ESB NETWORKS

Innovation 2026: Innovation To Deliver Networks For Net Zero Appendix

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Appendix 1 - Project Updates

Project List

	Name	Impact Status	Networks for Net Zero Strategic Objective
In Development			
1.	69kVA Pilot	Incremental	Empowered Customers
2.	AR/VR Fire Safety Training Pilot	Adjacent	Decarbonised Electricity
3.	Assetcool	Breakthrough	Decarbonised Electricity
4.	Battery Co-location Pilot	Incremental	Decarbonised Electricity
5.	ElectriCITY	Breakthrough	Empowered Customers
6.	Emergency Low Earth Orbit (LEO) Sat Communications	Incremental	Resilient Infrastructure
7.	Smart Fault Passage Indicators for Substations	Incremental	Resilient Infrastructure
8.	Tower Jacking Initiative	Breakthrough	Resilient Infrastructure
9.	Third Equation	Breakthrough	Resilient Infrastructure
In Progress			
1.	300 kVA Pilot	Incremental	Empowered Customers
2.	Compact 110 kV Line Design	Incremental	Resilient Infrastructure
3.	Composite Core Conductors	Breakthrough	Resilient Infrastructure
4.	Composite Cross Arm	Incremental	Resilient Infrastructure
5.	Composite Street Light	Adjacent	Empowered Customers
6.	Development of Dynamic Line Ratings (DLR)	Incremental	Resilient Infrastructure
7.	Flexible Demand Connections - Timed Connections	Adjacent	Empowered Customers
8.	Gridguard AI -Woodpecker Mitigation	Adjacent	Resilient Infrastructure
9.	GridWrap	Breakthrough	Resilient Infrastructure
10.	HV Distribution Network Development Study	Incremental	Resilient Infrastructure
11.	Looped Services Identification Using AI	Adjacent	Empowered Customers
12.	Portable Overhead Line Fault Passage Indicators	Incremental	Empowered Customers
13.	Prezerv	Breakthrough	Resilient Infrastructure
14.	Sidewalk Transformers	Adjacent	Resilient Infrastructure
15.	Zero Parallax	Adjacent	Resilient Infrastructure

Appendix 1 - Project Updates

Project List

	Name	Impact Status	Networks for Net Zero Strategic Objective
Completed			
1.	Advanced Infrastructure Self-Serve Pilot	Adjacent	Empowered Customers
2.	GridVision AI for Condition Assessment of Tower Corrosion	Adjacent	Resilient Infrastructure
3.	IFT (Interface Transformers) Units Refurbishment Pilot	Incremental	Decarbonised Electricity
4.	Industrial Heat Pump Network Impacts	Incremental	Empowered Customers
5.	Introduction of Alternatives to Creosote Wood Poles	Incremental	Resilient Infrastructure
6.	Island Decarbonisation	Breakthrough	Decarbonised Electricity
7.	Linebird	Breakthrough	Resilient Infrastructure
8.	Low Carbon Technologies Register	Incremental	Empowered Customers
9.	Neara MV/LV Pilot	Adjacent	Resilient Infrastructure
10.	Plexigrid	Adjacent	Decarbonised Electricity
11.	PortaSCAN Pilot	Breakthrough	Resilient Infrastructure
12.	Rooftop PV Identifier	Adjacent	Decarbonised Electricity
13.	Sustainable Backup Power Solutions	Breakthrough	Decarbonised Electricity
14.	VisNet Design Pilot	Adjacent	Empowered Customers

In Development: Project Descriptions

1	69 kVA Pilot	Timeline: Q2'25 – Q3'26
Scope	This project was initiated in response to requests from external stakeholders who need more flexible and cost-effective connection options for higher-demand loads. Currently, customers seeking these connections often face challenges such as long lead times and high costs due to material requirements and infrastructure constraints. To address this, the project focused on identifying and sourcing the necessary materials to support a 69 kVA whole current supply. This option could simplify the connection process, reduce costs, and shorten timelines for customers, particularly those in sectors like EV charging, by avoiding unnecessary complexity. A six-month pilot was launched to test the feasibility of this supply option, including the compatibility of the sourced materials with existing infrastructure. Stakeholder engagement was secured both internally and externally to support the pilot. The project assessed technical aspects such as design and materials, as well as commercial implications including costs to ESB Networks, customer charges, and any potential updates required to existing documentation. The findings will help determine whether this connection option can be extended to Charge Point Operators (CPOs) or more broadly to other demand customers, offering a faster and more economical pathway for connections.	
Key partners	Internal ESB Networks pilot	
Benefits	• CT Metering vs whole current metering • 400 Amps HDCO vs 100 Amp cut out • Reduced Cable Size • Reduced ESB Networks' Customer Delivery resource costs	
Impacts	• Better customer connection offering • Reduced Network Technician resources • Reduced Networks assets costs	
Outputs	• Test in ESB Networks' location • Roll out in public locations	
Next steps	• Complete pilot • Roll out in public locations	

In Development: Project Descriptions

2	AR/VR Fire Safety Training Pilot	Timeline: Q2'26 – Q4'27
Scope	As we scale up to deliver PR6, we need to roll out impactful training to a very wide range of staff and contractors across Ireland. The AR/VR Fire Safety Training Pilot is an innovation initiative designed to transform ESB Networks' approach to fire safety education. The scope of the project encompasses the design, development, and deployment of immersive training modules using Augmented Reality (AR) and Virtual Reality (VR) technologies. These modules aim to enhance traditional classroom-based and video-led fire safety training with interactive, scenario-based simulations that better prepare staff for real-world emergencies	
Key partners	To be confirmed.	
Benefits	Improved engagement and retention of fire safety knowledge, enhanced realism in training scenarios, and better preparedness for emergency situations. Immersive training reduces the need for physical simulations, lowering the carbon footprint and contributing to a more sustainable training model.	
Impacts	This innovation aims to modernise and improve the effectiveness of ESB Networks' approach to training to reduce fire-related incidents and reduce hazards for staff, contractors and the public. By simulating hazardous scenarios in a controlled environment, the training will better equip staff to respond effectively in real emergencies.	
Outputs	The project will deliver a set of immersive AR/VR training modules supported by technical assessments, stakeholder input, and usability testing. A comprehensive evaluation report will be produced to guide future integration into ESB Networks' safety programs.	
Next steps	Sourcing immersive training solutions from experienced AR/VR technology providers, with a focus on fire safety applications.	

In Development: Project Descriptions

3	AssetCool	Timeline: Q3'25 – Q3'26
Scope	AssetCool has developed a capacity-enhancing coating which can be applied to high-temperature low-sag (HTLS) composite core conductors to increase the capacity of overhead lines. This pilot will test the coating under realistic operating conditions. It will assess the thermal behaviour and ampacity performance of coated versus uncoated conductors over an extended monitoring period. AssetCool is the recipient of the Free Electrons 2025 Start Up of the Year award.	
Key partners	AssetCool	
Benefits	Capacity Enhancement	
Impacts	• 5–10% improvement in ampere capacity of coated conductors vs uncoated conductors. • Prove feasibility and reliability of robotic application process. • Generate sufficient insight to justify inclusion of coated conductor option in 2026 tender schedule. • Scalability potential assessed for broader rollout to 38kV network.	
Outputs	High-fidelity data over 12 months under various loading and weather conditions.	
Next steps	Finalise scope for proposed pilot in Q2 2026	

In Development: Project Descriptions

4	Battery Co-location Pilot	Timeline: Q2' 25 – Q3'26
Scope	This project focuses on designing and piloting a co-located battery solution that meets customer needs while aligning with ESB Networks' technical requirements for connection to the electricity network. The prototype is being developed in collaboration with subject matter experts from within ESB Networks, manufacturers, and external stakeholders. A six-month pilot will be implemented at agreed locations to assess impacts, risks, key learnings, and partner experience with the solution. The pilot will include a comprehensive evaluation of both technical and commercial implications, covering design, materials, costs to ESB Networks, customer charges, and potential updates to existing documentation. It will also investigate whether customer-funded upgrades to LV infrastructure could adversely affect ESB Networks, ensuring short levels (SCL) are maintained, and appropriate migration strategies are in place. Technical protection measures such as Export Limiting Schemes (ELS), Import Limiting Schemes (ILS), and directional overcurrent relays will be considered, with input from the system protection department. Power quality and voltage rise issues will be reviewed in detail, with all relevant data submitted to the Power Quality Manager and Planning Department for assessment. Stakeholder feedback and learnings will be captured and documented, with recommendations included in the final pilot report.	
Key partners	EPower, ZEVI, VT Electron, Threepwood Consulting Ltd	
Benefits	• Load shifting to reduce peak • Flexibility • Quicker connection in constrained capacity areas • Planning may not be required • Optimises the use of renewable generation when it is available	
Impacts	• Reduced network assets costs • Reduced demand for capacity • Reduced Network Technician resources • Faster connection times for customers	
Outputs	Field trial at suitable location	
Next steps	Energise and review pilot	

In Development: Project Descriptions

5	ElectriCITY	Timeline: Q1'26 – Q4'30
Scope	This project will explore technologies and solutions that support the electrification of urban communities.	
Key partners	Local authority, social housing organisation, third level institute, energy supply company, utility companies.	
Benefits	Demonstration of new and emerging technologies that can enable and support electrification with reduced impact to urban communities and their citizens.	
Impacts	Accelerated delivery of electrification solutions in urban communities.	
Outputs	A blueprint for electrification in urban communities. An understanding of the viability of emerging technologies, services and delivery solutions in accelerating urban community electrification and how electrification programmes can be designed to help ensure that no one is left behind in this transition.	
Next steps	Finalisation of scope and agreement with potential project partners.	

