over the year we completed nine projects and made significant progress on the other twenty-two.

The report documents the progress of EirGrid on innovative programmes throughout 2025 and points out our ambition for future developments of programmes and new initiatives to begin.

[1] EirGrid Annual Innovation Report 2023
[2] EirGrid Annual Innovation Report 2024
[3] EirGrid Innovation and Research Strategy 2023

Version	Publication Date	Changes
1.0	03 February 2026	Version published for public consultation.
2.0	31 March 2026	Version published after public consultation which includes Annex 3 - Consultation response.
3.0	31 August 2026	Version published for public EirGrid website.

Disclaimer

EirGrid PLC has followed accepted practice in the collection and analysis of data available. While all reasonable care has been taken in the preparation of this report, EirGrid is not responsible for any loss that may be attributed to the use of this information. Prior to taking business decisions, interested parties are advised to seek separate and independent opinion in relation to the matters covered by this report and should not rely solely upon data and information contained herein. Information in this document does not amount to a recommendation in respect of any possible investment. This document does not purport to contain all the information that a prospective investor or participant in the wholesale electricity market may need. Furthermore, all interested parties are strongly advised to channel any enquiries through EirGrid.

For queries relating to this document or to request a copy contact research@eirgrid.com.

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3. Introduction

EirGrid is responsible for operating and developing the electricity transmission system in Ireland, including the planning of strategic infrastructure to meet national energy and climate targets. EirGrid has also been mandated to develop, operate and own Ireland's forthcoming offshore electricity grid, expanding its remit to support the integration of large-scale renewable energy from offshore sources.

The electricity system on the island of Ireland is undergoing a transformation as we integrate more electricity generation from renewable energy sources. EirGrid is playing a central role in this process. As our country's Transmission System Operator (TSO) we are internationally recognised for developing a grid that can support up to 75% clean renewable energy at any moment, a capability that reflects years of targeted innovation and operational excellence.

This year's publication of the Climate Action Plan 2025 reaffirmed Ireland's commitment to halving greenhouse gas emissions by 2030 and achieving climate neutrality by 2050[4]. To achieve these Government-set targets, we need to overcome the natural limitations of many established technological, operations and market practices. The plan's emphasis on accelerating renewable integration, enhancing energy security, and deploying flexible, low-carbon technologies directly relate to EirGrid's directive and informs our innovation priorities.

Our Innovation and Research Strategy is closely aligned with the Shaping Our Electricity Future roadmap[5], which outlines the actions required to deliver a secure and decarbonised power system by 2030. The innovation programmes launched and currently being developed in 2025 are designed to advance the Shaping Our Electricity Future roadmap.

This document records the progress made on innovative programmes throughout the calendar year of 2025 and highlights our ambition for future developments. It reflects our commitment to delivering a transmission system that ensures a safe, reliable, robust and environmentally sustainable supply of electricity. Our innovation efforts span our nine Strategic Innovation Programmes[6], each of which is designed to address specific system needs. These include diverse topics from digitalisation and system strength to environmental stewardship and citizen engagement. As part of the report writing process, we have consulted with industry stakeholders and the public on our existing innovation programmes and projects. Their feedback is incorporated into this final version of the report.

As a key deliverable in the CRU's PR5 Regulatory Framework Incentives and Reporting[7], this Annual Innovation Report covers innovative projects undertaken by EirGrid in 2025. This marks the final year in PR5, the CRU's current Price Review cycle, and represents the culmination of the last five years' work in our organisation's innovation space before being superseded by the forthcoming PR6 period[8]. Throughout PR5, EirGrid has consistently delivered high-impact innovation, which aligns with regulatory incentives and national policy, and this report demonstrates our ambitions for continued growth in innovative developments throughout the PR6 period.

[4] Climate Action Plan 2025
[5] Shaping Our Electricity Future Roadmap Version 1.1 2023
[6] EirGrid Innovation and Research Strategy 2023
[7] PR5 Regulatory Framework and Incentives Reporting, CRU/20/154 2022
[8] EirGrid Price review 6 Business Plan (2026-2030) Plain English Summary 2025

4. Innovation in 2025

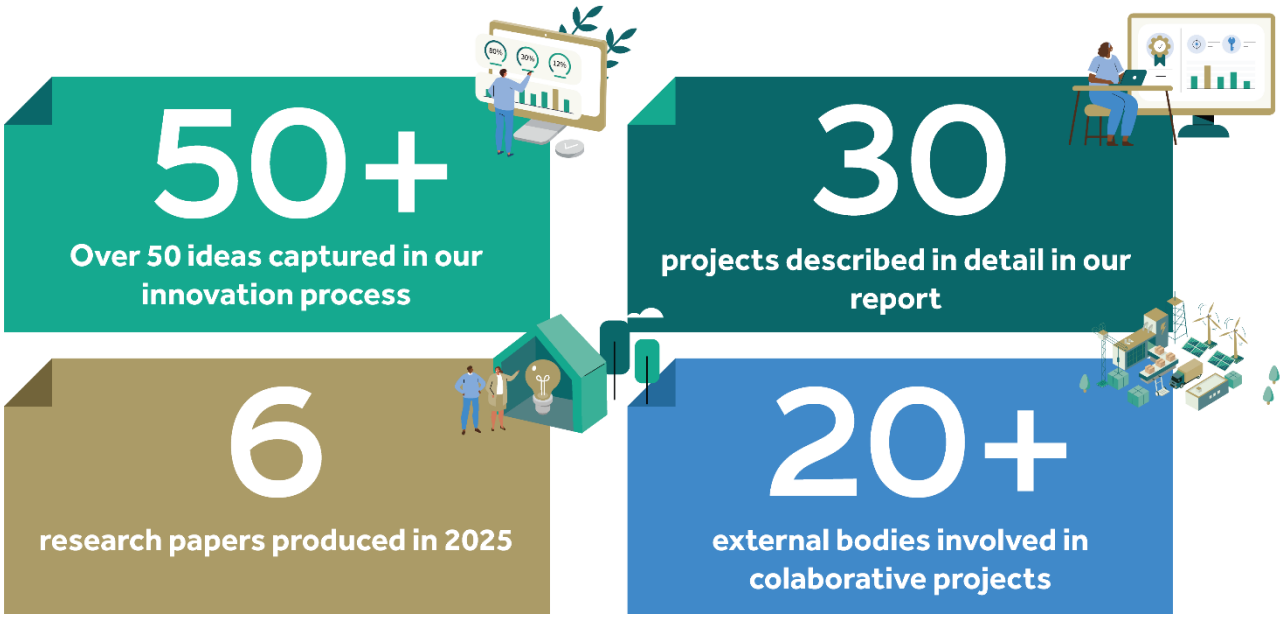

Figure 1: Key Innovation Metrics for 2025

In 2025, we captured over 50 ideas that included various innovation or research projects and covered process improvements. As some of these ideas are in their infancy and some are process improvements, which we classify as incremental innovation, we report on 30 projects in this report in greater detail. We've also had six papers authored by EirGrid staff, published in the proceedings of prestigious conferences and peer-reviewed journals.

4.1. Data Reporting Period

Data on projects active during the period 1st of January to 14 November 2025 are considered[9].

The following projects appear in the 2024 Annual Innovation Report[10] with status "In Progress". After detailed review we identified they should have been reported as completed in 2024.

- *Decision on increasing SNSP to 80%*
- *System Strength Definition*
- *Tackling Solar Energy Integration Challenges*

4.2. Incremental Innovation

Some ideas involved improvements in our processes and finding new ways of doing some of our usual activities. Key highlights for 2025 are below:

- We have developed an internal innovation management system to support the processing of innovation and research proposals. This framework is based on the ISO 56 000 series of standards which provide the fundamental concepts for innovation management systems[11]. This system aims to provide strategic innovation management guidance to build and grow business.

[9] Select developments from late November and December 2025 have been included to capture progress on key projects.
[10] It should be noted that the project *Exploring how AI/ML can help determine strategic network reinforcement projects in the transmission system including technology, length of cable/overhead line etc.*, included in the 2024 Annual Innovation Report, has been delayed indefinitely.
[11] ISO, Innovation Management — Fundamentals and Vocabulary, ISO 56000:2020

- Further informed by ISO 56 000, we have investigated the need and notional specifications for a bespoke innovation management software platform. Our investigations have considered off-the-shelf vendor solutions and in-house development. Implementing such a dedicated tool would make innovation management more systematic, while facilitating easy collaboration, thus driving innovation projects from inception to fruition faster.
- A significant number of studies we carry out use a lot of data from various teams within the organisation and external sources. We developed tools to automate the data collection and data checking as input data quality is very important for the study output to be useful.
- We have rolled out Generative AI services for EirGrid personnel to avail of this new technology's abilities to automate laborious tasks to increase efficiency.
- As part of the Power Platform suite, we developed and deployed the Project Status Reporting App. This tool streamlined project reporting by eliminating manual data transfers and time-consuming manual validation processes. It enabled teams to focus on higher-value activities, delivering measurable efficiency gains across project management workflows.

4.3. Research Papers

Authors from within EirGrid have published six research papers at various conferences, venues and journals, as below:

1. Asymmetry of Frequency Distribution in Power Systems: Sources, Estimation, Impact and Control; *IEEE Open Access Journal of Power and Energy*; January 2025.
2. Distinguishing the energy and non-energy actions in balancing energy markets; *Electric Power Systems Research;* January 2025.
3. New Reserve Services for the Ireland and Northern Ireland Power Systems; *2025 IEEE PES General Meeting*; March 2025.
4. A New Real-World TSO-DSO Operating Model: The Case for Ireland*; 2025 IEEE PES General Meeting Conference;* July 2025.
5. HVDC Digital Twin – Concepts and Roadmap*; CIGRE 2025 International Symposium*; October 2025.
6. Frequency Quality in Power Systems: Definition, Metrics, Control and Operation*; Springer Nature Switzerland*; November 2025.

Furthermore, EirGrid authors have had seven synopses accepted to the biennial CIGRE Paris Session, next scheduled for August 2026. Titles for these synopses are below:

1. Bridging Behind-the-Meter Data Gap: A Nodal Approach to Estimate Embedded Solar Generation in Real Time
2. Evolving Performance Standards for Large Electricity Users in Ireland and Northern Ireland
3. HVDC Digital Twin – Maturity Level and Use Cases
4. New technologies and concepts of DC and FACTS enabling energy transition
5. Power system stability aspects of decarbonisation of power systems and the road to net-zero
6. Power quality (PQ) and electromagnetic compatibility/ interference (EMC/EMI) aspects of decarbonisation of power systems and the road to net-zero
7. VFM (LSI/LSO) Prediction Tool Using Machine Learning

4.4. Strategic Innovation Programmes

The strategic innovation programmes identified as part of the Innovation and Research Strategy are EirGrid's view of the crucial areas of innovation and research that we need to focus on to ensure we can

respond effectively to the challenges ahead. These programmes were developed with external engagement as our Innovation and Research Strategy was developed. These programmes are expanded in the next few pages.

Please note that Annex 1 contains more details on each project and Annex 2 contains the list of terms and abbreviations.

Project status descriptions are listed below:

- Completed – project has been completed and project has no outstanding actions.
- In Progress – project has a scope agreed, resources are available, and work is being carried out.
- Initiated – project is in scoping stage, or scope is agreed but project work is not started yet.

Enhance data-driven decision-making leveraging artificial intelligence capability

Objective

Support the development of EirGrid's next generation artificial intelligence capability to enhance data driven decision making and transparency.

Benefit

Continue the collaboration at EirGrid for next generation artificial intelligence technologies and use cases. Build EirGrid's capability in explainable artificial intelligence and promote data governance and open data to bring society, decision-makers, and industry on the machine-enabled decision-making journey. Explore opportunities to use artificial intelligence and/or machine learning (AI/ML) capabilities across a variety of areas including network planning, forecasting within the national control centre and predictive maintenance to support asset management for EirGrid.

Projects

Completed

- **Checking if Artificial Intelligence/Machine Learning can Help Determine Strategic Storage, Demand or Generation Projects**
  Project to prioritise network reinforcement projects to achieve CAP targets more efficiently, considering an AI-based method for faster, streamlined analysis due to limited resources and the computational intensity of their current non-AI project.
- **DevOps Proof of Concept for IT Systems Delivery**
  Explored the use of a DevOps-based delivery model for IT systems to enable rapid prototyping, agile development, and AI-driven forecasting compared to traditional waterfall approaches.
- **Volume Forecast Methodology (Largest Single Infeed/Largest Single Outfeed) Prediction Tool Using Machine Learning**
  Developed a proof-of-concept machine learning tool to predict Largest Single Infeed (LSI) and Largest Single Outfeed (LSO) for reserve calculation in the Day Ahead System Services Auction.

In Progress

- **Exploring how Artificial Intelligence/Machine Learning can Assist in Generating Energisation Instructions**
  Investigates the feasibility of using AI/ML to automate the generation of energisation instructions by analysing structured and diagrammatic data to reduce manual effort and errors.
- **Microsoft Fabric and Purview on Enterprise Data Hub**
  Deploys the Enterprise Data Hub on Microsoft Fabric with Purview integration to deliver unified data governance, security, and scalable analytics for high-value business use cases.

Status and Vision

AI and machine learning are now delivering tangible benefits, with completed proofs of concept for grid planning, forecasting, and operational automation. Current projects focus on energisation instruction generation and enterprise data governance. Our vision is to scale these successes into business-as-usual processes, ensuring compliance with emerging standards and leveraging partnerships to embed AI-driven decision-making across planning and operations.

Flexible Network

Objective

Continue understanding and utilising the benefits of flexible network technologies to maximise the use of the transmission grid while minimising the requirement for new network build.