6	Emergency Low Earth Orbit (LEO) Sat Communications	Timeline: Q3'24 – Q4'26
Scope	This project is focused on identifying innovative solutions to strengthen communication capabilities during extreme weather events. Severe storms have highlighted challenges in maintaining reliable communication between operational teams, field crews, and customers. The initiative will assess alternative and resilient technologies to ensure critical messages can be transmitted when conventional systems are disrupted.	
Key partners	Engagement will be with technology providers and operational teams within ESB Networks.	
Benefits	Enhanced communication resilience during storm events will improve crew coordination, enable faster restoration for customers, and provide long-term improvements in operational readiness.	
Impacts	Accelerated delivery of This work has the potential to influence future investment in resilient communications infrastructure and integration into emergency response planning. solutions in urban communities.	
Outputs	The project will deliver a technical and operational assessment of potential solutions and recommendations for future deployment.	
Next steps	Sourcing innovative solutions from technology providers for Emergency Communications during Storm Events.	

In Development: Project Descriptions

7	Smart Fault Passage Indicators for Substations	Timeline: Q1'26 – Q1'27
Scope	This pilot will trial the deployment of Smart Fault Passage indicators to speed up fault identification and integrate into SCADA. This pilot will assess effectiveness in reducing fault location times and supporting faster restoration for customers.	
Key partners	Specialist providers will support device configuration, and ESB Networks' field staff will operate during the pilot phase.	
Benefits	The project will provide insights into how Smart Fault Passage Indicators within substations can reduce outage durations, improve operational efficiency, and support wider rollout decisions.	
Impacts	Learnings will inform the business case for broader deployment of these devices including impacts on asset management, communications performance, and staff training	
Outputs	A pilot evaluation report will be produced, detailing experience, communications reliability, and measured improvements in restoration times.recommendations for future deployment.	
Next steps	Devices will be used from Q1'26, with evaluation results expected by Q1'27.	

8	Tower Jacking Initiative	Timeline: Q3'25 - Q4'26
Scope	To resolve external conductor clearance violations on all steel lines, the traditional approach used in vast majority of cases is to sufficiently increase the height of one or both of the towers in the offending span. This approach typically requires a line outage in order for the existing tower to be replaced and the new structure installed. With the proposed tower jacking initiative, the clearance violations are resolved through increasing the height of the existing tower rather than replacing it. In addition, it is proposed that all tower raising works could be undertaken without requiring the line to be de-energised in the vast majority of cases	
Key partners	ESB Engineering and Major Projects,EirGrid, Ampjack, OHL framework contractors	
Benefits	• Outage savings compared to the traditional method are approximately two weeks per tower. • Sustainability benefits - retain existing towers and foundations • Environmental and planning considerations include avoiding the need to erect a new tower, which eliminates the requirement for a mobile crane on site.	
Impacts	To date ~25 towers on existing transmission lines have been identified as potential candidates for tower jacking which would result in significant line outage savings and other benefits as detailed above.	
Outputs	Tower jacking to become approved methodology for implementation on ESB Networks' lines as need arises. A key milestone on this journey is the successful implementation of tower jacking on a pilot project in Ireland in 2026.	
Next steps	• Design contract signed for pilot project and design stage currently ongoing between EMP and Ampjack on these tower raises. Design due to be finalised in Q4 2025. • Tower jacking to be incorporated into ESB Networks energised working procedure for review and acceptance by relevant stakeholders • Pilot project to take place on site in Q1/Q2 2026. • After success completion of pilot project – tower jacking to become BAU.	

In Development: Project Descriptions

9	Third Equation	Timeline: Q3'25 – Q3'27
Scope	The widespread adoption of EVs and heat pumps is impacting customers' voltage quality, creating new challenges for network stability and performance. To address this, ESB Networks is working with Third Equation, a UK-based company and top 15 finalist in the 2025 Free Electrons program, which has developed the Network Exchanger (NEx), an advanced power electronics unit designed to enhance network performance. The NEx provides automated voltage regulation, phase balancing, and harmonic elimination at the individual transformer level. ESB Networks, Third Equation, and Kyte Powertech are collaborating on a pilot project that will integrate a NEx unit into a ground-mounted substation. The unit will be installed on-site and monitored closely over a 12-month period to evaluate its impact and performance.	
Key partners	Third Equation, Kyte Powertech	
Benefits	The pilot will provide real-world performance data for the NEx, enabling a full understanding of its capabilities. If successful, it is hoped that customers would see fewer under or over voltage issues and that additional capacity within the transformer would be unlocked.	
Impacts	The technology has the potential to provide a ready-to-go solution for locations where under or over voltage issues are problematic, which can fit within a standard ground mounted substation footprint. Further iterations of the technology could include units designed for transformers on overhead lines.	
Outputs	Monitoring data from the pilot period will be used to produce a detailed analysis of the NEx performance and insight into its potential value.	
Next steps	Detailed technical design is underway. A ground mounted substation including the NEx will be assembled and tested at Kyte's factory in Cavan in early 2026. The substation will then be installed in a suitable location such as a housing estate and monitored for a period of 12-months.	

In Progress: Project Descriptions

1	300 kVA Pilot	Timeline: Q3'25 - Q4'26
Scope	Currently, customers with Maximum Import Capacity (MIC) requirements greater than 200 kVA must connect to the network via a block-built substation. This approach is costly, time-consuming, and requires significant space. For EV Charge Point Operators (CPOs), these constraints are particularly challenging due to limited space at service stations and the need to secure planning permission, which can delay progress on electrification. To address this, the initiative aims to source and pilot the necessary materials to support a 300 kVA supply from a unit substation, which is a compact, prefabricated design with a smaller footprint compared to traditional block-built substations. This solution could reduce costs, shorten timelines, and simplify installation for customers. Three pilot projects will run for six months each, focusing on testing the compatibility of newly sourced materials with existing infrastructure, including metering cabinets. Stakeholder engagement has been a key part of the process, with buy-in secured from relevant external parties. The pilot will also evaluate technical aspects, such as design and materials, as well as commercial implications, including costs to ESB Networks, potential customer charges, and any required updates to existing documentation. The findings will help determine whether this connection option can be extended to CPOs and potentially to all demand customers, offering a faster and more practical pathway for high-capacity connections.	
Key partners	EZO (Easy Go), EPower, ECars, ZEVI	
Benefits	• Accelerates infrastructure delivery • Reduces costs to customers • Reduces scale of infrastructure required overcoming space constraints • Reduced timeline on applications due to lack of requirement for planning permission	
Impacts	• Increase LV capacity of 330kVA in confined locations due to the project automatically requiring a newly installed 630 kVA substation • Decreased connection period for connections as application for planning permission and building of block-built substation are not required. • Increased number of EV charging bays as area of unit substation is much less than that of modular or block-built	
Outputs	• Energisation of three pilot sites using different assets to ensure greatest solution to the project is found before transitioning to BAU • Creation of a new procedure to ensure all physical and commercial requirements associated with a 200 to 300 kVA connection are captured	
Next steps	• Energisation of two additional sites • Monitor installations for a six-month period or create a staged charging scenario to showcase installation at maximum capacity. • Creation of procedure to allow transition to BAU	

In Progress: Project Descriptions

2	Compact 110 kV Line Design	Timeline: Q3'24 - Q4'28
Scope	An Innovative desktop Feasibility Study was completed in Q3 2024 for Uprating of Existing 38 kV Overhead Lines to 110 kV. The study's Conceptual Design Report proposed the introduction of a new Distribution System Operator (DSO) standard compact 110 kV overhead line design. The objective of this follow-on project is to develop the new Distribution System Operator (DSO) standard compact 110 kV overhead line design that could be employed to uprate ESB Networks' 38 kV overhead line corridors to operate at 110 kV voltage; this would provide the improved capacity and voltage reach needed to meet 2040 electricity network capacity forecasts. The design is intended to enable the uprating/conversion of existing 38 kV lines to 110 kV using a similar line profile to the existing circuit (i.e. the same height structures in same locations, same span lengths). The design could also be used for new lines at 110 kV or when re-conductoring/refurbishing existing 38 kV lines so they would be '110 kV ready'.	
Key partners	ESB Engineering and Major Projects	
Benefits	The project is expected to deliver the following benefits: • Enhanced Capacity: The proposed compact 110 kV overhead line will have a rating of 100 MVA, representing a circ. four-fold increase in capacity along these corridors. This substantial capacity upgrade is expected to be deliverable within a 5-year timeframe. • Minimal Community Impact: By using existing route corridors and structure positions and an innovative compact design, the solution will significantly reduce the impact on local communities. • Unlocking Value from Existing Corridors: This innovative approach unlocks additional capacity from existing line corridors, accelerating the delivery of new hard capacity and addressing the significant challenges associated with building new overhead lines.	
Impacts	The proposed compact 110 kV overhead line solution will deliver a circa four-fold increase in capacity along the corridors where it is utilised. It is expected that this will also deliver associated resilience and continuity benefits.	
Outputs	To develop a Distribution System Operator (DSO) Compact 110 kV design that: • Can be used to uprate existing 38 kV overhead line corridors to provide a sub-transmission capacity of at least 100 MVA summer rating. • Will be used to uprate existing 38 kV overhead lines and delivered in a 3- to 5-year timescale (which is quicker than building new 110 kV overhead line infrastructure) and which better meets landowner and stakeholder expectations than the standard 110 kV overhead line design. • Provides adequate resilience, reliability, and performance for a sub-transmission network, meeting current international technical standards.	
Next steps	It is planned that designs for a pilot project will commence in 2025 and specifications for new materials (e.g. post insulators) will be developed to enable procurement of the required materials. Construction and maintenance trialling of the new designs will be progressed as required to validate the designs and expedite the construction of the pilot project.	

In Progress: Project Descriptions

3	Composite Core Conductors	Timeline: Q2'24 - Q4'26
Scope	ESB Networks has progressed trials for the use of composite core conductors on the network. These new and innovative conductors are also known as Type 4 conductors or Polymer Matrix Composite (PMC) conductors and the trial will include testing and installation of three types of these conductors, namely Aluminium Composite Core Conductor (ACCC), Aluminium Composite Fibre Reinforced (ACFR) and Aluminium Encapsulated Composite Core (AECC). PMC conductors are a type of high temperature low sag (HTLS) conductor; however, they can be installed at much lower tensions than an equivalent aluminium conductor steel reinforced (ACSR) or traditional GAP type HTLS conductor which use a steel core – while not exceeding sag limits to maintain safety clearances. This conductor can double capacity in some instances while not increasing the mechanical loads on structures due to the lightweight and compact composite core complemented by formed aluminium layers to provide maximum conductive cross-sectional area. These novel conductors could be used extensively to increase capacity on the network while retaining existing structures. The scope of the work to be completed includes a construction trial and live trial installation for each of the three selected types of composite core conductor. These trials will inform ESB Networks regarding on the construction practices needed to work with this conductor type and will provide a limited live installation from which the performance of the conductor can be monitored. A subsequent monitored trial of a 38 kV uprating ACFR conductor in 2026 will provide real-world information on the performance of these conductors.	
Key partners	Various composite core conductor industry suppliers	
Benefits	Innovative new conductor type which could provide for capacity increases on existing overhead line while retaining existing structures	
Impacts	This technology may become a conductor of choice for the uprating of overhead lines to deliver additional capacity.	
Outputs	This trial will consider if the composite core conductor type is viable for implementation. There are several significant projects identified which could benefit from this technology. The trials will inform development of a specification for PMC conductor requirements including testing protocols for conductor and fittings.	
Next steps	ESB Networks has successfully trialled composite core conductors, including ACCC, ACFR, and AECC types, on a 110 kV section in Lanesborough. These innovative conductors offer increased capacity, reduced sag, and improved efficiency, supporting ESB Networks' goals for a more resilient and sustainable network. Two of the installations were completed with a third pending in late October 2025. Conductor/fittings for the 2026 trial of a 38 kV conductor are in the process of being sourced.	

In Progress: Project Descriptions

4	Composite Cross Arm	Timeline: Q2'25 – Q1'26
Scope	As part of ESB Networks' ongoing commitment to innovation and modernisation of its infrastructure, significant progress has been made in the evaluation and trial deployment of fibreglass composite crossarms for use on the bare Medium Voltage (MV) overhead line network. These lightweight, durable, and corrosion-resistant crossarms represent a forward-thinking alternative to traditional materials, aligning with ESB Networks for Net Zero Strategy. The scope of this initiative includes: • Supplier Engagement: Identification and collaboration with leading manufacturers in the composite crossarm market, focusing on those with proven expertise and substantial market presence. • Technical Evaluation: Comprehensive assessment of the mechanical and electrical performance of composite crossarms, including design validation, structural detailing, and standardisation in line with global benchmarks. • Procurement and Trials: Acquisition of trial quantities of composite crossarms for field testing. These trials encompass: - Construction and installation methodologies - Maintenance practices and lifecycle performance - Compatibility with existing ESB Networks MV OH Line standards Following successful procurement, construction and maintenance trials will be conducted, with further energised installations to be carried out where feasible. These trials will provide valuable insights into the practical application of composite crossarms, including installation techniques, operational reliability, and long-term performance monitoring.	
Key partners	Various industry suppliers	
Benefits	The designed composite crossarms are approximately 50% lighter than equivalent steel crossarms. Unlike steel, fibreglass composites are inherently resistant to corrosion. Reduce risk of conductor abrasion, and (iv) standardised profiles.	
Impacts	Composite arms have the potential to become a leading technology in the uprating of single-phase lines, enabling enhanced capacity and future-proofing the network for emerging demands.	
Outputs	A key outcome of this trial will be to determine whether this crossarm is suitable for broader implementation across the medium voltage network.	
Next steps	Composite crossarms designated for the MV overhead line trials are currently in the process of being delivered. Preparatory activities, including site readiness and installation planning, are underway to ensure a smooth execution of the trial phase. It is anticipated that the pre-installation work, field trials, and performance testing will be successfully completed by Q1 2026.	

In Progress: Project Descriptions

5	Composite Street Light	Timeline: Q2'23 - Q2'26
Scope	Local Authorities contacted ESB Networks to collaborate on the development and trial of an EV charging solution powered from public lighting supplies. The solution was required to accommodate simultaneous charging of two electric vehicles per street.	
Key partners	Electric Skyline – a public lighting maintenance contractor, Local Authorities, ZEVI, Department for Transport.	
Benefits	This solution will provide a means for EV drivers without private driveways to charge their electric vehicles in the vicinity of their homes. The design of the solution will integrate the public light, the EV chargers and the ESB Networks interface cabinet all within the one column, thereby reducing street furniture from 3 items to 1. The solution design also adheres to Government's accessibility standards for mobility impaired users, by enabling 360-degree access around the device. Payment for use of the charging service will also be facilitated by "Tap & Go" charging for customers.	
Impacts	This facility can be provided at public lighting points which are directly connected to the distribution network. The solution design will accommodate charging of four electric vehicles per street, double that requested by the Local Authorities.	
Outputs	The trial columns are complete and ready for delivery. Two sites, one in South Dublin and one in Galway city have been selected and civil works are currently being completed	
Next steps	Install and energise the trial columns. Review the output of the trial. Transition the trial to business as usual.	

In Progress: Project Descriptions

6	Development of Dynamic Line Ratings (DLR)	Timeline: Q1 '17 - Q4 '26
Scope	At present, conductors on the overhead distribution and transmission network are assigned static seasonal-based ratings. The daily capacity on the network is determined by the conductor size deployed on the circuit and the current season, i.e., Autumn, Winter, Spring, Summer. The use of static seasonal temperatures (i.e., summer 24°C) for determining the ratings is thought to be very conservative as daily temperatures rarely meet these in summer, however in winter, due to climate change there is an elevated risk that daily temperatures can exceed the winter ratings on rare occasions. This project uses innovative technology to change the way the available capacity of circuits is determined. Factors such as meteorological parameters (ambient temperature, wind-speed, wind direction) and the current state of the conductor on the circuit (ground clearance, sag, conductor temperature) will be used to dynamically determine the allowable capacity on the circuit on an hourly/forecast day ahead basis.	
Key partners	EirGrid (TSO), Dynamic line rating device and service providers.	
Benefits	As the current seasonal capacity ratings of circuits are considered very conservative, it is expected that the circuits where the technology is deployed will realise an increase in capacity. This advanced technology provides enhanced control, enabling operators to reduce capacity if a circuit exceeds permissible conductor temperature limits, which are typically caused by elevated ambient temperatures or reduced wind speeds, in order to optimise the lifespan of the conductors.	
Impacts	In certain cases, it is expected that this technology will provide: • An interim solution to uprating circuits where it is expected that the increase in capacity is only required during high wind conditions. • Operational resource improvements. • Avoided outages: Any consequential inconvenience or costs are avoided by not requiring a line outage to increase its capacity.	
Outputs	The Dynamic Line Rating (DLR) project, a long-term strategic initiative in partnership with the Transmission System Operator (TSO), has made significant progress. The initial functional specifications were completed and approved, and tender documentation was issued in 2022, leading to the selection of a successful vendor for the trial. The project has developed the necessary policies, processes, and procedures, and successfully installed 10 DLR sensors at the first trial location. A second trial line was identified, and sensor installation began in Q4 2024. In 2024, DLR devices were installed on the Cashla – Dalton 110 kV line and the busbar at Dalton 110 kV Station. In 2025, DLR devices were deployed on a third circuit, Corraclassy - Cathleen's Fall 110 kV line, as part of the trials. The trials are currently being monitored, with learnings from the initial installations under review. In 2025, work is progressing with EirGrid to agree a DLR Policy Document, together with lessons learned and specification improvements from the installation and operation of DLRs were collated.	
Next steps	• Trial installation on de-energised line by drone being examined. • Update DLR Functional and Technical Specification based on field experience. • Agree DLR Policy Document between ESB Networks and EirGrid. • Further market engagement for a framework for DLR devices and services	