Benefit

To meet our carbon emission and renewable energy targets, we have investigated flexible network technologies, such as Dynamic Line Ratings and Dynamic Power Flow Controllers. These technologies can provide a means to reduce network congestion, act as an alternative to extensive new network build, provide system services/operational flexibility, maximise utilisation of existing network assets, enable greater output from Renewable Energy Sources of Electricity (RES-E) generation hubs and create potential economic/reliability benefits. We are at a stage where we are implementing these technologies while finding innovative ways of extracting the most benefit. For example, understanding most suitable locations for large scale demand and generation.

Projects

Completed:

- **Dynamic Line Rating**
  Trials real-time dynamic line rating technology to increase transmission capacity safely by using live environmental conditions instead of conservative static ratings.

In Progress:

- **Dynamic Power Flow Controllers**
  Investigates modular power flow control devices to manage network congestion and optimise utilisation of existing transmission assets without extensive new builds.
- **NexSys - Enhanced Utilisation of Power System Network Infrastructure**
  Research methods and tools to maximise the use of existing grid infrastructure through advanced planning optimisation and dynamic technologies, reducing investment costs and curtailment.
- **Virtual Dynamic Line Rating Sensors**[12]
  Project aims to alleviate network congestion and improve grid efficiency by using advanced weather forecasting and AI to predict dynamic line ratings without costly hardware sensors.

Status and Vision

We have progressed trials of Dynamic Line Rating and will soon progress to trials for Dynamic Power Flow Controllers, demonstrating their potential to ease congestion and maximise existing network capacity. Our vision is to scale these technologies into business-as-usual, while continuing horizon scanning for high-readiness solutions and researching emerging options to further enhance grid flexibility. The progression from planning to implementation has prompted the renaming of this SIP from *Flexible Network Strategy* in previous iterations of the Annual Innovation Report.

[12] The 2024 Annual Innovation Report lists this project under the SIP *Enhance data-driven decision-making leveraging artificial intelligence capability*. The project is now listed under *Flexible Network* to more accurately reflect its current status.

Champion the Emergence of the Energy Citizen

Objective

Continue understanding and facilitating consumers' changing interaction with power system technologies and services.

Benefit

Continue enhancing EirGrid's understanding of all aspects of an active energy citizen, their behaviour and what drives their choices. Prepare EirGrid to play our role in facilitating the relevant national policies with respect to community participation and best practice pre-application community consultation programmes. Trial and iterate solutions to gain deeper understanding of new energy technologies (for example small scale PV, smart tariffs etc), the scale of consumer investment and how these can support EirGrid to transform the power system for future generations. Support our public engagement strategies by disseminating best practice research on community engagement and participation.

Projects

Completed:

- **CleanerGrid 2024/2025**
  Annual student competition inviting innovative solutions presenting their vision of what the energy sector will need to look like in 2050 to achieve net-zero emissions.
- **Public Engagement with Energy Transitions in an Era of Climate Crisis**
  Research project mapping actors, engagement practices, and community benefit strategies to improve public participation in electricity grid development.

In Progress:

- **CleanerGrid 2025/2026**
  The latest edition of EirGrid's student competition focused on accelerating offshore wind integration through innovative proposals for Ireland's clean energy transition.

Status and Vision

We have delivered impactful engagement projects and student competitions, strengthening public participation and awareness of the energy transition and EirGrid's role in society. Our vision is to build on these successes by expanding collaborative initiatives and developing new research to deepen understanding of consumer behaviour and community involvement.

Understanding pathways to 100% SNSP

Objective

Translate net zero carbon pathway research into real-world trials of next generation technologies and routes to integration.

Benefit

Enhance EirGrid's understanding of pathways to 100% System Non-Synchronous Penetration (SNSP) by assessing the impact and real-world performance of mass integration of emerging technologies such as inverter-based resources (wind and grid scale Photovoltaics (PV), grid forming control, electrolysers, and distributed energy resources (for example small scale PV). Prepare EirGrid to operate at 100% SNSP by delivering minimum viable products and trials to further inform EirGrid's understanding of the solutions required and routes to integration.

Projects

Completed:

- **Investigation on Strategies to Improve Power System Inertia in High Penetration of Renewable Energy Sources**
  Examines technical and policy strategies to enhance system inertia and maintain grid stability as Ireland moves toward 100% SNSP.
- **Low Carbon Inertia Solutions Phase II**
  Determines optimal procurement and placement of low-carbon inertia services to enable secure operation of the all-island power system with very high renewable penetration.[13]

In Progress:

- **Integrating Liquid Air Energy Storage with Irish Wind Farms**
  Explores the potential of co-locating Liquid Air Energy Storage with wind farms to reduce curtailment and improve grid resilience.
- **NexSys - Mitigation of Extreme Weather Events on High-RES Dependent Networks**
  Investigates the impact of extreme weather on renewable-dependent grids and strategies to mitigate operational risks under future high-RES scenarios.
- **Short-Circuit Modelling and Protection System Performance Analysis for Systems with High Level of Inverter Based Resources**
  Analyses the impact of inverter-based resources on fault response and protection system performance, proposing mitigation measures for secure operation.
- **Sources of Very Low Frequency Oscillations**
  Develops an offline tool to identify sources of very low-frequency oscillations in the all-island power system using data analytics and machine learning.

Status and Vision

We have advanced studies and trials to address system stability at very high renewable penetration, including inertia solutions and integration of emerging technologies. Our vision is to continue developing tools, models, and operational strategies that enable secure operation at 100% SNSP while deepening understanding of grid behaviour under these conditions.

[13] EirGrid Low Carbon Inertia Services – Phase 2 2025

Setting the course for the Control Centre of the Future

Objective

Identify what security tools and capabilities are required to maintain the protection of EirGrid's control centre now and in the future.

Benefit

Maintain the use of only the best security tools regarding detection, protection and monitoring. Foster excellent relationships with reputable, well-established security partners. Continue to improve and modernise security posture to meet the demands of the evolving threat landscape. Intensive engagement of the Enterprise Security team in identifying new tools and features as well as establishing the Control Centre of the Future.

Projects

In Progress:

- **Operational Tools and Capability Enhancement Programme**
  Establishes a programme to develop advanced operational tools and capabilities that enable secure operation of the power system with very high levels of non-synchronous renewable generation.
- **Reduced-order Model of the All-Island Irish Power System**
  Creates a simplified dynamic model of the all-island grid to preserve critical behaviours while reducing complexity for faster studies and benchmarking.

Status and Vision

We have initiated projects to enhance operational tools and develop simplified system models, alongside trials of innovative connectivity solutions. Our vision is to build a modern, secure control centre equipped with advanced capabilities to manage a grid operating at very high renewable penetration.

Lead the island's electricity sector on sustainability

Accelerate and expand implementation of existing grid-wide evidence-based environmental measures, and wherever possible, move beyond impact avoidance/reduction to enhance the environment in response to the biodiversity and climate emergency.

Benefit

Continue to enhance EirGrid's and society's understanding of the impact the power sector has on the all-island environment, and support learning and skill development to achieve the transition. Deliver societal benefits and support societal engagement with EirGrid by publishing evidence of clear and measurable action on environmental protection and enhancement. Prepare EirGrid to innovate alongside our stakeholders and customers in the pursuit of a fully sustainable and circular power system with minimal impact and enhancement of the environment over every timeframe. EirGrid will continue to evaluate emissions based on Science Based Targets and will make any results transparent. Integrate and retrofit assets with biodiversity mitigations and, where possible, enhancements. Standardise Nature Inclusive Design (NID) on EirGrid delivered offshore grid assets and support and advise developers in their own sustainable contestable design. This requires consideration of the effects of the continued growth of offshore windfarms on marine ecosystems to include hydrodynamics and sediment transport, fisheries, birds, and marine animals.

Projects

In Progress:

- **Environmental Evidence-Based Guidelines**
  Updates and expands evidence-based environmental guidelines to accelerate infrastructure delivery and ensure consistent, efficient assessment for onshore and offshore projects.
- **Nature Inclusive Design**
  Integrates biodiversity measures into grid infrastructure design, both onshore and offshore, to enhance habitats while meeting EU and national nature restoration targets.

Status and Vision

We have advanced biodiversity initiatives and have begun updating environmental guidelines to accelerate project delivery and improve ecological outcomes. Our vision is to embed nature-inclusive design and evidence-based practices across all infrastructure projects, ensuring sustainability becomes a core element of grid development.

Prepare for a multi-purpose offshore HVDC grid

Objective

Understand the capabilities and dependencies to delivering a multi-purpose, multi-terminal, multivendor high voltage direct current (HVDC) grid.

Benefit

Continue enhancing EirGrid's understanding of HVDC technologies and their development roadmap. Prepare EirGrid to embrace and develop HVDC assets considering the asset lifecycle from technology qualification to asset management. Prepare EirGrid to support the development of multi-purpose HVDC grids for offshore by understanding the implications for infrastructure development, multi-jurisdictional grid operation and multi-purpose, multi-jurisdictional markets. Participate in international working groups to further develop policies, technical standards, financial and legal frameworks for HVDC offshore grids.

Status and Vision

Currently, there are no active projects focused on preparing for a multi-purpose offshore HVDC grid within EirGrid. However, the need for this capability is recognised as critical for future offshore integration and cross border energy exchange. EirGrid maintains awareness of international developments and participants in knowledge sharing forums and aims to initiate dedicated research and innovation projects. The vision is to build the technical, operational, and market frameworks necessary for offshore HVDC integration, ensuring interoperability, resilience, and alignment with European standards.

Grow EirGrid's TSO capabilities for developing and operating the new offshore grid

Objective

Support EirGrid to develop scalable processes and solutions to manage the development of an offshore network.

Benefit

Enhance EirGrid's understanding of best practice and next generation offshore Transmission Asset Owner capabilities and solutions. Prepare EirGrid to fulfil its role in the planning, development, operation, and maintenance of an offshore transmission system throughout the three phases of the network development model. Enhance ways of engaging with communities and developers through novel solutions, processes, and data. Reduce the cost and risk of working offshore through digital solutions. This includes a collaborative approach with several key stakeholders and government departments.

Projects

Completed:

- **Offshore Wind Development Harmonic Distortion Mitigation Coordination**
  Analysed interactions between offshore wind farm harmonic mitigation measures to ensure coherent operation and optimise filter design for system efficiency.

In Progress:

- **Offshore Wind Supplemental Program**
  Provides a collaborative research platform to address offshore wind-specific challenges across grid integration, transmission systems, environmental aspects, and technology trends.
- **Temporary SCADA Over 4G Private Access Point Name**
  Demonstrates the feasibility of using secure 4G connectivity for temporary SCADA links to accelerate substation testing and reduce commissioning delays for offshore projects.

Status and Vision

We have completed studies on harmonic distortion mitigation and joined a new supplemental programme to address offshore wind integration challenges. Our vision is to build scalable processes and solutions for planning, operating, and maintaining offshore transmission systems, supported by collaborative research and best-practice adoption.

Plan for a net zero carbon, customer focused, export capable power system

Objective

Facilitate a plan-led, whole system approach to scheduling and exporting large volumes of renewable energy via electrical interconnection or via emerging energy carriers such as hydrogen and its derivatives.

Benefit

Continue to enhance EirGrid's understanding of the opportunities and challenges resulting from a range of emerging renewable technologies that are quickly becoming technologically and economically feasible at large scale, for example solar PV and offshore wind. Continue to investigate production scenarios of hydrogen and its potential to act as a long-term seasonal store of renewable energy. Continue to investigate other technologies to complement Ireland's large renewable resources such as batteries, pumped hydro storage and additional electrical interconnection with neighbouring countries. Prepare EirGrid to facilitate and capture benefits arising from the mass deployment of these new technologies and the benefits to the power system and its customers of potentially becoming an energy exporter.

Projects

In Progress:

- **Design and Development of Net Zero Energy Buildings with Internet of Things Integration**
  Develops a Net Zero Energy Building that balances energy generation and consumption using renewable sources and IoT-based smart controls.
- **Hydrogen Fired Gas Turbines**
  Investigates scenarios for connection of hydrogen fired gas turbines to a hydrogen network and the capability of the network to supply the required hydrogen to the gas turbine in each scenario.
- **HyLIGHT**
  Develops a roadmap for hydrogen in Ireland through techno-economic analysis, system modelling, and policy assessment to enable large-scale integration of green hydrogen into the energy system.
- **Investigating HVDC Interconnection as a Contributor to Security of Supply in Ireland**
  Examines the role of HVDC interconnectors in ensuring Ireland's electricity security of supply, both historically and in a future dominated by variable renewables.

- **NexSys – Impact of Green Hydrogen Integration onto the Power System**
  Will explore the technical and economic implications of integrating green hydrogen into the all-island power system, including optimal electrolyser siting and operational strategies.
- **Uncovering the Locational Costs of Electricity Transmission**
  Analyses transmission constraints and locational marginal prices using open-source tools to support better grid planning and market design for Ireland and Northern Ireland.

Status and Vision

We have progressed research on hydrogen integration and locational pricing to support future planning and market design. Our vision is to develop strategies for large-scale renewable export and sector coupling, enabling Ireland to become a net-zero, customer-focused energy hub.

5. Key Projects and Memberships

The illustration below shows a selection of our commitments between 2021 and 2025 and gives an idea how innovation projects in 2025 fit into the longer-term plan.