In Progress: Project Descriptions

7	Flexible Demand Connections - Timed Connections	Timeline: Q3'23 - Q2'26
Scope	ESB Networks is currently exploring innovative ways to manage capacity on the distribution network, including the use of flexible demand connections. The simplest form of a flexible demand connection is a timed connection, where a customer is offered a connection on the condition that they remain within their Maximum Import Capacity (MIC), which may be curtailed at particular times. Eligible customers will typically have a demand profile that aligns with times when capacity is available on the electricity network, allowing any increases in MIC to be accommodated within the existing network capacity. Meeting these conditions would enable ESB Networks to offer a timed connection, allowing customers to connect more quickly on a timed basis. Meanwhile, ESB Networks will analyse the effectiveness of the timed connection and other solutions, and plan and deliver the appropriate long-term network reinforcements for that location to provide a 24/7 firm connection. Customers offering timed flexibility would have a specific time window in which they could utilise their full MIC but would be restricted to operating at significantly lower demand at other times. This Timed Connection pilot will contribute to the development of fully flexible demand solutions by providing evidence and insights into the practical implications of flexible solutions, as well as key customer drivers and benefits.	
Key partners	Key partners for the initiative will be confirmed following acceptance of connection offers as part of the pilot.	
Benefits	The learnings from this pilot have the potential to accelerate electrification by enabling ESB Networks to offer faster demand connections for suitable applicants where capacity is available at particular times, while planning and delivering the long-term reinforcement works.	
Impacts	This project will enable ESB Networks to pilot an innovative approach to managing growing demand for network capacity. It will deliver valuable insights and highlight unforeseen impacts relating to commercial policy and planning standards.	
Outputs	A comprehensive report outlining key insights gained during the pilot phase will be produced, encompassing operational, planning, commercial, and asset management considerations related to timed connections within the distribution network. The report will also assess the advantages for participating customers.	
Next steps	ESB Networks issued its first timed connection offer in 2025 and possible implementation in Q1 2026.	

In Progress: Project Descriptions

8	Gridguard AI -Woodpecker Mitigation	Timeline: Q2'24 - Q2'27
Scope	ESB Networks overhead line (OHL) Asset Management team has been completing trials to determine the vulnerability of various wood pole types to attack and damage from woodpeckers. Various innovations are being explored to mitigate against damage from woodpeckers and methods to repair damaged poles. This work has also incorporated testing of non-destructive testing equipment to assess the condition and remaining strength of wood poles which has value beyond woodpecker challenges. The great spotted woodpecker species first arrived in Ireland circa 2005. Since then, the population of this bird has been steadily increasing. The woodpecker is a protected species under the Wildlife Acts. Trending analysis sightings data suggests a 30% increase per annum in the population growth of these birds. Woodpeckers can cause significant damage to the wood poles on the overhead network, which can be categorised as direct or indirect.	
Key partners	Gridguard AI	
Benefits	This pilot has the potential to deliver a preventative solution to woodpecker damage, reducing the need to identify and remediate damaged poles and reduce the likelihood of secondary decay ensuring existing poles can remain in service.	
Impacts	The innovations trialled will be critical to managing the growing challenge posed by woodpecker damage on the overhead electricity network.	
Outputs	The output from this trial will be a report on the product's performance, as well as its environmental and ecological impacts.	
Next steps	Three independent trials using Gridguard AI, are to commence Q1 2026, where 114 units will be deployed on three sections of network, which are severely prone to woodpecker interference.	

In Progress: Project Descriptions

9	GridWrap Pilot	Timeline: Q4'25 – Q2'26
Scope	The pilot aims to evaluate the effectiveness of GridWrap a composite wrap material in enhancing the structural integrity and lifespan of wooden utility poles across ESB Networks' infrastructure. The scope includes testing both new creosote-treated poles and decommissioned poles with woodpecker damage, focusing on how well the wrap adheres, works with other materials, and performs in real-world conditions – particularly in terms of increasing the pole's strength and load-bearing capacity.	
Key partners	GridWrap Inc.	
Benefits	By assessing GridWrap's performance under Irish network conditions, ESB Networks seeks to determine its viability as a scalable, cost-effective alternative to full pole replacement. It also has the potential to reduce operational costs, minimise network disruption, and improve winter resilience, particularly for poles affected by woodpecker damage or ground-level decay.	
Impacts	This initiative supports ESB Networks' strategic goal of exploring innovative, non-invasive solutions to improve asset resilience, safety, and sustainability. If successful, the technology could be integrated into ESB Networks' asset management strategy, contributing to long-term infrastructure reliability and positioning ESB Networks as a leader in sustainable utility innovation.	
Outputs	The pilot will involve 42 poles (30 new creosote-treated poles and 12 decommissioned poles with woodpecker damage), with trials conducted in accordance with EN14229 standards to ensure statistically valid results. The output from this trial will be a report on the product's performance, as well as its environmental and ecological impacts.	
Next steps	The identified wood poles will be wrapped in Q4 2025, and the cantilever testing is scheduled for Q1 2026.	

In Progress: Project Descriptions

10	HV Distribution Network Development Study	Timeline: Q2'24 – Q1'26
Scope	This HV Distribution Network Development Study aims to develop innovative approaches to enhance the 38 kV HV distribution network outside major urban areas to meet the capacity requirements for a Net Zero ready electricity network by 2040. This project addresses the increasing load on the 38 kV electricity distribution system due to increased renewable energy generation and the electrification of heat and transport. It builds on a previous feasibility study to identify future HV distribution network voltage levels and recommend the direction for voltage conversion. CAP24 targets for renewable energy generation and the electrification of heat and transport will significantly increase the load on the 38 kV electricity distribution system, requiring widespread uprating of substations and overhead lines with higher capacity installations. The 38 kV network also faces asset replacement and supply chain challenges.	
Key partners	ESB Engineering and Major Projects	
Benefits	The project is expected to deliver several benefits, including confirming the appropriate voltage levels for the HV distribution network and providing a basis for stakeholder consultation. It will recommend an innovative and integrated approach to network development that ensures the required capacity for a cost-effective, Net-Zero ready distribution network by 2040. Additionally, it will provide a methodology that can be translated into policies and procedures for network planners to apply consistently across the country, excluding the Dublin urban area.	
Impacts	The final HV network development approach adopted will inform future investment decisions by ESB Networks in its network reinforcement and customer connection decisions.	
Outputs	A comprehensive report will be developed that outlines international practices by comparable utilities in relation to voltage conversion and rationalisation to address capacity growth requirements. The key deliverables from the study are: • Identify the future HV distribution network voltage level(s) to be employed and recommend the direction of travel in relation to voltage conversion. • Propose an optimum HV network development approach for 2040 based on sample area case studies. • Undertake specific studies on voltage uprating approaches to understand the optimal reach of 110 kV and 20 kV networks and the optimal voltage uprate approaches in specific scenarios. • Report on future network voltages and international practice completed in Q1 2025.	
Next steps	Report comparing the application of the different 2040 network development approaches (based on 38kV and 110kV) ongoing, and draft report for briefing within ESB Networks expected Q1 2026.	

In Progress: Project Descriptions

11	Looped Services Identification Using AI	Timeline: Q2'25 – Q4'25
Scope	Looped services, where a single cable supplies two adjacent customers, were common until the early 1990s but are now inadequate for modern low-carbon technologies (LCTs) like EV chargers and heat pumps. The Looped Services Identification Project aims to locate and classify legacy looped service connections within ESB Networks' low-voltage infrastructure using artificial intelligence detection on images captured on smart meter installations. The project leverages the Smart Metering Programme's image database, applying AI models to detect looped versus normal service configurations based on visual cues such as cable count and fuse unit layout. The scope includes training AI on tagged images, tracing identified looped services back to MPRNs, and developing a dashboard for operational use.	
Key partners	Internal ESB Networks pilot.	
Benefits	This initiative offers a scalable, data-driven approach to modernising ESB Networks' LV network. By identifying looped services proactively, ESB Networks can better plan for reinforcements, reduce customer disruption, and support LCT adoption. The AI model improves operational efficiency by automating what was previously a manual and error-prone process. It also could enhance customer service, allowing queries about looped service status to be answered quickly via dashboards.	
Impacts	Initial trials have shown promising results, with AI models achieving recall and precision rates above 75% and improving across iterations. The project uncovered challenges such as image quality variability, tagging complexity, and the need for robust data governance.	
Outputs	The initial proof-of-concept phase has been completed, showing that it is possible to train an AI model to detect looped services from the available imagery. A dashboard has been developed to show the potential use cases for the output data.	
Next steps	Further model training and automation of input data pipelines is to be carried out on a pilot basis. A full-scale model will be run on all available imagery (approx. 2 million MPRNs) depending on the success of this stage.	

In Progress: Project Descriptions

12	Portable Overhead Line Fault Passage Indicator	Timeline: Q1'25 – Q4'26
Scope	This pilot will trial the deployment of portable overhead line Fault Passage Indicators (FPIs) to speed up fault identification. This pilot will assess effectiveness in reducing fault location times and supporting faster restoration of supply for customers.	
Key partners	Specialist providers will support device configuration, and ESB Networks' field staff will operate during the pilot phase	
Benefits	The project will provide insights into how portable overhead line FPIs can reduce outage durations, improve operational efficiency, and support wider rollout decisions.	
Impacts	Learnings will inform the business case for broader deployment of portable overhead line FPIs, including impacts on asset management, communications performance, and staff training.	
Outputs	A pilot evaluation report will be produced, detailing experience, communications reliability, and measured improvements in restoration times.	
Next steps	Devices will be used from Q4'25, with evaluation results expected by Q4'26.	

13	Prezerv	Timeline: Q3'25 – Q2'26
Scope	Prezerv uses ground penetrating radar (GPR) and AI assisted cloud point processing technology to provide 2D and 3D visualisations of underground assets with greater speed, precision and accuracy than traditional technologies. ESB Networks and Prezerv have designed a trial of Prezerv's technology that will see multiple sites in the Greater Dublin Area undergo the GPR scanning and analysis process, each of which will test the capabilities of the technology against a different use case. Prezerv is a US-based top 15 finalist in the 2025 iteration of Free Electrons.	
Key partners	Prezerv	
Benefits	The trial will provide insight into exactly how the Prezerv scanning and analysis process operates, as well as experience of and insights into the benefits and limitations of the 2D and 3D visualisation outputs. The use cases which will be tested are all of high importance to operational, engineering, environmental and planning teams and include earth grid mapping of HV substations, analysis of congested cable routes and pre-construction site surveys.	
Impacts	The technology has the potential to improve ESB Networks' knowledge of underground asset locations and condition. This could pinpoint locations for new cable routes, lead to a reduction in the scale of exploratory digging, result in fewer cable strikes during construction, reduce time spent waiting for survey results and pinpoint areas for underground asset reinforcement.	
Outputs	3D point cloud visualisation of electrical and other underground infrastructure.	
Next steps	Carry out the trial fieldwork by end 2025 with interpretation and analysis of data in early 2025.	

In Progress: Project Descriptions

14	Sidewalk Transformers	Timeline: Q3'17 - Q2'26
Scope	The aim of the project is to develop a prototype miniature secondary substation, known as a sidewalk transformer, as an alternative to conventional reinforcement, particularly for urban centres where space to construct traditional substations is limited, and then to trial that solution. The electrification of heat and transport and the proliferation of LCT, will lead to increased demand loads and potential congestion on LV networks, which necessitates novel solutions.	
Key partners	Kyte Powertech	
Benefits	The project aims to benefit customers by offering a potential network capacity solution for the anticipated increase in loads arising from electrification of heat and transport, particularly in urban settings, through trialling a viable option to uprate the network, as cost effectively as possible.	
Impacts	This solution will allow additional transformers to be located on narrow streets in densely populated city areas, where spatial restrictions limit the opportunity for construction of traditional substations with larger footprints. This will enable capacity to be increased for residential customers in urban centres where increased network load arising from LCT take-up and use is anticipated.	
Outputs	ESB Networks is conducting a trial in Ireland of these units. A 10 kV 200 kVA prototype sidewalk transformer has been designed, type tested and installed in ESB Networks' National Training Centre in Portlaoise. The sidewalk transformer has been upgraded from 200 kVA to 315 kVA and is currently in the prototype stage. It is not yet ready for deployment in a live environment. A foundation has been poured at the NTC in Portlaoise, and components are awaited from stores. Once available, a cable crew will install the unit in a dead situation to identify and resolve any final technical issues.	
Next steps	The first unit will be installed at the NTC for a non-energised fit-out trial using test MV and LV cables to confirm compatibility. If successful, it will be redeployed to a Dublin site for full operation. The 200 kVA prototype core will be repurposed into a new enclosure and fully connected to the live network at the NTC.	

In Progress: Project Descriptions

15	Zero Parallax	Timeline: Q4'25 – Q4'27
Scope	ESB Networks has initiated a pilot deployment of Zero Parallax, an advanced thermal monitoring system to enhance the resilience and responsiveness of its substation infrastructure. This solution integrates a 120°/180° field of view sensor with AI-driven analytics to provide continuous, real-time thermal surveillance of its substations. It is designed to support early detection of anomalies such as overheating, potentially enabling a shift from reactive inspections to predictive, data-informed condition-based maintenance.	
Key partners	Zero Parallax	
Benefits	This technology brings strategic benefits to ESB Networks by supporting its transition to a condition-based maintenance model and enhancing its digital asset management capabilities. By integrating AI-driven thermal imaging into substation operations, the project enables smarter decision-making, optimises resource allocation, and extends the lifespan of critical infrastructure. It also strengthens ESB Networks' ability to manage aging assets and accommodate increasing renewable generation, contributing to environmental sustainability and regulatory compliance. If successful, this approach will help to reduce unplanned outages, improve asset performance, and strengthen overall grid reliability.	
Impacts	The implementation of real-time thermal monitoring through this pilot will significantly enhance ESB Networks' ability to proactively manage substation health. By replacing periodic manual inspections with continuous, AI-driven surveillance, the system will enable earlier detection of faults and emerging risks, reducing the likelihood of equipment failure and improving safety. This shift from reactive to predictive maintenance supports a more resilient and responsive grid, aligning with ESB Networks' strategic goals and helping to future-proof infrastructure in line with increasing operational demands.	
Outputs	As part of the pilot initiative, two 220 kV substations (Huntstown 220 kV in north County Dublin and Cashla 220 kV near Oranmore in County Galway) have been selected for initial assessment. These substations are representative of both a smaller and very large footprint substation environment, offering valuable insights into the system's adaptability across different contexts.	
Next steps	Installing the Zero Parallax thermal monitoring system at selected substations, configuring the AI analytics platform, and initiating real-time data collection. This will be followed by performance validation, and ongoing monitoring to support predictive maintenance and inform future scalability.	

Completed: Project Descriptions

1	Advanced Infrastructure Self-Serve Pilot	Timeline: Q4'24 – Q4'25
Scope	This pilot aimed to develop and demonstrate an interactive web user interface that enabled customers considering demand connections at the medium-voltage level to access tailored network capacity information, high-level estimated costs, and potential timelines for their desired connection. It was hoped that a self-serve capacity screening tool could provide an enhanced pre-application service for customers, while also leading to a reduction in applications that were not progressed by customers. This pilot aimed to build on the existing capacity heatmap data already published on our website.	
Key partners	Advanced Infrastructure Technology Ltd.	
Benefits	The pilot successfully validated the feasibility of a customer-facing self-service tool for Medium Voltage (MV) connections, demonstrating its potential to reduce speculative applications and support more informed customer decision-making. By offering transparent access to capacity data the tool could empower users to assess connection viability independently. Additionally, the project yielded valuable learnings that may inform the development of a scalable, enduring solution, ensuring future iterations are even more effective and user-friendly.	
Impacts	Network planning studies are time consuming and costly for ESB Networks, yet a substantial number of demand applications which have been studied on behalf of customers are allowed to lapse or are withdrawn by the applicants. It is hoped that greater insight to available network capacity, high level costs and potential delivery timelines will reduce these speculative applications for network capacity and result in greater numbers of applications progressing to live connections. The outputs and learnings of this pilot are intended to inform a technical specification for the development of an enduring self-serve solution.	
Outputs	The Advanced Infrastructure platform delivered: A browser-based self-screening tool hosted by Advanced Infrastructure, featuring an interactive map with indicative local MV capacity, and cost/timeline estimations for a connection of defined size (MVA). Two technical reports: 1. Architecture and Scalability Report – outlining full deployment feasibility. 2. User Testing Feedback Report – summarising insights from CPO testing. A video demonstration and recorded user testing sessions.	
Next steps	To engage with the business on the roadmap for digital self-serve tools and integrate learnings from the pilot.	

Completed: Project Descriptions

2	GridVision AI for Condition Assessment of Tower Corrosion	Timeline: Q2'22 - Q4 '25
Scope	As part of ESB Networks' drive to modernise asset management and improve efficiency, this project focused on evaluating GridVision AI, a machine learning-based software tool designed for automated condition assessment of overhead transmission lines. The initiative served as a proof of concept to determine whether AI could reliably identify and quantify high-level corrosion across our fleet of steel lattice towers. The scope included assessing steel transmission towers using Collaborative-AI models to detect deep rust corrosion, with the goal of eliminating time-consuming manual steps in the inspection process. A key feature of this tool was its ability to highlight and quantify corrosion levels on individual tower members, providing a structured and repeatable approach to condition monitoring.	
Key partners	GridVision	
Benefits	This technology could provide an objective and rapid means of undertaking an initial assessment of the relative levels of corrosion (Grade 4+ on the UK NG Scale) on steel towers to help determine if full detailed manual steelwork inspections at individual bar-level are needed on some or all the towers on a given circuit.	
Impacts	Using automated image capture on towers provides a repeatable means of capturing identical sets of imagery over time e.g., every 5 years. A machine learning corrosion detection tool then also provides a repeatable, objective means of assessing corrosion on bars/bolts at Grade 4+ at each time point and allows for comparison of corrosion development over time.	
Outputs	The corrosion detection system provided a percentage score indicating the level of severe corrosion on each tower. Towers with higher scores could then be prioritised for detailed inspections. Overall, the project showed that the AI solution was highly effective, achieving an average accuracy of 93% in identifying corrosion. During later trials, the AI model was improved to give more consistent results by averaging scores across multiple images. While a review of results on the Cashla–Prospect line showed only moderate correlation with manual inspections, mainly due to poor image quality and differences in how corrosion was counted, the tool still proved valuable for quickly highlighting towers that may need further attention. This approach offers a practical way to focus resources on the structures most at risk, reducing reliance on time-consuming manual checks.	
Next steps	Improving and validating the AI corrosion scoring tool so it can confidently guide maintenance priorities. The next phase involves analysing data from the Dunstown–Moneypoint line, where over 600 towers have already been surveyed. AI corrosion scores will be benchmarked against detailed manual inspections on about 100 towers to fine-tune accuracy and set clear thresholds for when a tower needs further attention. ESB Networks will also refine methods for combining bar and bolt corrosion counts to align with AI results. The goal is to make the AI corrosion score a standard part of our UAV inspection process, giving engineers an objective and consistent way to identify towers that require detailed steelwork assessments or repairs.	