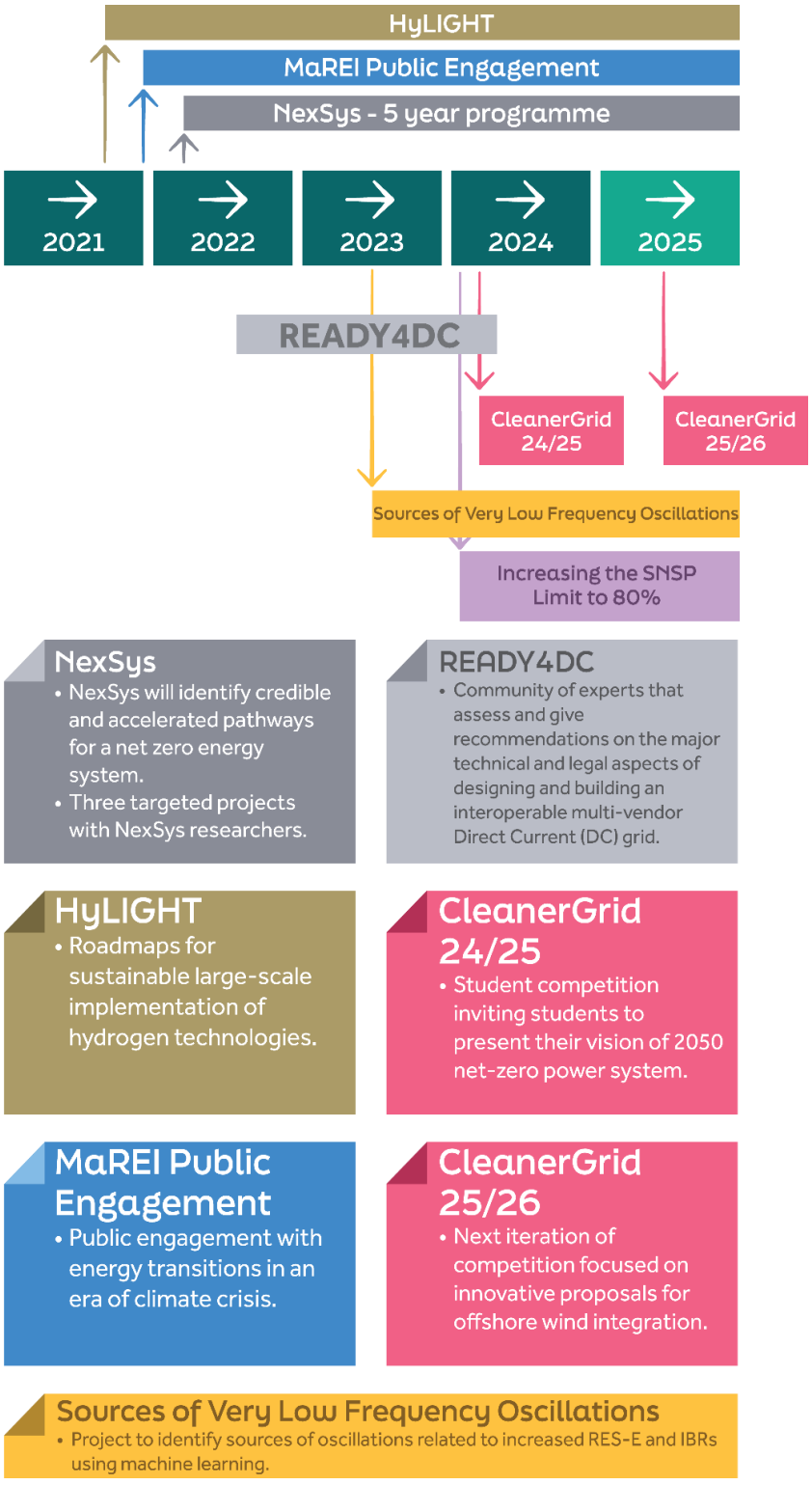

Figure 21: Key Projects 2021 to 2025

We hold several memberships to support our innovation and research. Some key examples are listed below:

- *Centre for Applied Data Analytics Research (CeADAR)*

  As Ireland's national centre for applied AI, a membership with CeADAR provides access to their bespoke technical services, AI training material and applied research in AI and ML. Our CeADAR membership supports us in being a fast follower in the emerging field of AI applications.

- *Electric Power Research Institute (EPRI)*

  This membership gives us access to cutting-edge research and industry-expert insights on a variety of topics related to electric power systems. EPRI's studies into the sector's emerging technologies provide support to the energy transition.

- *Energy Systems Integration Group (ESIG)*

  ESIG membership provides access to leading expertise in the integration of modern energy systems. This holistic approach supports our planning and operation efforts to meet government-mandated energy and climate targets.

- *European Network of Transmission System Operators for Electricity: Research Development and Innovation Committee (ENTSO-E RDIC)*

  A membership with the ENTSO-E RDIC allows us to work collaboratively with other European TSOs on addressing common challenges and contribute to new developments in energy sector technology, policy and other relevant areas.

- *Florence School of Regulation (FSR)*

  The FSR is an important actor at both an EU and international level in energy and climate policy, particularly in electricity markets. As donors, receive greater access to and information on the school's developments and access courses on several relevant topics such as electricity markets and power systems.

- *Industry Research and Development Group (IRDG)*

  Our membership with the IRDG allows us to avail of their expansive Innovation Network of collaborating organisations. We gain access to funding supports and expert advice from these bodies.

6. Our Vision

Our vision for the future focuses on three key pillars:

- Pillar 1: Research – Generation of knowledge and insights
- Pillar 2: Innovation – Application of knowledge and insights to realise value
- Pillar 3: Processes – Systematic and strategic approach to research and innovation management

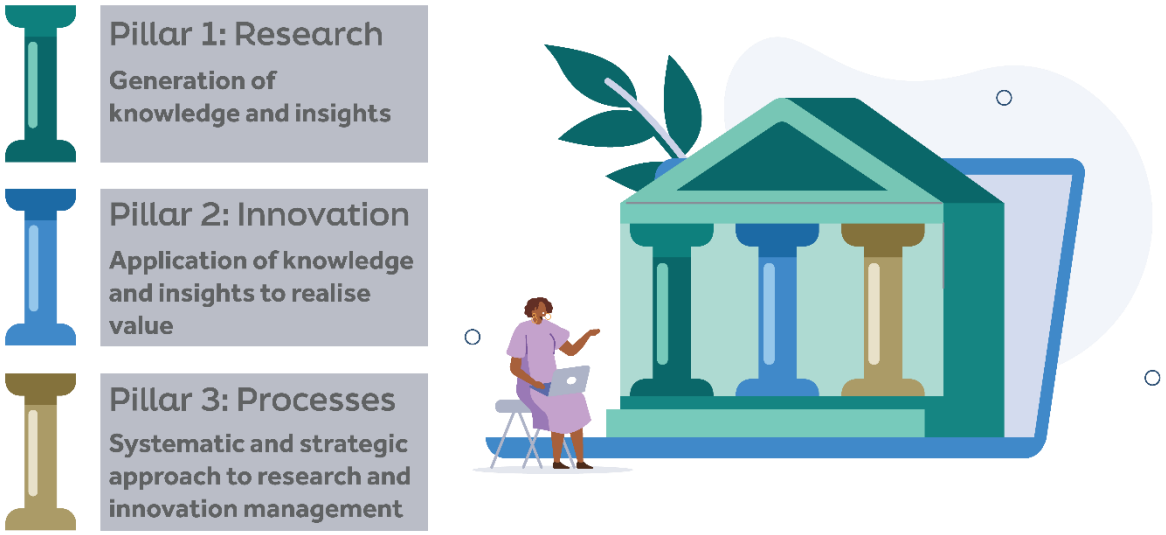

Figure 32: Three Pillar Arrangement

6.1. Pillar 1: Research

The EirGrid Innovation & Research Strategy identifies the importance of co-ordination and collaboration with our industry and academic partners. We also recognise that there is a need to diversify our research partners and branch into other research areas and research institutions. We will require the input of experts from across multiple sectors and countries to meet government targets related to the pursuit of net zero.

6.2. Pillar 2: Innovation

Our innovation initiatives will be guided and shaped by the knowledge and insights gained from our research projects as well as our Innovation and Research Strategy and framework. Further, we will incorporate principles from the ISO 56 000 series of standards on innovation management in our fundamental innovation practices.

We are currently developing detailed roadmaps for each of the nine SIPs, defining the specific scope, sequencing, and timing of activities required to realise their objectives. These roadmaps will serve as the operational blueprint through which we deliver on the ambitions set out in our Innovation and Research Strategy document.

6.3. Pillar 3: Processes

The Innovation & Research Strategy identifies the importance of co-ordination and collaboration with our industry and academic partners, as well as establishing the needed frameworks and internal processes and enablers for driving and supporting innovation and activating our research and innovation purpose. The aim of this pillar is to establish those necessary frameworks.

This pillar covers key areas such as:

- Making the innovation process digital, transparent and accessible to all our colleagues
- Allowing our colleagues to innovate by offering training and development and time and space to innovate
- Further enhancing innovation by establishing roles of Innovation Champions and focusing on enhancing innovation capability and offering it as a service.

7. Next steps

This Annual Innovation Report documents EirGrid's progress on innovative programmes throughout the 2025 data collection period and points out our ambition for future developments of programmes and new initiatives to begin. The innovation programmes mentioned here reflect the ambitions of our Innovation and Research Strategy. We sought feedback on this report from 3 February to 3 March 2026 to enable us to gather the views of our stakeholders, and ensure the projects are deemed appropriate by all. The consultation was published on our EirGrid consultation portal[14]. Our responses to the feedback received from the consultation are included in Annex 3.

[14] EirGrid, Consultation Portal

Annex 1 – Project details

This section provides detailed information on each of the innovation and research projects included in this report. Projects are grouped according to the primary SIPs they fall under.

Enhance data-driven decision-making leveraging artificial intelligence capability

Checking if Artificial Intelligence/Machine Learning can Help Determine Strategic Storage, Demand or Generation Projects in the Transmissions System, including Technology, Export/Import Capacities, Duration of Storage, etc.

Status	Completed
Partner(s)	Trinity College Dublin
Scope	Objective: Explore the suitability of AI/ML methods for prioritising storage, demand or generation projects in the transmission development process. Included: Development of a notional proof-of-concept and presentation of results to relevant EirGrid personnel. Excluded: All use of sensitive EirGrid models and data.
Rationale	Integrating new storage, demand or generation projects is key to achieving climate action targets. Existing prioritisation methods are resource intensive. This project investigates whether AI-based approaches could offer a more streamlined alternative.
Expected Impact	The project is a proof-of-concept of a tool that may eventually become a useful asset within EirGrid. This specific project does not aim to produce such a tool, only provide insight into potential for future development. Cost savings: Zero monetary budget from EirGrid, Trinity carries all costs. Incorporation into BAU: Potential for future use in prioritisation workflows.
Progress in 2025	Project concluded in H1 2025 with submission of a master's thesis. The thesis presents a hybrid AI model (GCNs + Transformers) for power flow analysis using simulated data from the IEEE 57-bus system. Demonstrated strong predictive accuracy and feasibility.
Dissemination	Remains internal to EirGrid. Presentation of project results to EirGrid personnel. Project IP held by Trinity College Dublin. May be part of future publications at their discretion.
Future Potential	Serves as a springboard for future work. Positive results suggest scalability to real-world grids. Next steps could include PhD/Post-Doc research and potential development of a specialist FTE within EirGrid focused on AI-driven grid analysis.

DevOps Proof of Concept for IT Systems Delivery

Status	Completed
Partner(s)	KPMG PowerRunner
Scope	This Proof of Concept explored the use of a DevOps-based delivery model for IT systems, contrasting it with traditional waterfall approaches. The project

	involved rapid prototyping, SME collaboration, and AI-driven forecasting, all delivered within six weeks.
Rationale	Proof of Concept to explore agile, DevOps-based IT delivery methods that better align with the pace and complexity of modern energy system challenges. The approach aimed to enhance responsiveness, foster collaboration, and enable rapid prototyping for data-driven solutions, supporting innovation and operational excellence.
Expected Impact	• Demonstrated ability to deliver high-quality, cost-effective solutions rapidly • Forecasting tool achieved 90% accuracy within six weeks • Estimated 15% reduction in reserve requirements using AI-based forecasting • Incorporation into BAU: supports strategic shift toward agile, modular IT systems and vendor-agnostic platforms
Progress in 2025	Project concluded with three working prototypes delivered in six weeks. AI models were validated using operational data and demonstrated scalability, adaptability, and low compute cost.
Dissemination	Internal close-out report summarising findings and recommendations. No formal dissemination activities (e.g. publications, conferences).
Future Potential	The project demonstrated that DevOps methods can deliver fast, scalable, and cost-effective solutions. With further investment, this approach could be expanded across EirGrid to support agile system development, AI-driven forecasting, and modular IT architecture, enabling more responsive, innovative, and efficient delivery of future operational tools.