Completed: Project Descriptions

3	IFT (Interface Transformer) Units Refurbishment Pilot	Timeline: Q2'24 - Q2'25
Scope	This project aims to refurbish and upgrade Interface Transformers (IFTs) to enhance their functionality and extend their operational life. This initiative aims to reduce waste, extend asset life, and provide cost savings, aligning with ESB Networks' circular economy approach. ESB Networks is committed to minimising waste and promoting sustainability by refurbishing existing equipment, significantly reducing the amount of waste that would otherwise be scrapped, and recycling and reusing materials to reduce the need for new procurement. These efforts contribute to a reduced carbon footprint, substantial cost savings, and support ESB Networks' commitment to environmental sustainability.	
Key partners	Internal project.	
Benefits	• Reduces ESB Networks' carbon footprint by reducing waste and recycling existing material. • Provides substantial savings on the cost of replacing existing IFT Subs. • Is in keeping with the circular economy approach taken by ESB Networks. • Significantly reduces lead in time compared with a new purchase.	
Impacts	The units are stripped down, degreased, cleaned, and painted. A new zinc-coated floor and brackets are installed to support the two reclosers and controllers. Additionally, a new control panel with a protection relay is fitted to each unit, allowing the IFT (Interface Transformer) to be fully automated.	
Outputs	An IFT (Interface Transformer) refurbishment workshop was set up focusing on upgrading and automating IFTs to support the 20 kV project team.	
Next steps	Formalise the Interface Transformer (IFT) Refurbishment process and transition it into Business-as-Usual (BAU). Apply learnings from pilot projects to develop a repeatable approach for refurbishing other electrical equipment as part of standard operations.	

Completed: Project Descriptions

4	Industrial Heat Pump Network Impacts	Timeline: Q2'23 - Q2'25
Scope	The NEXSYS Heat Pump project aims to comprehensively analyse the implications of incorporating an industrial heat pump into the electricity network. The scope includes a detailed assessment of the impact on the electricity network, considering factors such as load curves, peak demand, power losses, voltage drop, power quality, and reactive power requirements. The broader analysis encompasses the examination of the industrial heat pump, its size, industry applicability, and interactions with other systems like storage, supplementary heating, and waste-heat systems. Additionally, the project involves a review of relevant industry standards and an in-depth analysis of heat pump performance and load capacity scheduling.	
Key partners	NEXSYS partners.	
Benefits	This project will help to build understanding of the impact of industrial heat pumps on the electricity network to enhance network planning and maintain power quality. This would optimise heat pump utilisation without compromising the stability of the electricity distribution system. It will also ensure compliance with industry standards, mitigate potential issues related to power quality, harmonics, and technical considerations.	
Impacts	Identification of early adopters and insights into the scale of heat pump installations. Consideration of on-site integration solutions and their impact on the electricity network. Addresses concerns such as voltage drop, power quality, power factor correction, and cleaning cycle management.	
Outputs	A comprehensive analysis report will be developed detailing the impact of industrial heat pumps on the electricity network, heat pump performance and load capacity scheduling insights. A key element of this analysis on the electricity network will be understanding power quality impacts.	
Next steps	Finalisation and publication of project reports and dissemination to internal ESB Networks' teams.	

Completed: Project Descriptions

5	Introduction of Alternatives to Creosote Wood Poles	Timeline: Q3 '16 - Q4 '25
Scope	This materials science innovation project addresses the need for alternative structures or solutions to replace creosote wood poles. These structures must be capable of operating under Irish climatic conditions without the use of creosote which contains hazardous components. The sale of creosote has been banned to the public and although business users are entitled to continue to use it under certain conditions, the current EU-wide derogation on the use of new creosote poles is due to expire in Oct 2029. It is not presently known if an extension to this derogation will be permitted. The recommended solutions must be adaptable to and reliable in the Irish climate cognisant of the forecasted impacts of future climate change. Not only are non-hazardous products needed but replacement processes must also be introduced to store, transport, handle, install, access, maintain, operate as well as to uninstall the products. There are over 2.2 million creosote-treated wood poles installed countrywide on the LV, MV, 38 kV and HV networks. The Irish climate accelerates the decay of untreated wood poles and exacerbates the challenges, with consequential risks to safety, continuity, and reliability. Therefore, alternatives to the creosote treated pole need to be trialled and evaluated. Substitute pole preservatives have been trialled as an alternative to creosote and will continue to be assessed. Any substitute for the existing stock of wood poles must be robust and reliable or risk inconvenience for the customer and cost inefficiencies for ESB Networks.	
Key partners	ESB Networks' Network Assets team has engaged with Vattenfall (Swedish utility) who have used composite poles for nearly 15 years and is seeking opportunities to engage with other Nordic utilities who similarly use composite poles. ESB Networks has advanced technical development with Jerol (Sweden), with a substantial pole order currently in progress. Discussions are ongoing with RS (Canada), Comrod (Norway) and Creative Composites (USA). We are also exploring alternative wood types to provide diversity in supply and are continuing to research chemical alternatives that could be used in their treatment.	
Benefits	This innovation project seeks to provide viable alternatives to creosote treated wood poles. The creosote treated wood pole has been the backbone of the overhead distribution electricity network in Ireland since the Shannon Scheme in the late 1920's. Through this project, we aim to ensure that any new technologies introduced on the network have been thoroughly vetted though rigorous technical assessment, testing and trials on the network. This work will consider pole implementation in relation to several factors including safety, environment, cost, service life, resilience, work methods, handling, and storage.	
Impacts	Composite poles will provide a solution which can replace wood poles in certain circumstances. These poles will not carry the same environmental or safety concerns posed by wood poles treated with creosote. Tooling and installation methods for these poles will be very similar to existing work practices. The service life of a composite pole may prove to be significantly greater than an equivalent treated wood pole.	

Completed: Project Descriptions

5 continued	Introduction of Alternatives to Creosote Wood Poles	Timeline: Q3 '16 - Q4 '25
Impacts	A cost increase is anticipated as creosote poles are retired and other pole types, such as composite poles, are introduced. These costs are mitigated by a longer lifespan, reduced crew mobilisations for pole replacements, increased storm resilience, reduced risk of wildlife damage, more agile supply chain and higher materials consistency. Research and trials on alternative wood pole treatments will identify the best performing alternatives to creosote. This work will establish if there are viable wood pole treatment options which provide a sufficient service life for the wood pole while removing environmental and safety concerns presented by creosote.	
Outputs	ESB Networks has installed approximately 20 modular composite poles (2017) and 5 singular poles (2022) across LV, MV, and 38 kV voltages on the overhead network. These installations included urgent pole replacements due to storm damage of wood poles in November 2022. These are being monitored for signs of wear, degradation, and weather effects. A 5-year audit was carried out on the poles installed in 2017, and all are performing well. During 2023 and 2024, significant progress has been made with several large deliveries of composite poles into the country. Composite poles are being supplied to each region in the country for familiarisation and installation. Composite pole installation on the network in designated situations/locations will become a business-as-usual activity. A framework tender for the supply of composite poles is being progressed, with the technical specification and tender documentation now complete. In 2024, orders of wood poles treated with creosote alternatives (Tanasote and DCOI) have been received and will be installed on the network. Additionally, significant progress was made in 2024 (Q3, Q4) with the 220 kV composite poles.	
Next steps	The timelines of this innovation project have been extended to reflect the need to monitor the trial poles for a more appropriate time (more than 10 years) to better reflect their long-term performance in the Irish context. No adverse effects are reported on the trial pole sets from initial audits in 2022, and final performance comparison stress tests will be required at the end of the trial. A construction & maintenance trial involving four foundation types was completed, and the Construction & Maintenance Trial Report is expected to be issued in Q1 2025. The procedural standards for composite poles are in development, and ESB Networks' staff will need appropriate training in relation to the correct handling, tooling, erecting, etc., of composite poles. Alternative pole solutions which are implemented on the network will be digitally recorded in a dedicated app, and the condition/performance of these poles will be tracked over time. Next steps for 2025 include the preparation of a functional specification by EirGrid for 220 kV composite poles, expected to be issued to ESB Networks for review and acceptance in Q1 2025. Following the approval of the functional specification, an ESB Networks procurement specification will be drafted. Additionally, the feasibility of an energised trial to develop construction plans is being examined.	