Volume Forecast Methodology (Largest Single Infeed/Largest Single Outfeed) Prediction Tool Using Machine Learning

Status	Completed
Scope	Proof of concept for a Volume Forecast Methodology (VFM) tool to predict Largest Single Infeed (LSI) and Largest Single Outfeed (LSO) across Ireland, Northern Ireland, and the all-island system. The tool supports reserve calculation for the Day Ahead System Services Auction, a key FASS programme deliverable.
Rationale	A requirement of the FASS programme and aligned with SEMC guidance to improve volume forecast accuracy based on system needs and operational experience.
Expected Impact	• Enables development of a day-ahead Volume Forecast Methodology prediction tool • Potential to reduce reserve overprovision and associated market costs • Incorporation into BAU subject to adoption by FASS team or management
Progress in 2025	Proof of concept developed, tested, evaluated, and documented between June and August 2025
Dissemination	• Internal presentation and publication • CIGRE Paris Session 2026 paper synopsis accepted
Future Potential	May progress to pilot stage if adopted by FASS team or management

Exploring how Artificial Intelligence/Machine Learning can Assist in Generating Energisation Instructions

Status	In Progress
Partner	CeADAR – Ireland's centre for AI
Scope	The studies within this project will investigate the feasibility of using AI to generate Energisation Instructions (EI). EIs are the formal operational commands issued to safely apply electrical power to a specific part of the grid, ensuring all safety, technical, and communication protocols are followed before energisation. These investigations will involve the analysis of structured data inputs (AutoCAD, Spreadsheet, SLDs and other documents) to identify what needs energising and visual/diagrammatic data (SLD and schematic) to determine how to energise. Additionally, the use of AI in assisting the generating of EI documentation will be investigated.
Rationale	Energisation of grid components is a rule-driven and repetitive task that is labour-intensive and requires expert knowledge. However, it is also prone to simple but costly errors which can have safety, financial, and reputational consequences. This makes the production and implementation of EIs suited to AI augmentation, as the step-by-step nature and rules-based approach can be readily modelled by AI/ML programs, allowing these approaches to automatically generate energise instructions for a substation based on operating factors, weather conditions, and historical energisation success rates, while flagging any safety concerns.
Expected Impact	The project aims to produce an AI/ML tool which can generate a part of the EIs. The tool would consume related inputs (operating factors, asset type and conditions, weather, etc.) and output the switching procedure for grid infrastructure.
Progress in 2025	• Kick off with CeADAR • Project suggested internally as a potentially useful development. • Project pitched to and accepted by CeADAR. • Ensuring the project remains aligned with EU AI act and EirGrid's AI strategy. • Process and data points understanding jointly with SMEs and CeADAR. • Data points population Cost savings: Potential to reduce the time, labour and cost associated with creating EIs and with energising infrastructure/assets on the grid. Incorporation into BAU: Proof-of-concept study, it will not be implemented as BAU.
Dissemination	Work in progress
Future Potential	The outcome of this project will serve as a proof of concept for how AI/ML can help in generating EIs. If successful, the project may be extended for further sections of the process.

Microsoft Fabric and Purview on Enterprise Data Hub

Status	In Progress
Scope	This project will deploy the Enterprise Data HUB (EDH) on Microsoft Fabric and integrate it with Microsoft Purview. Fabric is a unified end-to-end data and analytics platform that integrates with multiple Microsoft services. The integration of Purview will deliver a unified data governance and compliance platform which will enable EirGrid to discover, classify, protect, and manager

	data on the EDH. This includes tools for data governance, security and compliance, and risk management. Build out of the new Enterprise Data Hub platform to underpin Use Case industrialisation. Integration of Security, Data Lineage and Platform upgrade to MS Fabric and integration with Microsoft Purview. Migration of Use Cases from the legacy Enterprise Data Hub to the new platform.
Rationale	The deployment of the EDH with Microsoft Fabric and Purview will deliver a performant, secure, scalable platform with automated data pipelines. These improved data pipelines will enable data analytics, automation and AI use case projects of high value to the business.
Expected Impact	This project will deliver the following: • Unified data access and governance of high-quality data • Scalability and performance • Cost efficiencies and flexibility.
Progress in 2025	Core platform has been built, including Sandbox, Development, Test and Production, along with automated data pipelines for the ingestion of data. User acceptance testing of these pipelines is underway.
Dissemination	Outcome will be reported to the regulators as part of Price Control Reporting. The customer base for this project is initially internally focussed to the EirGrid Group, but the platform is intended to provide data to external stakeholders in the future.
Future Potential	The project will deliver the capability to develop proof of concept, proof of value and production use cases in the solution of innovative and high-value business platforms (an example could be Dispatch Down, Lead-to-Service order / Lead-to-Service Inquiry etc). Automation of highly manual processes will improve the speed and accuracy of operational processes. Centralised data management will facilitate a single source of high-quality data to the business to serve all areas of the organisation

Flexible Network

Dynamic Line Rating

Status	Completed
Partner(s)	ESB Networks: Transmission Asset Owner
Scope	The scope of this project is to trial and investigate Dynamic Line Rating (DLR) implementations in Ireland, to trial 'Direct Measurement' DLR technology, and to consider the 'Indirect' DLR technology and studies on the wider roll-out of this flexible network solution.
Rationale	DLR installations enable the usage of real-time thermal loading limits which increase transmission capacity of lines safely without high-cost burden or extensive outages. The dynamic ratings are determined from the live environmental conditions, while seasonal static ratings assume conservative limits. DLR offers the potential to facilitate the connection of greater volumes of variable renewable generation with less infrastructure upgrades and provides a

	medium-term solution for congested lines. The technology also offers the capability to forecast line ratings based on weather forecasting.
Expected Impact	• Increase the capability for variable renewable generators to export power onto the grid without the requirement of building/upgrading network infrastructure. • Ease congestion problems experienced on the grid as well the future potential to use forecast dynamic line ratings within our processes.
Progress in 2025	DLR sensors were installed on the **Cashla-Dalton 110 kV overhead line** and the **Dalton Station 110 kV busbar** in November 2024. The Dalton busbar application was novel and required EMS updates and additional testing, which delayed activation. Both the Cashla–Dalton line and the Dalton busbar were successfully enabled in the EMS in **December 2025**, with ratings now determined by DLR rather than static seasonal ratings. This marks a significant milestone, as these schemes are now operational and delivering benefits. The **Cathaleens Fall-Corraclassy 110 kV overhead line** DLR installation was completed in **October 2025** and activated in the EMS in **December 2025**. A solution was implemented to cap DLR-recommended ratings, allowing DLR benefits to accrue while respecting conductor constraints until planned conductor replacement occurs. This interim measure ensures improved operational flexibility without waiting for physical uprating. The **Lisheen-Thurles 110 kV line** continues to perform very well, with curtailment of wind generation at Lisheen, previously caused by high loads on the overhead line, reduced considerably. This demonstrates the effectiveness of DLR in unlocking latent capacity without costly uprating works. The deployment of the Cashla–Dalton scheme was completed and activated in **December 2025**, following necessary software changes and rigorous testing throughout the year. These updates confirm that multiple DLR schemes have now transitioned from trial installations to active operation, significantly reducing curtailment and improving network utilisation.
Dissemination	Internal only.
Future Potential	The data from trials is being analysed to further our understanding. The trials are deployed on different sections of the networks with the aim that each new trial will give us understanding and insights in new areas. This knowledge will progress these technologies into our BAU.

Dynamic Power Flow Controllers

Status	In Progress
Partner(s)	ESB Networks: Transmission Asset Owner
Scope	Dynamic Power Flow Control devices are modular devices suitable for installation on 110 kV, 220 kV, 275 kV and 400 kV circuits that will be installed on an as-required basis in the most beneficial locations on the transmission network. The candidate lines are as follows: • Flagford – Sliabh Bawn – Lanesboro (110 kV) • Sligo – Srananagh – Corderry (110 kV) • Letterkenny – Tievebrack - Binbane (110kV)

- Letterkenny – Cathaleen's or Letterkenny – Clogher (110 kV)
- Killonan – Knockraha (220kV)
- Clashavoon – Knockraha or Cullenagh – Knockraha (220 kV)

Rationale

The energy system is in a transition that leads to a changing load flow pattern. As a result, transmission grids are operated closer to their thermal and dynamic stability limits. Since building new transmission lines to relieve the congested lines are both expensive and challenging from a consenting perspective, the market for alternative technologies is growing. Usually Phase Shift Transformers (PST) are used to perform power flow control. These are devices that allow active power flow to be controlled, thereby reducing power flow on congested lines while diverting power flow to lines with spare capacity. The disadvantages of PSTs are their reactive power consumption and their limited control speed. In addition, they are large and heavy devices requiring extensive civil works infrastructure to be in place at installation sites.

Solutions like Dynamic Power Flow Controllers (DPFC) promise to be modular and relatively easy to re-deploy. This way it will be possible to move them around the network to where they have the biggest impact and improve system stability and transfer capacity.

Expected Impact

- The deployment of dynamic power flow control devices will have an important role to play in network congestion management and maximising the existing network capacity.
- These devices will also assist in minimising the need for network reinforcement projects and mitigating the challenges associated with building new overhead lines or underground cables.

Progress in 2025

- Project specifications completed.
- Project tender launched.
- Recommended supplier established.

Dissemination

None at this stage.

Future Potential

The project will evaluate options for progression in 2026.

NexSys - Enhanced utilisation of power system network infrastructure

Status

In Progress

Scope

The NexSys program aims to determine how energy systems should evolve to incorporate more renewable electricity by 2030 and subsequently to achieve a net zero carbon goal by 2050. Adjacent to this, NexSys has developed three targeted projects. This project seeks to develop an understanding of enhanced utilisation of power system network infrastructure covering the following scope:

- Quantification of the benefits of existing and future technologies that could improve the real-time utilisation of existing networks and enable operational (stability) limits to be pushed higher.
- Development of a multi-year, stochastic planning optimisation tool that selects passive and active measures to minimise investment costs, renewables curtailment, etc. Sections of the grid will be used to demonstrate the optimisation approach on timescales from 2030 towards 2050, with the impact on capital investment, network loading, renewables curtailment, etc.

- Investigation of high wind conditions or post-disturbance network overloads, supported by system service product designs to encourage provision of congestion-relieving capability.

Rationale

In addition to the significant network reinforcements that are needed over the next few years to support our renewable ambition, there is a need to explore potential options for better utilising our existing network infrastructure to minimise extensive network build and thus investment costs.

Expected Impact

- Gaining a greater understanding of the potential for network planning to incorporate static and dynamic technology options to facilitate maximisation of existing network utilisation.
- Building a greater understanding of the operation of dynamic technology options that will support maximisation of network utilisation.

Cost savings: Minimisation of network build via maximisation of current existing network infrastructure will reduce the required investment from EirGrid.

Incorporation into BAU: Optimisation tool developed during this project can be used by planning teams to select necessary projects and upgrades while minimising costs. System service product tool can be used to prevent grid congestion.

Progress in 2025

The first project scope “Quantification of the benefits of existing and future technologies” has been successfully completed.

- A combined unit commitment and optimal power flow model is developed and applied to a future high-renewables Irish power system model. The model fully integrates four critical grid-enhancing technologies (GETs): dynamic line rating (DLR), power flow controllers (PFCs) (via distributed static series compensators (DSSC), battery energy storage systems (BESS), and transmission switching (TS) topology.
- This framework allows for the analysis of the impact of various combinations of these GETs, moving beyond single-technology benefits.
- The primary analysis quantified the impact of these integrated technologies on reducing renewable curtailment, mitigating network congestion, lowering the overall system operation cost.

Dissemination

Research publications:

- M. Numan and D. Flynn, "Optimising renewable energy integration using grid-enhancing technologies," *IET Powering Net Zero (PNZ 2024)*, Birmingham, UK, 2024, pp. 228-234, doi: 10.1049/icp.2024.4582.
- M. Numan and D. Flynn, "Role of Grid-Enhancing Technologies in the Transition to a Renewables-Dominated Power System," *IET Powering Net Zero (PNZ 2025)*, Glasgow, UK, 2024.

Future Potential

The developed model and subsequent findings will help power system designers in moving from theoretical quantification to practical deployment strategies. The quantitative derived from the integrated model will provide insights for system operators and regulators regarding the cost-benefit analysis of deploying GETs versus traditional network reinforcement (building new lines). This will enable optimal capital expenditure allocation will ensuring the grid remains robust and flexible as renewable penetration steadily increases.

Virtual Dynamic Line Rating Sensors

Status	In Progress
Scope	This project aims to alleviate network congestion by enhancing the current-carrying capacity of the electricity grid. It uses advanced weather forecasting and AI techniques to predict dynamic line ratings without installing physical sensors, offering a cost-effective, data-driven solution to improve grid performance.
Rationale	Traditional static line ratings limit grid capacity and hinder renewable integration. This project proposes a virtual sensor approach to enable higher renewable penetration and reduce the need for costly infrastructure upgrades.
Expected Impact	• More efficient use of grid infrastructure • Reduction in network congestion costs • Delay of costly reinforcements • Potential integration into SCADA/EMS systems and policy frameworks
Progress in 2025	Proof-of-concept developed and validated using the Lisheen-Thurles line. Forecasting extended to other lines in the Network Delivery Portfolio. Reliability assessment and techno-economic analysis underway.
Dissemination	• Internal workshops and training • Presentations at CIGRE, ENTSO-E, IEEE • Whitepapers and case studies • Engagement with regulators and TSOs • Academic publications and university collaborations
Future Potential	• Real-time deployment for live grid control • Backup support when physical sensors fail • Strategic use in low-congestion areas for cost efficiency

Champion the Emergence of the Energy Citizen

CleanerGrid 2024/2025

Status	Completed
Scope	CleanerGrid is EirGrid's annual competition for third-level students from across Ireland, where entrants are invited to provide innovation solutions that take climate action. Participants can come from any academic discipline asked to present their vision of what the energy sector will need to look like in 2050 to achieve net-zero emissions. Individual or team entries of up to six members were challenged to find innovative ways, utilising publicly available EirGrid data to lead the energy sector to a net-zero future.
Rationale	Significant change within the energy sector is taking place to meet various government set targets. Collaboration across multiple disciplines is required to develop a through overview of what can be done in the future. This competition encourages third-level students to be more aware of the challenges the energy-sector faces in aiming to achieve a net-zero emissions target by 2050. By asking third-level students to develop innovative solutions using publicly available data from Eirgrid, we can enable them to become informed and empowered Energy Citizens.
Expected Impact	• Competition entries will present their vision of what the energy sector in 2050. Elements of this may be to show new ways of doing things, new ways of using the data or something completely new we never thought of before. • Awareness of the challenges faced in the energy sector will be raised among third level students. • Winning entries were analysed to assess the likelihood of implementation into EirGrid BAU.
Progress in 2025	Promotion of the competition began in September 2024, and applications were accepted from September to October 2024. The competition ran from October 2024 until March 2025. Submissions from the student(s) were made in March 2025 and judging for the competition also occurred in March 2025, and the top three teams were notified and invited to present their projects and attend an awards ceremony in March 2025, where the winners were announced
Dissemination	• The winners were officially announced on EirGrid's social media platforms, highlighting the innovative solutions presented by each of the finalist teams. • The five finalist teams were invited to present their projects to members of EirGrid staff at the company headquarters.
Future Potential	The winning entries were analysed for the potential to work with finalists to further develop and implement their solutions within EirGrid.

CleanerGrid 2025/2026

Status	In Progress
Scope	CleanerGrid is EirGrid's annual competition for third-level students from across Ireland that challenges entrants to develop innovative solutions that take climate action. Participants from any academic background are welcome, working individually or in teams, and are challenged to develop solutions that

	accelerate the clean energy transition, by harnessing our island's offshore wind energy potential and provide a secure, renewable, and clean source of energy for Ireland.
Rationale	CleanerGrid empowers students to generate innovative solutions for Ireland's clean energy transition. EirGrid seeks fresh perspectives to overcome technical, regulatory, and societal challenges in integrating offshore wind into the grid. This initiative fosters collaboration, inspires future talent, and accelerates progress toward secure, sustainable electricity for a net-zero future.
Expected Impact	CleanerGrid 2026 will present actionable actions to EirGrid that could be implemented to accelerate offshore wind integration, strengthening Ireland's grid resilience and renewable capacity. Innovative student proposals can influence future projects, reduce carbon emissions, and inspire industry collaboration driving progress toward a secure, sustainable energy system and positioning Ireland as a leader in clean energy innovation. Winning entries will be analysed to assess the how they could be implemented into EirGrid BAU
Progress in 2025	Promotion of the competition began in September 2025, and applications were accepted from October 2025. The competition will conclude in Q1 2025, and the award ceremony is also scheduled for Q1 2025.
Dissemination	Dissemination of the finalist entries will be done internally and externally in early 2026. The finalists will be invited to EirGrid's offices to present their projects to judges and EirGrid staff.
Future Potential	Increases awareness of EirGrid's role and mission amongst the wider public. The winning entries will be analysed for the potential to work with EirGrid to further develop these ideas.

Public Engagement with Energy Transitions in an Era of Climate Crisis

Status	Completed
Partner(s)	MaREI (The SFI Research Centre for Energy, Climate and Marine research and innovation) at UCC.
Scope	Transition based assessment of actors, roles and agency in energy grid system change. • A synthesis review of international literature on engagement practices in electricity grid system change. • A scoping review with a view to map actors, roles and agency in energy grid system change. • An Integrated review of EirGrid's Multi-stage and Deliberative Engagement Processes. • Mapping emerging public and new local initiatives. Comparative Analysis of Community Benefit Fund • Scoping review of community benefit literature. • Mapping existing initiatives and stakeholders. • In-depth case-study research in three different locations. • Comparative analysis of findings. Assess the impact of community benefit funding using comparative analysis of three different case studies. • Development of multi-stakeholder engagement plan.

- Mixed-method data collection strategy (desk and field-based).
- Data consolidation and cross-case examination.
- Distilling key learnings and policy recommendations.

Dissemination and Exploitation

- Establish project identity and presentation guidelines, including brandings and templates for all deliverables.
- A project microsite to include information about the objectives and work plan, upcoming events, published papers and other relevant materials.
- Establish a social media presence, building on existing networks.
- Research briefs summarising and adapting results of journal articles into learning or policy briefs.
- Participation in and presentation at relevant conferences, workshops, EirGrid organised and other relevant events.

Rationale

Public engagement is a recognised pillar for transformation, understanding how best to develop public engagement and increase its role in grid development is crucial to a successful energy transition.

The project uses empirical and qualitative research to map actors and benchmark EirGrid's public engagement activity against international trends and examples. In this way it builds a framework to evaluate different aspects of engagement processes and programmes, to capture learnings, increase guidance and develop recommendations for tracking and measuring impact pathways for future development.

This included drawing multidisciplinary insights on public engagement with interconnectors, an area that has received limited attention worldwide. The project also sought to assess the impact of community benefit funding using a comparative analysis of three different case studies in Ireland. The approach adopted simultaneously offered guidance and developed suggestions throughout the consultation and engagement lifecycle, capturing learnings from both engagement processes and outcomes.

Expected Impact

- The project has now concluded with key findings including that:
- Community Benefit Funds are seen as valuable tools for supporting affected communities and promoting grassroots climate action but would benefit from stronger capacity-building and alignment with long-term national sustainability goals.
- That effective engagement requires strong organisational support and alignment between strategic goals and local initiatives.
- That EirGrid's six-step strategy and community forums offer inclusive spaces for dialogue, enabling communities to influence technology choices and support broader sustainable development goals within their own communities.
- That interconnector research benefits from a multidisciplinary lens, incorporating cultural and heritage perspectives to deepen community engagement.
- Critically the project also produced recommendations for long term public engagement development, including impact evaluation guidance and strategies to foster energy citizenship.

These findings will inform third party public engagement stakeholders and serve as a critical baseline for the continued development of Public Engagement practices at EirGrid in the pursuit of accelerated grid infrastructure delivery.

Progress in 2025	Building on 2024 progress which saw EirGrid team members facilitated by the MaREI researchers being involved in a review of international best practice and co-authoring journal papers in 2025, building on the value of research findings the team focussed on providing some guidance for EirGrid on how to develop, track and evaluate impact pathways for public engagement with energy transitions. These guidelines are focused on public/community engagement in energy transitions with relevance to broader stakeholder engagement and served as an amalgamation of insights gathered throughout the process since 2021. On completion of this paper, all deliverables anticipated had been delivered and the project concluded.
Dissemination	This project creates a wealth of original academic reference specific to the Irish context, contributing to the library of international best practice and creating reference of value to our international peers and wider industry, at home and abroad. The impact case study briefs are intended as useful accessible learning documents for a wide audience of public engagement practitioners. The learnings and papers are subject to study and citation on publication and will continue to be explored by a wide range of academic and industry experts and professionals.
Future Potential	The project is now closed.

Understanding pathways to 100% SNSP

Integrating Liquid Air Energy Storage with Irish Wind Farms to Reduce Curtailment and Enhance Grid Resilience

Status	In Progress
Scope	Research Questions: • How can Liquid Air Energy Storage (LAES) be used to absorb curtailed wind energy when co-located with wind? • How does co-located LAES affect the economic value of wind farms and contribute to net zero targets?
Rationale	Ireland's increasing wind energy capacity poses significant challenges due to its intermittent and variable nature, which can affect grid stability and reliability. This project investigates the integration of energy storage systems (ESS) as a technical solution to mitigate these issues and reduce curtailment.
Expected Impact	To create a view of the effectiveness of using LAES co-located with wind to increase SNSP
Progress in 2025	Literature review, initial system model, and integration of the storage system with a simulated wind source planned.
Dissemination	None so far, possibly via publication/poster in the future.
Future Potential	Work in progress

Low Carbon Inertia Solutions Phase II

Status	Completed
Scope	The studies related to LCIS Phase II focusing on the system inertia needs and placement in the future where it is expected that a significant additional wind and solar generation (with significantly relaxed SNSP limit) will be connected and the all-island power system operated with fewer synchronous generators.
Rationale	The Low-Carbon Inertia Services (LCIS) program was designed to fulfil requirements for a system service comprising the provision of synchronous inertia, reactive power support and short-circuit contribution to alleviate future system operation challenges. Many previous studies clearly indicated that frequency stability and security is one of the major concerns for our non-AC interconnected system with a significant system non-synchronous penetration (SNSP). Both rate of change of frequency (RoCoF) and frequency nadirs/zenith are challenging for certain operational scenarios. To integrate more non-synchronous renewable sources and accommodate their production in a safe and secure manner, one of the main objectives will be to further reduce the number of large synchronous generators on load. This will further reduce system inertia and exacerbate both RoCoF and nadirs/zeniths in the future. LCIS Phase II procurement, follow-up of Phase I, will focus on procurement of low-carbon inertia from technologies like synchronous condensers over the coming years.

Expected Impact	1. Pave the path towards the goal of operating All-Island Power system with 100% RES by proposing adequate LCIS placement, sizing and procurement. 2. Improve study capabilities significantly by developing new models and performing study assessments of unique future operational scenarios considering almost no synchronous generation on load. Cost savings: LCIS is procured via structured contracts allowing for cost controls and competitive pricing. Incorporation into BAU: Findings from this study are being actively used to aid EirGrid's procurement of LCIS, with informed siting and optimal volumes from the study being considered.
Progress in 2025	The study was completed in March 2025. It identified inertia volumes required to be procured for EirGrid and SONI. Based on the results of technical studies, EirGrid and SONI consulted on a targeted procurement volume of 10,000 MVA.s (Max 12,000 MVA.s) in Ireland and a targeted procurement volume of 4,000 MVA.s (Max 6,000 MVA.s) in Northern Ireland. There will be no locational procurement within each jurisdiction although connection to some transmission stations will be precluded.
Dissemination	The findings from this study were published in a consultation paper, which outlined the proposed requirements, contractual framework, and procurement arrangements for the provision of LCIS-services. The consultation was open to responses from July 2025 until September 2025. An online webinar was held on the 19th of August discussing the content of the consultation paper.

NexSys- Mitigation of Extreme Weather Events on High-RES Dependent Networks

Status	In Progress
Partner(s)	University College Dublin (UCD) through NexSys Programme
Scope	The NexSys program aims to determine how energy systems should evolve to incorporate more renewable electricity by 2030 and subsequently to achieve a net zero carbon goal by 2050. Adjacent to this, NexSys has developed three targeted projects. This project seeks to develop an understanding of the impact and mitigations of extreme weather events on a high-RES dependent network covering the following scope: • Documentation of actual cases of weather-related extreme RES ramping events worldwide. • Examination actual high wind speed shut-down events in Ireland and Northern Ireland. Compare what was forecast to what materialised. • Documentation of the power output characteristics of different wind turbine types in response to high wind-speeds, and different PV types in response to cloud cover. • Analysis of the probability and impact (magnitude and rate of change in power output) of high speed shut-down events on windfarms in Ireland and Northern Ireland. Analysis of the probability and impact (magnitude and rate of change in power output) of rapid shut-down (and start-up) of PV caused by cloud cover or a solar eclipse in Ireland and Northern Ireland. Determination of whether such events be reasonably forecast.

	Focus will be placed on 2030+ levels of RES to take account of significant levels of solar PV (grid scale and roof-top) and large/concentrated offshore wind farms.
Rationale	As the system becomes more and more weather-dependent, and as our climate changes, it is vital that we have an understanding of the probability and impact of extreme weather events, so that we can plan and manage the generation and so that we are equipped with strategies to mitigate the impact of extreme weather.
Expected Impact	• Greater understanding of low-RES periods for current and future generation portfolio 2030 timeline. • In the 2050 timeline, gain a better understanding of the effect of low-RES periods on interconnection and the required portfolio of technologies to enable a net zero European power system. Greater understanding of operational strategies for extended low-RES periods (2030 to 2050 timescales).

Progress in 2025	• Delivered report on low-RES period for Ireland's current and future (2030+) generation portfolio.
	• Present project progress to EirGrid and showed preliminary results to be included in future reports:
	  ○ Interconnection and the portfolio effect for low-RES periods across Europe.
	  ○ Weather-related RES ramping events for Ireland's current and future generation portfolios.

Dissemination	• Research publications:
	  ○ Morin, Boris, Aina Maimó Far, Damian Flynn, and Conor Sweeney. "Reducing RES Droughts through the integration of wind and solar PV." Renewable Energy (2025): 123392. https://doi.org/10.1016/j.renene.2025.123392
	  ○ Maimó Far, Aina, Conor Sweeney, and Damian Flynn. "Wind and solar PV generation ramping events from farm to national level: the case of Ireland." Advances in Science and Research 22 (2025): 53-58, https://doi.org/10.5194/asr-22-53-2025
	• The work published in the paper "Wind and solar PV generation ramping events from farm to national level: the case of Ireland" was presented at the annual meeting for the European Meteorological Society September 2024.

Future Potential	The outcomes of the project will increase our understanding of the potential impact of extreme weather events, and this increased understanding will aid in the future development of mitigation strategies for dealing with such events.

Sources of Very Low Frequency Oscillations

Status	In Progress
Partner(s)	Queen's University Belfast, SONI
Scope	The objective of this project is to develop an offline tool for identifying the source of very low-frequency oscillations for the All-Island Power System.
Rationale	As the power system moves towards nearly 100% instantaneous renewable penetration by 2030, lower levels of rotational inertia caused by high penetration of inverter-based renewables means the power system frequency dynamics become faster and more prone to large transients and oscillations.

Sustained oscillations can be harmful and lead to equipment damage and power system instability.

Expected Impact

A simple to use and robust off-line tool for the identification of sources of oscillations and analyses of previous incidents through data mining and machine learning will bring benefits to our oscillation management process and enhance the security of supply of the all-island power system.

Once the tool is proven worthy of implementing it will be integrated into our oscillation management processes.