Completed: Project Descriptions

6	Island Decarbonisation	Timeline: Q2'23 – Q3'26
Scope	The islands of Inish Turk and Tory operate as isolated electrical networks with no interconnection to the mainland distribution system, relying primarily on diesel generators for their electricity supply. As low-carbon technologies become more widespread, these small island systems are experiencing increasing operational challenges. In particular, high penetrations of behind-the-meter solar PV can affect system stability and reliability. This project aims to reduce reliance on diesel generation by assessing and trialling alternative, sustainable sources of power. It also seeks to develop solutions that can safely accommodate higher levels of behind-the-meter solar PV, supporting long-term decarbonisation, energy resilience, and greater sustainability for the island communities.	
Key partners	Consultancy and technology providers offering expertise in providing sustainable technology solutions.	
Benefits	Electricity generation with a lower carbon intensity whilst ensuring the continued safe and secure supply of energy for the islands. Proposed solutions should also enable and support increasing levels of behind the meter solar PV.	
Impacts	Support ESB Networks in replacement of diesel generation with decarbonised alternatives on the islands.	
Outputs	The project will deliver a comprehensive report including stakeholder inputs, technical assessments, and recommended strategies. Case studies will be developed to inform future replication across other island communities.	
Next steps	A high-level report outlining decarbonisation pathways for the islands has now been completed. The report includes a series of recommended next steps that can be progressed in subsequent phases of the project.	

Completed: Project Descriptions

7	Linebird	Timeline: Q2'25 – Q3'25
Scope	Linebird is a top 15 Free Electrons 2025 finalist. Their technology utilises an Unmanned Aerial Vehicle (UAV)-deployed toolkit for live-line maintenance and condition assessment. It includes Grabber and Cutter tools for removing debris from overhead lines and an aerial ohmmeter (Ohmstik Plus) for measuring joint resistance without requiring outages. This innovation aims to reduce service disruptions and improve safety, especially during storm damage scenarios. A three-day trial was carried out using a heavy-lift UAV from an ESB Networks contractor. The trial included training at the National Training Centre (NTC), live testing on the Cushaling-Portlaoise 110 kV line, and further demonstrations at the NTC.	
Key partners	Linebird and Cyberhawk	
Benefits	The trial, conducted with a specialist UAV pilot, demonstrated that the Linebird UAV toolkit can safely and effectively perform live-line maintenance without requiring outages or personnel on the structure. The Grabber successfully removed debris from overhead lines, the Cutter cleanly severed a line remotely, and the Ohmmeter accurately measured joint resistance. This approach enhances safety, reduces operational disruption, and enables proactive asset management.	
Impacts	The successful trial demonstrated significant improvements in safety by eliminating the need for personnel to access live or damaged infrastructure. It also reduced time and crew requirements, enabling faster response and more efficient resource use. This technology opens the door for forward planning of maintenance based on condition assessments, helping to prevent emergency repairs.	
Outputs	The key outputs from the project include a validated UAV-based toolkit for live-line maintenance and condition assessment, successful field data from the Grabber, Cutter, and Ohmmeter tools, and a proven trial methodology for future deployments. The trial also produced operational learnings and a framework for integrating UAV-based maintenance into ESB Networks' standard practices.	
Next steps	ESB Networks to review the completion report from Linebird which will include resistance data, visual records, and flight logs from the trial. ESB Networks will also review internal procedures and safety standards considering the successful outcomes. ESB Networks will explore opportunities for pilot projects or scaled deployment, with a focus on integrating UAV-based maintenance into forward planning and routine operations.	

Completed: Project Descriptions

8	Low Carbon Technology Register	Timeline: Q3'23 - Q2'25
Scope	Traditionally, when applying to install inverter based LCT (low carbon technology) generation devices to the electricity distribution network, customers also had to provide copies of technical documentation sourced from the LCT manufacturers to show that the devices had been designed and tested to industry standards. This resulted in LCT manufacturers providing multiple copies of the same Type Test reports and Certificates of Conformance to each applicant customer and ESB Networks evaluating and storing multiple copies of this technical documentation for each installation of the same LCT devices. Establishing the LCT Register was envisaged as a means to reduce this administration overhead, introduce efficiencies for applicant customers, LCT manufacturers and ESB Networks, and also provide assurance that the LCT technologies, whether inverter-based generation technologies or demand devices such as EV chargers or Heat Pumps meet standards and requirements to connect to the LV distribution network. By choosing to install a device listed on the LCT Register, applicant customers will no longer need to provide copies of Type Test reports or Certificates of Conformance when applying to connect. The LCT Register will also provide assurance that registered LCT demand devices, i.e., EV chargers and heat pumps have been designed and tested to industry standards. The LCT Register, launched in January 2025 and updated on a regular basis, is a list of devices which meet the industry standards required by ESB Networks to connect to the LV electricity distribution network. The LCT Register Project involves the following: • Appointment of an LCT Compliance Agency to maintain the Register on ESB Networks behalf. An interim LCT Compliance Agency was appointed to enable the baseline LCT Register be established and this interim agency will remain in place until an enduring provider of this service is appointed. • Establishment of the register of LCT devices compliant with industry standards. The LCT Register was launched in January 2025 and is updated regularly as LCT manufacturers apply to have their devices included. • Modification of connection application documentation and processes to reference the LCT Register and minimise the need for applicant customers to provide copies of technical documentation sourced from LCT manufacturers. The online NC7 and NC8 application forms have been designed to reflect the existence of the LCT Register and introduce efficiencies for applicants of mini-gen and small-scale generation devices. Changes to the microgeneration (NC6) application process are envisaged for 2026. • Development and population of an LCT Database, recording where specific LCT devices have been connected to the network.	
Key partners	Interim LCT Compliance Agency, Threepwood Consulting Ltd.	

Completed: Project Descriptions

8 continued	Low Carbon Technology Register	Timeline: Q3'23 - Q2'25
Benefits	The LCT Register will give rise to several benefits: • Efficiency: Including LCT Register Reference Numbers on application forms will remove the need to provide copies of technical documentation in support of connection applications, thereby reducing administration overhead for LCT Manufacturers, applicant customers / electrical contractors and ESB Networks. • Compliance Assurance: By installing / connecting devices that are on the LCT Register, all parties can be confident that these devices have been designed to meet industry standards. • Visibility: The LCT Register will provide the foundation for increased and enhanced visibility of the LV network and enable new and enhanced data driven services for all customers, better supporting electrification, design of flexibility schemes and enabling prioritised uprating of the LV network.	
Impacts	Implementation of the LCT Register will lead to increased efficiency in the application process for connection of LCT devices onto the LV electricity distribution network.Customers installing LCT devices which are on the LCT Register will has assurance that the devices they have selected comply with industry standards.	
Outputs	ESB Networks has appointed Threepwood Consulting Ltd as interim LCT Compliance Agency to establish and maintain the initial baseline LCT Register. The LCT Register has been published on ESB Networks website. The LCT Register will be updated over time with details of additional LCT devices, as and when LCT manufacturers provide the interim LCT Compliance Agency all necessary information to enable registration.	
Next steps	• ESB Networks will establish an LCT Database which will identify where known low carbon technologies (inverter-connected generation, electric vehicle chargers and heat pump devices have been connected to the LV electricity distribution network. Collaboration with 3rd parties on the development of data sharing agreements will be essential to enable population of the LCT Database. • Modifications will be made to the design of the LCT Register to enable it to integrate with the suite of online NC* application forms. • The Microgeneration application form (NC6) will be modified, to reference the LCT Register, drive efficiencies and reduce administration in that process. • A new process for customers to notify ESB Networks of EV Charger and Heat Pump installations will be introduced.	

Completed: Project Descriptions

9	Neara MV/LV Pilot	Timeline: Q3'24 - Q2'25
Scope	A digital twin is being developed and trialled on an area of LV/MV network (~400 km) located in the central region of the country. This trial has been progressed based on evidence that the platform provides value in relation to HV vegetation management. This pilot is focussed on several medium and low voltage use cases including: • Vegetation management • Asset location/GIS (Geographic Information System) correction • Data unification • Phase tracing • Hazard identification • Design of new or upgraded overhead lines. • Resilience assessment of network • Thermal rating/capacity assessment of existing overhead lines • Network design.	
Key partners	Neara	
Benefits	The use cases being examined could provide significant enhancements in terms of network reliability and resilience. The potential benefits being explored include: • Targeted vegetation management (ability to prioritise based on proximity to network, predict future growth). • Improved continuity performance – identify immediate risks to network from vegetation, conductor clashing, inadequate jumper clearance. • Data unification for assets – reconciliation of various independent data sets • Network/asset identification and GIS (Geographic Information System) correction. • Increased capacity using thermal rating analysis. • Resilience assessment of network – analyse overhead network for different storm conditions. • Manual processes completed digitally (e.g. phase tracing)	
Impacts	The impact of this technology is yet to be established. There are many potential benefits, and the completion of the trial will determine whether the proposed use cases are viable and would provide sufficient benefit to pursue this technology.	
Outputs	• Developed an engineering-grade 3D digital twin of 415 km of MV/LV network • Unified over 12 ESB Networks and third-party datasets (MyPole, GNET, LiDAR, imagery) • Created automated workflows for vegetation risk, clearance, and phase tracing • Produced network capacity and resilience reports validated against Storm Eowyn • Delivered a comprehensive final report and business case for network-wide scaling	
Next Steps	• Assess cost-benefit of expanding LiDAR capture nationwide • Define capture and data quality standards for large-scale automation • Explore options for scaling to 150,000+ km of network under ESB Networks' digital network strategy	