Progress in 2025

- PhD student completed a three-month placement at the Alan Turing Institute (January–April), gaining practical experience in AI and data analytics for large data sets, which directly benefits this project by strengthening its capability to analyse wide-area power system measurements and develop data-driven methods for oscillation analysis.
- To address the challenge of identifying Very Low Frequency Oscillations in power systems, QUB analysed frequency measurements from multiple grid locations and found that existing multivariate methods are either computationally intensive or rely on post-processing to identify common modes across channels, limiting their suitability for real-time applications. QUB's research introduces Fast and Adaptive Multivariate Empirical Mode Decomposition as a faster, more efficient, and more accurate approach for real-time oscillation mode identification, eliminating the need for post-processing while effectively handling non-stationary signals. The research was presented at the IEEE Power & Energy Society General Meeting in Austin in July 2025 and subsequently published in November 2025, as referenced below:
- A new dataset of sub-synchronous oscillation events from 2024 PMU records was gathered through a PhD student's industry placement with SONI (June–July 2025). During the placement, the student extracted the relevant events and gained a deeper understanding of how oscillations are assessed and managed in practical power system operation.
- Further analysis of VLFO events has been carried out, incorporating active power and phase angle measurements across the entire grid. The results were presented to SONI during the project meeting in September 2025.

Dissemination

- Research publication: R. Maclean, X. Liu and R. J. Best, "Fast and Adaptive-MEMD for Oscillation Mode Identification," 2025 IEEE Power & Energy Society General Meeting, Austin, USA, 2025, pp. 1-5
- A draft journal paper is currently in preparation to advance understanding of grid dynamics and frequency oscillation behaviours.

Future Potential

Using the new dataset, the next phase of research will extend the analysis beyond very low frequency oscillations to include sub synchronous oscillations, which have become an increasing concern for TSOs both locally and internationally, particularly with the growing penetration of inverter-based resources. Further investigations will focus on the grid conditions that lead to oscillatory events through data-driven analysis and targeted simulation studies.

Investigation on Strategies to improve power system inertia in high penetration of renewable energy sources

Status	Completed
Partner	University College Cork
Scope	The project investigates strategies to improve power system inertia, in a power system with a high penetration of renewable sources of energy. The project investigates the level changes required on a technical and policy level for this implementation to happen and the combination of solutions that could aid in maintaining grid stability as Ireland progress towards its 100% SNSP target
Rationale	Providing more grid stability through system inertia is essential as renewable energy grows, as it helps the power system resist sudden changes in frequency and maintain reliable operation. Inertia acts as a buffer, giving the grid time to respond to disturbances and preventing outages. Therefore, investigating strategies to improve power system inertia via policy changes or technical innovations is crucial to the operation of the grid.
Expected Impact	Provide recommendations and guidelines to aid EirGrid in improving the power system inertia. Potential new technologies and areas were identified in this project.
Progress in 2025	Project concluded in Q3 2025 with submission of a master's thesis.
Dissemination	Recommendations and guidelines were proposed by UCC to EirGrid staff. MSc thesis is available via UCC's website
Future Potential	Findings from this project could possibly be implemented for Future Power System studies.

Short-Circuit Modelling and Protection System Performance Analysis for Systems with High Level of Inverter Based Resources

Status	In Progress
Scope	The objective of this research project is to investigate the impact of inverter-based resources (IBRs) on the performance of EirGrid's protection system. Advanced short-circuit models of IBRs with various control systems aims to be used to investigate the fault response of IBRs within in the EirGrid system. The performance of the protection system will then be assessed in various scenarios, and potential challenges will be identified. Mitigation measures will be proposed to improve the existing protection schemes or by designing new ones.
Rationale	This project aims to contribute to a better understanding of the performance of transmission system protection schemes in power systems dominated by IBRs. This will be achieved by providing protection engineers with models, tools, and guidelines required to perform accurate protection studies on systems with elevated levels of IBRs. The project results are expected to benefit the participants and the public through improved grid reliability and secure system integration of renewable energy resources.
Expected Impact	• Improve understanding of the distinct response from IBRs and modelling capability • Findings from the project could potentially require changes of fault response from IBRs

Progress in 2025	No significant progress reported.
Dissemination	Work in Progress
Future Potential	This project will enable an increase in the capability of protection studies of new and existing IBR connections and thus increase protection performance.

Setting the course for the Control Centre of the Future

Reduced-Order Model of the All-Island Irish Power System

Status	In Progress
Scope	The project aims to develop a reduced-order dynamic model of the all-island Irish power system. The full model includes 1479 buses, 796 lines, 1055 transformers, 245 loads, 22 synchronous machines, and 176 wind generators, with 1443 state variables and 7197 algebraic variables. The reduced model will simplify this while preserving critical dynamics for benchmarking and reproducibility.
Rationale	Full network models are not always necessary for all study types. Reducing model complexity can save computation time and resources. Exploring reduction techniques is valuable for the industry.
Expected Impact	• Ability to perform studies efficiently • Planned budget: N/A • Potential for benchmarking and reproducible testing (work in progress)
Progress in 2025	Project started in September 2025. Literature review and model development underway.
Dissemination	Work in progress
Future Potential	Work in progress

Operational Tools and Capability Enhancement Programme

Status	In Progress
Partner(s)	SONI
Scope	The Operational Tools & Capability Enhancement (OTCE) programme was established to deliver the Control Centre of the Future, alongside broader operational capabilities, to ensure the power system can operate securely to enable high levels of variable, non-synchronous renewable generation. OTCE enables the identification, prioritisation, and development of capability enhancements across the full operational spectrum — from long-term policy development to real-time system operations. The programme adopts a phased delivery approach, balancing technical feasibility, anticipated benefits, and cost considerations to support the system operators' strategic objectives.
Rationale	By leveraging advanced technologies, real-time data analytics, and efficient management of renewable and distributed energy resources, OTCE will contribute to enhanced grid stability, optimised energy use, and the widespread adoption of sustainable energy practices — ultimately supporting the decarbonisation of the power sector.
Expected Impact	OTCE is a key enabler of the Operational Policy Roadmap, accelerating both the pace of decarbonisation and the efficient integration of renewable and distributed energy resources. Through advanced operational practices, technology deployment, and real-time analytics across forecasting, modelling,

and system studies, OTCE will strengthen system security and resilience while improving operational efficiency and resource utilisation.

By delivering the capabilities required to operate the power system securely as non-synchronous generation from onshore wind, solar, and offshore wind increases, OTCE will enhance grid stability, optimised energy utilisation, and accelerated decarbonisation of the power sector.

Progress in 2025

Building on the Programme establishment in 2024, OTCE has adopted a tranche-based approach to deliver priority innovation projects. An optioneering analysis was previously conducted to determine whether progressing a subset of projects would achieve the desired outcomes or if the full programme should advance.

Tranche 1 projects are now underway with resource support in place, enhancing forecasting, modelling, and system study capabilities to better support an increasingly complex power system. Governance structures have been established, and benchmarking exercises for the initial projects have been initiated. In parallel, a long-term initiative is advancing to coordinate and automate the future dispatch system — a foundational step toward operating the grid of 2030 and beyond.

Dissemination

- Internal Knowledge Sharing – Produce technical reports that summarise key findings, challenges encountered, and recommended improvements, ensuring learnings are captured and accessible across the organisation.
- Industry Engagement & Collaboration – Present outcomes at relevant industry forums and share anonymised benchmarking insights and best-practice reviews with participating TSOs to support collective capability building.
- Regulatory & Policy Contributions – Provide results and insights to regulatory bodies to help inform and shape future policy and regulatory approaches to grid innovation.

Future Potential

OTCE has the potential to fundamentally modernise how EirGrid & SONI operate the power system by creating a digital, intelligence-driven control environment that strengthens system security, improves market efficiency, and supports the energy transition well beyond 2030.

By leveraging leading-edge technologies, tools, and capabilities, OTCE will enable EirGrid & SONI to integrate higher levels of renewable generation while maintaining a secure, reliable, and highly decarbonised power system capable of meeting future demands.

Lead the island's electricity sector on sustainability

Nature Inclusive Design

Status	In Progress Status: East West Interconnector Nature Inclusive Design (NID) initial investment: Completed East West Interconnector further investment: Delayed (est. Q4 2025). Other NID: On-going implementation, and further refinement of actions for nature on all onshore substations, onshore overhead line upgrades, onshore underground cable projects, offshore cables and platforms, and interconnectors onshore and offshore.
Scope	The objective of the project is to use more innovative means to integrate wildlife into grid developments both onshore and offshore, in response to the biodiversity crisis declared by the Irish government, without delaying the accelerated delivery of these projects. There are limits to where nature is allowed near grid infrastructure, e.g. within the energised fenceline, or above ground cables. Within the scope of this work, is the aim of objectively challenging the current restrictions, by using the precedence in other jurisdictions, e.g. use of green roofs on GIS substation roofs.
Rationale	In response to a United Nations report demonstrating that nature is declining at an unprecedented rate, the Irish government declared a biodiversity emergency in 2019. Since June 2024, the EU's Nature Restoration Law has set mandated targets for biodiversity levels. EirGrid must act to deliver on these EU & Irish government targets.
Expected Impact	Enhancing natural habitats will promote nature-based carbon removal, improve the resilience of ecosystems to climate change, bolster EirGrid's reputation in communities across Ireland which will aid the acceptance of grid infrastructure across Ireland, and leave a legacy of wildlife for future generations.
Progress in 2025	Offshore NID: • NID included in concept designer's scope for EirGrid's first offshore grid project, within concept design tender documentation. • EirGrid PSDP engagement in design risk assessment for merging NID solutions Onshore NID: • Construction of first artificial bat roost house on TAO or TSO site was completed at Oldstreet substation, Co. Galway. This initiative was conceived by EirGrid, with the design overseen by our lead ecologist during the planning application process. • Committed (within frozen outline design for planning application submission est. FY26) to first Constructed Wetland on CP1238 Arklow Station - an example of a cost-effective nature-based solution (to pollution and attenuation).

- Secured CAPEX funding to carry out €100k primary research (field-based root radar studies, and lab-based thermal tests) into viability of planting certain selected shrubs and trees over HV cables.

Dissemination	The outcomes from onshore Nature Inclusive Design are reported in: • The EirGrid Annual Report • The EirGrid Sustainability Report • EirGrid's new biodiversity strategy plan will include detailed reporting on NID EirGrid does not yet have a date for installation of its marine NID initiative (see timelines above) Any learnings will need to await the actual installation of same on offshore grid infrastructure (and monitoring of environmental performance), which will be post 2030 EirGrid estimates it will publish learnings from Onshore Nature Inclusive Design in 2027, once the early eco-landscaping initiatives are sufficiently mature.
Future Potential	The initiatives, which are already part of BAU, were formalised as specific objectives and policies in the Grid Implementation Plan 2023-202824 ensuring enduring implementation up to 2028. They will also be central activities whose implementation will be measured long-term in EirGrid's forthcoming Biodiversity Strategy, intended to be for a ten-year period 2025-2035 (with regular updates).

Environmental Evidence-Based Guidelines

Status	In Progress
Scope	Update existing Evidence-Based studies and guidelines to accelerate the delivery of infrastructure projects and prepare new guidelines for EirGrid's role as Ireland's offshore TSO. A scoping report has been prepared. The existing studies and guidelines and new topics have been prioritised for multi-year delivery. The existing guidelines will be updated because of age (10+ years) and focus on new project types. New topics will be prepared as they were not originally considered.
Rationale	Existing studies and guidelines are out of date and do not consider UGC and offshore projects and must be updated. Certain topics were not included in the original project and must be included as planning and assessment has evolved. With the increased numbers of projects, we need more consistency and efficiency in our projects.
Expected Impact	Accelerated delivery through new studies and guidelines. The project will provide an evidence base for assessment and methodology as to how projects should be approached. This will provide confidence to planning authorities. • Reduce the timeline for the delivery of key infrastructure projects.

- EBEG documents will be used by project teams to provide objective information to project stakeholders on the environmental impact of projects

Progress in 2025	In FY25, we prepare a scoping report to outline how the project will be approached over the next three years. The progress of updating the Social Impact and Cultural Heritage guidelines was started.
Dissemination	Will be issued to stakeholders for comment and then made publicly available.
Future Potential	Studies and Guidelines will be implemented on all relevant infrastructure projects.

Grow EirGrid TSO capabilities for developing and operating the new offshore grid

Offshore Wind Development Harmonic Distortion Mitigation Co-ordination

Status	Completed
Partner(s)	Guidehouse Netherlands B.V., EPRI
Scope	The five phase-one offshore wind developments will be connected to the transmission system by long cables, which will be compensated to cater for power quality requirements. As all offshore connections will connect to the same region of the system, the shunt filter(s) connected at one node are likely to affect other nodes. This project investigated the interaction between these developments to ensure all mitigation solutions operate coherently without negatively impacting others. It also explored the potential for an optimised approach to avoid excess mitigation measures and improve efficiency in MVAr levels and supporting infrastructure.
Rationale	• Investigate the interaction between the five wind farms to ensure coherent operation of mitigation solutions. • Explore optimisation opportunities to avoid excess mitigation and improve system efficiency.
Expected Impact	• Harmonised operation of mitigation solutions across offshore developments • Identification of excess mitigation measures • Efficiency gains in MVAr levels and supporting infrastructure
Progress in 2025	• Modelling tasks • Harmonic compliance checks at 220kV and 66kV nodes • Harmonic filter design and adjustments • Combined harmonic incremental limit compliance • Reporting • Results presentation
Dissemination	Due to the sensitivity of customer data, dissemination options are limited. Potential avenues include internal workshops, individual discussions with offshore developers, external presentations (excluding sensitive data), and academic publications where feasible.
Future Potential	The project explored interactions between mitigation solutions and identified opportunities for optimisation. Findings may inform future offshore grid development strategies.

Offshore Wind Supplemental Program

Status	In Progress
Partner(s)	EPRI
Scope	To fill critical knowledge gap by providing a collaborative, cross-cutting research platform to address offshore wind-specific research and development needs throughout the project lifecycle.

Rationale

This program will help us enhance our understanding of best practice and next generation offshore Transmission Asset Owner capabilities and solutions.

The project will focus on the following areas:

- Grid integration and energy systems
- Transmission and collection systems
- Environmental aspects
- Wind generation
- Technology trends

Expected Impact

Gaining a greater understanding to help us fulfil our role in the planning, development, operation, and maintenance of an offshore transmission system throughout the three phases of the network development model.

Progress in 2025

- Lifecycle analysis of offshore wind farms, with emphasis on resilience, reliability, and O&M strategies.
- Candidate projects prioritised across transmission, site, and balance of plant, leveraging EPRI expertise to address key offshore wind challenges.

Dissemination

Tasks are expected to be prioritized with input from supplemental program advisors. Candidate projects are derived from the four topical areas below.

Offshore Wind Plant Design and Operations

- Specifications and design for future plants, asset resilience, climate ambient risks.
- Asset management and advanced data analytics for offshore wind-specific components.
- Cyber and physical security, health and safety aspects, and emergency response or restoration services.
- Environmental aspects, avian and bat interaction, marine diversity, fisheries, and end-of-use and recycling.
- Advancements in quality, inspection, and reliability, non-destructive evaluation technologies, corrosion protection systems, M&D, and root cause analyses.

Grid Integration and Energy Systems+ Transmission planning (local and interregional) tools and applications.

- Production cost modelling and resource adequacy assessments.
- Inverter-based resource performance and controls.
- Power-to-X and hybrid assets.

Transmission and Collection System Infrastructure

- Design, operation, monitoring, and maintenance of high and medium-voltage cable systems, substations, high voltage switchgear, and HVDC systems converter stations.

Wind Generation R&D-Bridge to existing research for onshore wind and where offshore approaches differ, in the areas of:

- Performance and reliability and peer-to-peer benchmarking.
- Component monitoring (large direct-drive generators, power converters, foundations, etc.).
- Advanced, condition-based maintenance strategies.
- Techno-economic analysis across the project lifetime.

Future Potential

Key outputs for 2026 include Technology Transfer, Advanced O&M Modelling, and Market Trends/Updates related to HVDC and HVAC offshore wind farms.

	The project will share the knowledge via different routes. For example, via technical research reports, whitepapers, annual technical progress reports, technology transfer webcasts etc. The knowledge will be shared within the company and help us fulfil the offshore transmission asset owner role.

Temporary SCADA over 4G private Access Point Name

Status	In Progress
Partner(s)	SCADA and Network / Telecom
Scope	This initiative aims to open new horizons for the organisation by demonstrating that substation pre-testing can be successfully conducted prior to the commissioning engineer's arrival—provided there is 4G coverage. The device's simplicity and widespread compatibility make it a game-changer for remote or time-sensitive deployments. Building on this success, the solution can now be extended to support permanent SCADA connections for non-critical stations or smaller Demand Side Unit (DSU). This approach offers a cost-effective and rapid deployment option, significantly improving operational flexibility.
Rationale	The initiative was launched to validate the feasibility of pre-commissioning SCADA signal testing using temporary 4G IoT connectivity, ahead of fibre deployment and substation energisation. By leveraging the Oval lab and collaborating with the SCADA team, EirGrid aimed to mitigate project delays caused by late telecoms delivery and limited ESB resource availability. This approach enables early RTU validation, supports agile deployment for critical projects like Timoney and Rattin 110kV, and lays the groundwork for scalable EMS integration across distributed generation sites.
Expected Impact	Open new horizon for SCADA transmission while maintaining security and improving time to deployment and reducing cost
Progress in 2025	The initiative has progressed through several key phases. First, ESB Networks (ESBNT) field teams were onboarded and trained to support the concept and execution of remote SCADA testing. The Oval lab was enhanced to serve as a controlled environment for validating the solution prior to live deployment. Efforts were made to ensure the system is plug-and-play, enabling rapid and repeatable installation. Internally, cross-functional collaboration was established between SCADA, Network/telecom, and EMS teams to align technical requirements and operational workflows. A pilot deployment was successfully launched at Timoney, with Ratin identified as a strong candidate for the next phase of rollout.
Dissemination	Internal only
Future Potential	Offshore projects as well as interconnector applications.

Plan for a net zero carbon, customer focused, export capable power system

Uncovering the Locational Costs of Electricity Transmission

Status	In Progress
Partner(s)	University College Dublin
Scope	Investigate locational costs of electricity transmission using open-source power system analysis tools. Develop a map of Locational Marginal Prices (LMPs) for Ireland and Northern Ireland.
Rationale	Understanding locational costs can support better grid planning and market design. Open-source tools allow flexible and transparent analysis.
Expected Impact	• Provide insights into transmission constraints and locational pricing • Support future planning and congestion management • Demonstrate feasibility of using open-source tools for Irish grid analysis
Progress in 2025	• Project picked up by a master's student • Initial meetings held with supervisor • Software arrangements initiated
Dissemination	Noting yet/nothing planned, but likely articles originating from research
Future Potential	• Expand methodology to include topology optimisation • Contribute to broader understanding of locational pricing in Ireland

Hydrogen Fired Gas Turbines

Status	In Progress
Partner(s)	Gas Networks Ireland, University of Galway
Scope	The project is investigating several possible scenarios for the connection of hydrogen fired Gas Turbines (GTs) to a hydrogen network and the capability of the network to supply the required hydrogen to the GT in each scenario.
Rationale	We need to know what changes or upgrades would be required to gas network to properly supply GTs in the future with hydrogen. Additional compression etc.
Expected Impact	• Better understanding of requirements and cost of them to supply hydrogen to GTs.
Progress in 2025	Analysis is well under way, and we are now making changes to the scenarios to make them as helpful as possible (pipe lengths, diameters, pressures etc.)
Dissemination	Likely to be published in academic paper.
Future Potential	This will help us with our ongoing collaboration with GNI on developing a gas network fit for the needs of the electricity network.

HyLIGHT

Status	In Progress
Partner(s)	MaREI (The SFI Research Centre for Energy, Climate and Marine research and innovation) at UCC.

Scope	The HyLIGHT programme looks at the outlook for hydrogen in Ireland under five work packages. The programme also addresses a roadmap for hydrogen to determine a plan for the hydrogen industry in Ireland.
	• WP1 – Hydrogen Production
	  ▪ Techno Economic Analysis and Optimisation
	  ▪ Identification of New Economic Opportunities for H2 Production
	• WP2 – Hydrogen Storage and Delivery
	  ▪ TWh Hydrogen Storage
	  ▪ The evolution of the Gas Grid / Interconnection / tankers / on-site storage
	• WP3 – Hydrogen Demand
	  ▪ Large Industry Heat and Power Users
	  ▪ Hydrogen use in gas turbines
	  ▪ Outlook for E-fuels and H2-enriched Biofuels
	  ▪ Development of Hydrogen Markets in Ireland
	• WP4 – Hydrogen in the Irish Energy System
	  ▪ Energy System Modelling
	• WP5 – Hydrogen Policies, Social and Economic Aspects
	  ▪ EU and Ireland and UK hydrogen policy and GHG emission reduction
	  ▪ Determine the policy environment necessary to enable decarbonisation of the Irish energy system
	  ▪ Public perception of hydrogen
	  ▪ Assess socio and economic costs and benefits of large-scale hydrogen roll out

Rationale	The overall aim of HyLIGHT is to provide the knowledge, data and necessary tools to guide the cost-effective decarbonisation roadmaps for sustainable large-scale implementation of hydrogen technologies in Ireland to enable sector integration for a zero-carbon, secure, resilient energy system. HyLIGHT will achieve its aim by collaborating with the leading national and international companies, universities and stakeholders working to facilitate the delivery of hydrogen to all energy sectors heat, transport and electricity and also to where it is needed in industry, in a safe and cost-effective manner for energy consumers and industry. Over its 3-year timeline, HyLIGHT has four objectives: Vision, Roadmap, Plan, Partner(s)hip. The first three each contribute to a project milestone. The fourth facilitates collaboration in optional investment opportunities facilitated by the network and knowledge gained that may build into independent projects outside this project.
Expected Impact	• Roadmap for the hydrogen industry in Ireland. • Report on electrolyser project at Galway Port for green electricity production. • Report on onshore hydrogen storage methods. • Reports on the socioeconomic effects, techno-economic and new economic opportunities of large-scale hydrogen roll out and public perception of hydrogen. • Report on the development of the hydrogen market in Ireland.

	• Report on hydrogen policy in Ireland and the UK in addition to reducing carbon dioxide emissions. • Report for e-fuels and hydrogen enriched biogas. • Report on modelling hydrogen integration onto the All-Island system. • Report on using hydrogen in current gas turbines.
Progress in 2025	Creating of final report entitled - Ireland's roadmap to zero carbon energy system - role of green hydrogen.
Dissemination	Draft outline of report shared with EirGrid at in person workshop in October 2025. Final version of report to be shared in late 2025. EirGrid will circulate findings internally.
Future Potential	Project Concluding.

NexSys - Impact of Green Hydrogen Integration onto the Power System

Status	In Progress
Partner(s)	University College Dublin via NexSys programme
Scope	The NexSys programme aims to determine how energy systems should evolve to connect more renewable energy towards 2030 and subsequently get to the net zero carbon goal by 2050. This project is one of three targeted projects which are in addition to the broader NexSys hub programme. This project seeks to develop an understanding of the impact of the integration of Green Hydrogen onto the Power System covering the following scope: • Modelling and techno-economic analysis for the all-island power system for a multi energy vector system including electricity and gas systems. • Identification of optimal location, planning and scheduling of electrolysers operation under dynamic conditions in all island power system. • Investigation of the technical capability of green hydrogen system for providing system services and system operation. • Investigation of the likely behaviour of electrolysers during low RES-E periods and the extent to which their demand can be flexible enough to prevent them adding to system load in these periods. Investigate way of scheduling and dispatching electrolysers i.e. self-dispatch.
Rationale	The production of hydrogen through electrolysis is an area that provides significant opportunity for reducing renewable energy dispatch down, providing system services, as well as decarbonising the gas network. As large demand sources, the location and behaviour of electrolysers will have an important impact on the electricity network and market making it important for EirGrid and SONI to understand fully.
Expected Impact	• Gaining a greater understanding of the benefits and challenges associated with using hydrogen for power generation on the all-island power system. • Understanding the optimum locations for hydrogen electrolysers as well as optimal dispatch schedule for electrolysers taking account of the interactions between the all-island power system and the gas network. • Gaining a greater understanding of the impact of large-scale hydrogen production from offshore wind on the all-island power system and on the various electricity markets.

Progress in 2025	• Project scope updated. • Post-doc researcher recruited.
Dissemination	None so far.
Future Potential	The outputs will inform future network planning, market design or operational roadmaps.

Design and Development of Net Zero Energy Buildings with Internet of Things Integration

Status	In Progress
Partner(s)	Maynooth University
Scope	The project scope includes the design, simulation, and implementation of a Net Zero Energy Building integrating renewable energy sources. It covers the development of Internet of Things (IoT) based systems for monitoring and optimising energy consumption. The scope also involves evaluating building performance to ensure sustainability and energy neutrality.
Rationale	The Program aims to achieve a fully self-sustaining Net Zero Energy Building that balances energy generation and consumption through smart technology and renewable resources.
Expected Impact	The project is expected to reduce energy consumption and carbon emissions while promoting sustainable, smart building practices.
Progress in 2025	• Project kicked off
Dissemination	None to date
Future Potential	• To be confirmed

Investigating HVDC Interconnection as a Contributor to Security of Supply in Ireland.

Status	In Progress
Partner(s)	University College Cork
Scope	Objectives: • Assess historical contribution of interconnectors to security of supply in Ireland – compared to capacity market auction de-rating factors. • Wind speed and solar irradiation correlation analysis between Ireland and neighbours – what does this apply about fundamental diversity of generation mixes in high wind and solar future • Develop an informed view on whether the existing assumptions around interconnection and security of supply in Ireland are appropriate for electricity system planners. If not, suggest what assumptions could/should replace the existing ones.
Rationale	Currently, interconnection between Ireland and other countries is assumed to contribute towards the security of electricity supply in Ireland. Is this justified based on historical data (contribution of imports in previous scarcity events in Ireland). However, this may change over time as the generation mixes of countries change towards more weather dependent renewables.
Expected Impact	The extent to which interconnection is assumed to be able to contribute to security of supply/resource adequacy has a significant impact on planning for the electricity system.

Progress in 2025	The project commenced with a literature review and discussions surrounding the anticipated scope.
Dissemination	None.
Future Potential	Final year project report in line with the requirements for the Bachelor of Electrical and Electronic Engineering degree at UCC.