Completed: Project Descriptions

10	**Plexigrid - Advanced Modelling, planning and analysis for LV Electrification - (AMP-LV)**	**Timeline: Q2' 23 - Q2'25**
Scope	The Plexigrid pilot sought to implement an advanced grid management solution in ESB Networks to support better network planning, optimise capital investment and model the impact of Low Carbon Technology (LCT) on the LV Network. The project encompassed implementation and evaluation of Plexigrid's platform over two stages. The first stage, 'Grid Planning and Analytics', focused on evaluating current grid structures and data formats, ensuring effective data integration into the Plexigrid platform. This involved collaboration between Plexigrid and ESB Networks to align on data formats and exchange methods. Once the data was exchanged, Plexigrid engaged in data cleaning and structuring to create a model of the LV Network. This stage included developing a digital twin for grid analytics and capacity assessments, detecting, and addressing any data quality issues. The second stage, 'Advanced Analytics', built upon the first by incorporating simulated smart meter data and available secondary substation monitoring data. This stage leveraged historical data for improved insights into grid performance, loss reduction, and power quality enhancement.	
Key partners	Plexigrid	
Benefits	Data-Driven Network Planning: The pilot will provide insights for future network planning, particularly in accommodating new low carbon technologies and managing the growing demand for electric vehicle recharging and other emerging technologies. Enhanced Data Quality: The pilot will indicate the quality and reliability of LV grid data, providing ESB Networks with a more accurate and detailed understanding of the current state and future needs. Capital Expenditure Optimisation: By utilising analytics, ESB Networks can better identify where investments are most needed, potentially reducing unnecessary capital expenditures and focusing on areas that yield the most significant benefit.	
Impacts	The Plexigrid pilot enabled ESB Networks to understand how LV asset data can be used more intelligently to make data-driven decisions for grid reinforcements and new connections. By leveraging advanced analytics and simulation, the project will facilitate better understanding and management of the Networks' capacity and performance.	
Outputs	Phase 1 completed in 2024 which included uploading all LV GIS (Geographic Information System) asset data from two areas to the Plexigrid digital model, allowing simulation modelling to be tested. Phase 2 completed in Q2 2025, including incorporation of simulated smart meter event data and substation monitoring data to improve insights into grid performance.	
Next steps	Further evaluation of LV planning software solutions will continue and be informed with learnings from this pilot.	

Completed: Project Descriptions

11	PortaSCAN Pilot	Timeline: Q4'24 – Q3'25
Scope	The PortaSCAN device introduces a novel approach to assessing the condition of wooden utility poles, particularly in identifying internal decay. Traditional inspection methods often struggle to detect decay at elevated sections of poles. PortaSCAN addresses this challenge by enabling remote, non-destructive investigation using X-ray scanning while the network remains live. The device can be mounted on an insulated 'hot' stick, enabling inspectors to safely scan poles at greater heights. These X-ray scans are intended to provide insights into internal decay, density, and structural integrity. While the device shows promise, its accuracy and efficiency are to be validated through field trials. The implementation of PortaSCAN into ESB Networks' pole investigation routine could support the identification of potentially compromised poles, enhancing safety for staff, contractors, and the public. It may also assist in prioritising repair or replacement works by contributing to assessments of remaining pole strength.	
Key partners	Revo Group	
Benefits	• Enables non-invasive testing, preserving the structural integrity of wooden poles. • Minimises the risk of further damage caused by invasive tools like the Matson borer. • Allows for assessment of poles along the full height from a ground-based inspection (vertical scanning). • Enhances safety for Network Technicians by reducing the need to work at height. • Can help identify potentially hazardous wooden poles, enhancing safety reliability and resilience of the network for ESB Networks staff, contractors, and the public.	
Impacts	• Aligns with ESB Networks' innovation goals by integrating advanced technology into maintenance practices. • Could position ESB Networks as one of the first utilities in the EU to implement such a technology.	
Outputs	The PortaSCAN device was trialled across multiple ESB Networks' locations including both rural and urban overhead network as well as training locations. The trial focused on assessing the device's ability to accurately detect and quantify decay in wooden poles, comparing results with existing methods such as the resistograph and Matson borer. While the device shows promise, particularly in vertical pole scanning, some further calibration is needed for the timber species found on the Irish network and the type of incipient decay present in some poles.	
Next steps	Next steps include evaluating the trial data, confirming software adjustments, developing a training and safety framework in line with Environmental Protection Agency and Radiation Protection Advisor requirements, and assessing the feasibility of integrating PortaSCAN into routine operations.	

Completed: Project Descriptions

12	Use of Artificial Intelligence (AI) to Detect Rooftop PV in Satellite Imagery	Timeline: Q1'25 – Q2'25
Scope	The Rooftop PV Satellite Identification Pilot was a proof-of-concept initiative led by ESB Networks' Innovation, Analytics, and Enterprise Services Data Science teams. Its primary aim was to assess the feasibility of using satellite imagery and machine learning to detect rooftop photovoltaic (PV) systems across urban and suburban areas in Dublin. Four test zones–Lucan, Sandymount, Clontarf, and Raheny–were selected due to the availability of high-resolution Bing Maps imagery. The pilot involved scanning approximately 23,000 buildings, extracting geolocation data from Geo-Directory, and automating image collection and tagging to train a model capable of distinguishing PV panels from similar features like windows, shadows, and car roofs.	
Key partners	ESB Networks Internal Project	
Benefits	The pilot demonstrated that rooftop PV systems can be reliably identified using AI and satellite data, at least in urban settings where highly granular satellite imagery is available. This approach offers a scalable and non-invasive method for mapping distributed solar generation, which is critical for grid planning, policy development, and customer engagement. The insights gained may support strategic decisions around microgeneration targets, network reinforcement, and integration of low-carbon technologies. Additionally, the pilot lays the groundwork for future national-level deployments, potentially enabling real-time visibility of PV assets and enhancing ESB Networks' ability to manage distributed energy resources.	
Impacts	The pilot identified approximately 1,500 solar PV installations across 23,000 scanned buildings, translating to an estimated 5 MW of solar capacity based on a conversion factor of 0.15 kW per square metre. These findings provide a clearer picture of existing PV penetration and its spatial distribution, which is essential for assessing grid impacts and planning upgrades. The project also highlighted key technical considerations for scaling, such as the need for high-granularity imagery, robust tagging protocols, and careful calibration of confidence thresholds to minimise false positives. These learnings inform future data engineering, privacy, and operational requirements for broader implementation.	
Outputs	The pilot produced several outputs: • A trained machine learning model capable of identifying rooftop PV systems from satellite imagery. • A dataset covering 23,000 buildings, with 1,500 confirmed PV installations. • A Power BI dashboard visualising confidence scores, estimated PV area, and geographic distribution by Eircode. • CSV exports of the detection results for further analysis and stakeholder engagement. • Documentation outlining solution architecture, tagging methodology, and lessons learned for future scaling.	
Next steps	No further work is planned on this project. Learnings have been documented and may form part of future pilots where appropriate.	

Completed: Project Descriptions

13	Sustainable Backup Power Solutions	Timeline: Q2'23 - Q2'25
Scope	This project is seeking sustainable solutions to replace diesel generation used by ESB Networks for temporary and emergency backup scenarios. Diesel generation has been used over the last fifty years to provide temporary generation during substation maintenance, upgrade works and for continuity purposes during certain network outages. In addition, diesel generation is installed at over fifty ESB Networks depots to provide backup power in the event of localised network outages.	
Key partners	Consultancy and technology providers offering expertise in providing sustainable technology solutions.	
Benefits	Supports the decarbonisation of ESB Networks' diesel generator fleet, directly contributing to the organisation's Net Zero 2040 objectives.	
Impacts	Implementation will require process, infrastructure, and operational changes to support integration of new sustainable technologies.	
Outputs	• Comprehensive report evaluating technologies for backup and emergency generation was produced. • New specifications and operating procedures will be developed for the suite of applicable use cases. • Piloted a mobile Battery Energy Storage System (BESS) at the NTC, Portlaoise in Q1 2025 demonstrating capability. • A second trial with an alternative vendor was conducted in Q3 2025 to compare system performance and operational suitability.	
Next steps	Findings from both trials will inform the development of future specifications and rollout strategies.	

Completed: Project Descriptions

14	VisNet Design Pilot	Timeline: Q2'25 - Q4'2025
Scope	The Connect Europe initiative is a four-week structured pilot program led by EA Technology and powered by the VisNet Connect platform. Its primary aim is to bring together some European Distribution System Operators (DSOs) to collaboratively explore and address the challenges of accelerating low-voltage (LV) grid connections. The project is about mutual learning, testing new approaches, and sharing insights on digital tools and process improvements. All participants use a hosted demo environment, with no obligation to adopt the platform ensuring a focus on exploration and knowledge exchange.	
Key partners	Connect Europe is led by EA Technology, with support from DSOs such as Alliander, HEDNO, and ESB Networks.	
Benefits	Participants in Connect Europe gain the opportunity to benchmark their processes against other DSOs and explore innovative use cases. By engaging in this pilot ESB Networks can test concepts, provide feedback, and influence future roadmaps for digital grid connection tools.	
Impacts	The project addresses the urgent need to modernise ESB Networks' LV grid connection processes, which are under increasing pressure due to mass electrification and rising connection volumes. By participating in the Connect Europe project, ESB Networks aims to explore solutions to reduce wasted effort and improve time-to-connect metrics.	
Outputs	The project will produce a consolidated summary of findings, to be presented at Enlit Europe 2025.	
Next steps	No further work is planned on this project. Learnings have been documented and may form part of future pilots where appropriate.	

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