Annex 2 - List of abbreviations

Abbreviation / Term	Definition
AC	Alternating Current
AI	Artificial Intelligence
APN	Access Point Name
BAU	Business-As-Usual
CAP	Climate Action Plan
CIGRE	Conseil International des Grands Réseaux Electriques (Council on Large Electric Systems)
CRU	Commission for Regulation of Utilities
DASSA	Day-Ahead System Services Auction
DC	Direct Current
DER	Distributed Energy Resource
DLR	Dynamic Line Rating
DPFC	Dynamic Power Flow Controller
DSSC	Distributed Static Series Compensator
DSU	Demand Side Unit
EMS	Energy Management System
ENTSO-E	European Network of Transmission System Operators for Electricity
EPRI	Electric Power Research Institute
ESB	Electricity Supply Board
ESBN	Electricity Supply Board Networks
EU	European Union
EWIC	East West Interconnector
FASS	Future Arrangements for System Services
GB	Great Britain
GET	Grid Enhancing Technology
GIS	Gas-Insulated Switchgear
GT	Gas Turbine
HVDC	High Voltage Direct Current
IBR	Inverter-Based Resource
IoT	Internet of Things
ISO	International Organization for Standardisation
LCIS	Low-Carbon Inertia Services
LMP	Locational Marginal Price
LSI	Largest Single Infeed
LSO	Largest Single Outfeed
MaREI	Marine Environmental Research Institute
ML	Machine Learning
NexSys	Next Generation Energy Systems
NID	Nature Inclusive Design
O&M	Operations & Maintenance
OTCE	Operational Tools & Capability Enhancement
PES	Power and Energy Society
PST	Phase Shift Transformer
PV	Photovoltaic
RES	Renewable Energy Sources

RES-E	Renewable Energy Sources – Electricity
RTU	Remote Terminal Unit
RoCoF	Rate of Change of Frequency
SCADA	Supervisory Control and Data Acquisition
SEM	Single Electricity Market
SEMC	Single Electricity Market Committee
SEMO	Single Electricity Market Operator
SNSP	System Non-Synchronous Penetration
SOEF	Shaping Our Electricity Future
SONI	System Operator Northern Ireland
TS	Transmission Switching
TSO	Transmission System Operator
UCD	University College Dublin
UGC	Underground Cable
VFM	Volume Forecast Methodology
WP	Work Package

Annex 3 – Consultation response

Introduction and Purpose

On the 3rd of February 2026, EirGrid published the Annual Innovation Report for consultation[15].

The consultation enabled EirGrid to capture feedback from stakeholders on the planned next steps for ongoing projects, as well as understanding the level of support for future innovation projects, and any suggestions as to how they could be enhanced.

Within this annex, EirGrid summarises the responses and the proposed actions to best deliver on our stakeholders' recommendations. As the consultation respondents did not recommend changes to the content of the Innovation Report, we have not made any amendments to reflect the feedback received.

Responses

This consultation utilised the consultation portal, and for transparency, the full submissions are available for viewing on the portal[15]. All three responses were received through the EirGrid portal. One of the respondents did not permit the sharing of their name, the other two respondents are listed below:

- Cork Chamber
- Gas Networks Ireland

EirGrid would like to thank the contributors for their time reviewing the report and providing carefully considered answers to questions asked.

General responses

All the respondents are largely supportive of the report and its contents. Two of the three respondents go on to recommend additional points of consideration related to current and future innovation/research projects, and we thank them for their valuable insights.

Completed and Future Projects

This section discusses Questions 1 to 3 related to Section 4: Innovation in 2025.

Question 1

Do you agree with the proposed future potential for projects that are ongoing or initiated? Are there any additional considerations EirGrid should make in their plans for next steps?

Summary of Responses

The respondents are supportive of our focus on digitalisation, system flexibility, data-driven network management and RES-E integration, which they perceive as aligning with Ireland's decarbonisation objectives and needs of the economy.

One respondent encouraged closer alignment between utilities, including EirGrid and local authorities. We are appreciative of this point and assure the respondent that we aim to increase opportunities for collaboration in the innovation project development process. In 2025, for example, members of our Public Engagement team presented to the Cork Development Forum to outline the Strategic Delivery Framework for the Southern Region[16], and planned PR6 transmission projects. EirGrid has also participated in regional engagements such as the annual Energy Cork Conference, which brings together local authorities, industry stakeholders and infrastructure partners to support coordinated regional energy planning. Further examples of cross-utility work include the *Dynamic Line Rating* and *Dynamic Power Flow Controllers*

[15] Annual Innovation Report 2025 - Submissions | EirGrid Consultation Portal
[16] Strategic Framework for Grid Development in the Southern Region, 2025

projects. We will continue to build on these existing interactions as part of our ongoing engagement with local authorities and regional stakeholders.

The respondent also pointed to the need to align innovation projects with regional development strategies and spatial planning frameworks. We thank them for this valuable input and agree that there is potential in innovative future planning methods for grid development.

The respondent pointed to the necessary incorporation of demand growth forecasting linked to industrial policy. We thank the respondent for this input and point them towards the recently published All-Island Resource Adequacy Assessment (AIRAA)[17] that cover demand growth forecasting in detail.

The same respondent pointed to climate resilience as a perceived priority in projects. We thank the respondent for this input and assure them that Climate and Sustainability are of high priority to EirGrid. Along with projects within the Strategic Innovation Programmes (SIP) *Lead the island's electricity sector on sustainability*, EirGrid is exploring methods of climate resilience related to the infrastructure central to our operations.

Further, the respondents highlighted business engagement frameworks as a potential additional consideration. The respondent puts forward that structured engagement pathways with business users would ensure solutions are practical, scalable, and aligned with operational realities, particularly for energy-intensive sectors and small-medium enterprises. We thank them for this valuable point and ensure them that this point will be considered in future evaluations of how EirGrid engages with external stakeholders.

We thank the respondents for their valuable input.

Conclusions / Actions

We appreciate the feedback and suggestions from the respondents, and we thank them for their support.

Question 2

For completed projects are there any additional steps you believe EirGrid should be pursuing?

Summary of Responses

A respondent has recommended the consideration of replication and scaling as step in completed projects. They communicate their view that transferable solutions can be identified to then be deployed regionally and nationally. We thank this respondent for their input and will consider incorporating this as a step in the project development process.

A respondent has indicated that pathways to commercialisation should be considered as an additional step in completed projects. Similarly, another respondent suggested that projects should be analysis to determine their potential and identify commercial readiness with suitable industry partners to prepare them for commercial readiness. We thank the respondents for their valuable insight. However, we believe that this is outside our remit at the state TSO of Ireland.

A respondent has pointed to Knowledge-sharing platforms as a means of communicating lessons learned from projects for use by industry, regulators and stakeholders. We welcome this input and agree that this would potentially offer a valuable means of sharing learnings. The 2025 Annual Innovation Report outlines our existing approach to disseminating learnings, which is primarily delivered through the Annual Innovation Report itself, internal dissemination activities, and collaboration with project partners. While the current reporting approach already provides annual transparency, we acknowledge that a platform such as that suggested by the respondent could offer benefit, and we will consider this suggestion in future decisions.

[17] All-Island Resource Adequacy Assessment, EirGrid, 2026

EirGrid notes the point by a respondent recommending independent impact evaluation that assesses economic, environmental and system resilience outcomes, not just technical performance. This report outlines how learnings from completed projects are reviewed internally to inform future development and integration into BAU processes. Impact assessment is already embedded in our internal review cycle. We acknowledge the value stakeholders place on independent evaluation and will consider this point in future considerations around project evaluations.

Question 3

Do you have any suggestions for additional projects EirGrid should be pursuing?

Summary of Responses

The respondent pointed to regional flexibility markets as a potential future project for EirGrid to pursue. EirGrid has investigated methods of managing energy markets before, including research published in 2025, Distinguishing the energy and non-energy actions in balancing energy markets; *Electric Power Systems Research;* January 2025[18]. Further, the ongoing national Flexibility Needs Assessment[19] will inform EirGrid's future projects on this topic. We thank the respondent for this suggestion and agree that there is potential for further research on this topic.

The respondent highlighted that investigations on how to integrate green hydrogen production and storage into network planning. We thank them for this input and point them towards the HyLIGHT project which EirGrid has been supporting and which investigates the adaption of the Irish economy and infrastructure to the introduction of hydrogen as an energy carrier[20].

The respondent also pointed to the need to integrate AI grid management. Under our *Enhance data-driven decision-making leveraging artificial intelligence capability SIP,* EirGrid has pursued several projects including machine learning and AI tools that can be used to determine which grid projects should be prioritised. We thank the respondent for their input, and EirGrid will continue to research related projects to identify potential uses of AI tools across the business.

The same respondent also suggested that training pipelines and digital skills development for future energy systems require further development. EirGrid regularly engages with academic institutions across the island of Ireland via collaborative research, e.g. PhD and master's projects, and our student competition, CleanerGrid. Through this engagement in projects and CleanerGrid help to develop the skills of the future energy systems workforce by having them research cutting-edge topics, develop innovative solutions and interact with our staff. We thank the respondent for this comment as EirGrid is exploring ways to continuously develop skills of the energy sector's workforce.

One respondent highlighted how further integration of Long-Duration Energy Storage (LDES) could be incorporated in current projects aimed at reducing the levels of dispatch down. EirGrid's current LDES procurement represents the initial phase of Ireland's approach to supporting its integration into the grid. The scope of this phase has been defined around a minimum four-hour duration to meet the specific objectives of this first procurement round. As such, it is not intended to cover the full spectrum of long-duration storage solutions that may be relevant to the power system in the future.

EirGrid recognises that technologies with longer-duration capabilities, including multi-day storage, may offer additional system benefits as renewable penetration increases. A wider range of storage technologies and durations will be considered as part of planning for future system evolution. This includes activities progressing under the Government's Electricity Storage Policy Framework (Action 2)[21], which will help inform how more diverse storage solutions could be integrated effectively.

We welcome the respondent's perspective and will consider these points as part of our forward planning and the development of future, more comprehensive procurement arrangements.

[18] Distinguishing the energy and non-energy actions in balancing energy markets - ScienceDirect, 2025
[19] ACER approves EU-wide methodology to assess national electricity flexibility needs – ACER, 2025
[20] MaREI HyLIGHT, 2026
[21] Electricity Storage Policy Framework, 2024

We appreciate the feedback and suggestions from the respondent. EirGrid is already actively pursuing projects on the research topics suggested and will continue consider the feedback given when selecting additional projects. We thank the respondent for their suggestions for additional projects which EirGrid could pursue.

Innovation Management

This section discusses Question 4 related to Section 6: Our Vision.

Question 4

Are there Innovation Management procedures that EirGrid should be investigating?

Summary of Responses

A respondent has pointed to open innovation frameworks for academia, enterprises, start-ups and research centres. We are greatly appreciative of the respondent's input and agree that this would indeed be a largely beneficial target. We assure the respondent that we are currently developing methods to guide the direction of research and innovation with external parties, with the aim to publish these in the future. We believe that this will create a mutually beneficial arrangement whereby external researchers can select their topics of research to match the EirGrid SIPs, in turn creating opportunities for collaboration.

The same respondent has suggested focus on challenge-based innovation programmes linked to defined system problems. We thank the respondent for this point, and point them to our annual CleanerGrid[22] competition, which is thematically very similar to their suggested solution. Previous iterations of the competition are discussed in detail in Annex 1 – Project details.

The respondent suggests the use of agile governance models for rapid progression of projects from pilot to deployment. EirGrid thanks the respondent for this point. We can assure the respondent that in our current methods of project progression we aim to be as efficient as possible, while assuring due diligence and adherence to stringent criteria related to TSO operations.

The same respondent mentions the point that innovation procurement models should support Small-Medium Enterprise participation. EirGrid thanks them for their valuable input on this, however we point to our role as a semi-state organisation and the corresponding requirement to observe a rigorous tendering process. We remain open to participating with relevant Enterprises but are bound to this existing process.

The final point from the same respondent within the question recommends cross-sector innovation partnerships with transport, water, telecoms and data infrastructure. We thank the respondent and welcome this point. EirGrid is committed to expanding our collaboration with other entities such as those listed and agree we will consider these examples carefully when partnering in future projects.

We thank the respondents for their input relating to Innovation Management. As we explore this emerging field and how it may benefit our innovation efforts, we will certainly consider the respondents' valuable points in how we structure future Innovation Management systems.

[22] CleanerGrid, EirGrid, 2026

Key Projects

This section discusses Question 5 related to Section 5: Key Projects and Memberships.

Question 5

Do you support EirGrid's choice of key projects that should be focused on?

Summary of Responses

We thank the respondents for their approval of EirGrid's choice of key projects and for recognising how these projects deliver on improving enhanced grid flexibility, integration of renewable energy, digital infrastructure, data-driven system management and security of supply. We also agree with one respondent that our research and innovation projects should be economically viable, socially equitable and future proofed for demand growth, while also striving to maintain alignment with national climate targets.

We appreciate the support from the respondent and will take on board their suggestions.

Completed and Future Projects

This section discusses Questions 6 related to Section 4.2: Incremental Innovation.

Question 6

How well do you think our incremental innovations including improved collaboration tools and automation and new data methods support everyday business operations and drive efficiency?

Summary of Responses

There is general approval, and recognition of our incremental innovation's value by the respondents. One respondent points to the critical nature of early-stage stakeholder engagement in identifying and resolving issues with major project developments. We appreciate this input and will consider it in our future project processes as we aim to improve their efficiency.

The same respondent provides valuable input in their recommendation that incremental innovation is not pursued in lieu of transformational innovation. We thank them and assure them that we remain focussed on both forms of innovation, especially at this pivotal point in our transformation of the existing electricity network.

Completed and Future Projects

This section discusses Question 7 related to Section 4.4: Strategic Innovation Programmes.

Question 7

What are your thoughts on the Strategic Innovation Programmes (SIPs) mentioned in the report? Should there be any additional SIPs added? Is there redundancy between existing SIPs?

Summary of Responses

We thank the respondents for their support and approval of EirGrid's current SIP program. Several respondents suggested the addition of new SIPs to cover unrecognised areas, and that there was some overlap between the areas of focus for the SIPs. EirGrid will take this feedback on board as it reviews and updates the SIPs and our Innovation Strategy going forward.

Conclusions

It is in EirGrid's view that only very minor changes to the version of the report shared during the consultation are required. This is due to the unanimously positive response to the report and its contents. Feedback from respondents on additional suggested points of focus will be utilised across EirGrid to help shape the future of the innovation programmes detailed in this report. There is potential for innovation projects to be captured in this report in the coming years that incorporates the feedback given during this report's consultation.