ESB NETWORKS

Price Review 6 Business Plan

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Managing Director's Foreword

Ireland's electricity network is a critical component of our national infrastructure which underpins economic growth, sustains our modern economy and supports key policy objectives relating to housing, industrial growth and climate change. The investments we make in the electricity network directly affect people's lives now and in the future. They impact on our national competitiveness, our ability to attract foreign direct investment, the pace of new housing development, and our legally binding target to reach net zero no later than 2050.

Every five years, ESB Networks submits a business plan to the Commission for the Regulation of Utilities (CRU), outlining our planned investments in the network over the next five years as part of a regulated Price Review (PR) process. This process safeguards customers by regulating how much money ESB Networks can recover through electricity bills and ensuring that the benefits for customers are delivered safely, sustainably, and efficiently.

Our business plan for Price Review 6 (PR6) covers the period 2026 to 2030. It addresses the strategic objectives and outcomes identified by the CRU in their PR6 Strategy Paper as well as our own long term vision for the network, as set out in our Networks for Net Zero Strategy.

PR6 will build on and accelerate the significant progress achieved across the electricity sector over the past five years. Since 2021, ESB Networks has connected over 1.4 GW of utility scale renewable generation, 120,000 Microgen solar installations, and over 135,000 homes, farms, and businesses to the network. We have installed more than 1.85 million smart meters, invested in digital, data, and telecoms systems, and set up the National Networks Local Connections programme to unlock the benefits of a more flexible distribution system for our customers. During PR5, we have also made a crucial contribution to Ireland's energy security by connecting 853 MW of thermal generation and 608 MW of battery energy storage to the transmission and distribution networks, with further projects to be connected before the end of 2025.

We have also invested significantly in our existing network asset base, strategically maintaining and replacing network assets to ensure that they remain reliable and resilient to the challenges that lie ahead.

We achieved these milestones against a backdrop of geopolitical instability, population growth, and growing concern about climate change. These factors have fundamentally altered the energy landscape, resulting in accelerated housing, infrastructure, and climate targets and placing significant new demands on the electricity network.

In this context, our PR6 investment programme will be bigger in scale and ambition, reflecting the strategic importance of the electricity network in enabling social, economic and environmental transformation over the coming decades. We are seeking to address the immediate and future needs of customers by aligning our plan with relevant policy objectives and targets, including those contained in the draft National Planning Framework, Housing for All, the National Development Plan 2021-2030 and the Climate Action Plan.

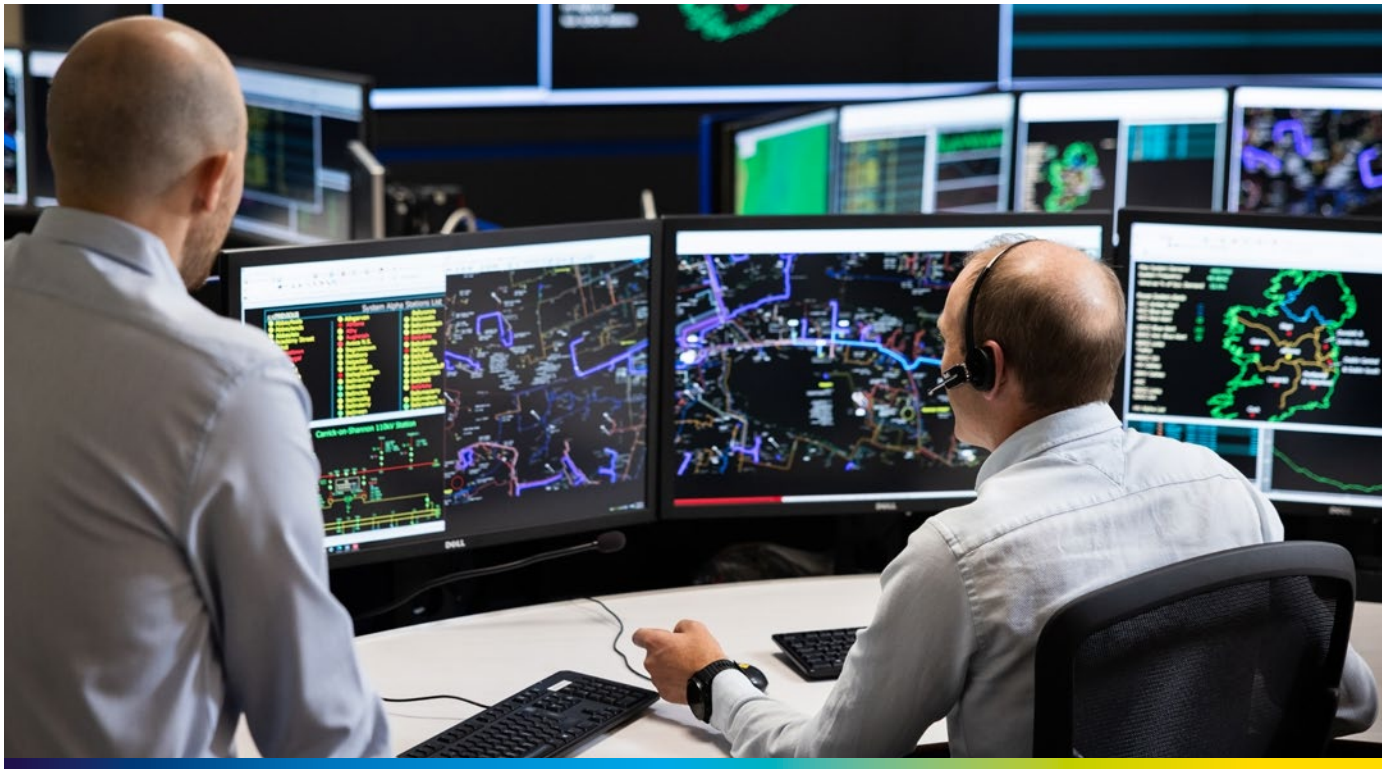
While our plan for PR6 is significant in its own right, it is just one part of a strategic roadmap that builds on PR5 and puts in place the foundations for further investment beyond 2030 on Ireland's path to Net Zero. Substantial and sustained investment will be needed to achieve this ambition.

This will require whole-of-system support, recognising the interconnected nature of the energy landscape and the need for coordinated action across all sectors. We have worked very closely with EirGrid, the transmission system operator (TSO), and with our customers and stakeholders to put together this plan.

We have outlined our approach to scaling our investment in a way that optimises the pace and scale of delivery and protects customers. The plan reflects the realities of the world in which we live today, and the inherent uncertainty and risks surrounding the pathway to Net Zero. To address this uncertainty, we are proposing an ambitious but balanced approach which combines investment in physical network assets with smart, non-wires solutions and an agile investment approach. This will ensure that the benefits of a resilient, sustainable, and future proofed network are realised without placing undue burden on our customers.

As we chart a course for Ireland's pathway to a sustainable, vibrant, Net Zero economy, our approach is firmly grounded in the needs and expectations of our customers and the communities we serve. Our proposals are guided by their insight and feedback, and we thank the many individuals and groups who have taken the time to engage with us in the preparation of this Plan.

We look forward to working with the CRU, our customers, and all stakeholders to deliver our PR6 business plan, so that together we can achieve the transformation needed to ensure a sustainable, low carbon future for Ireland.

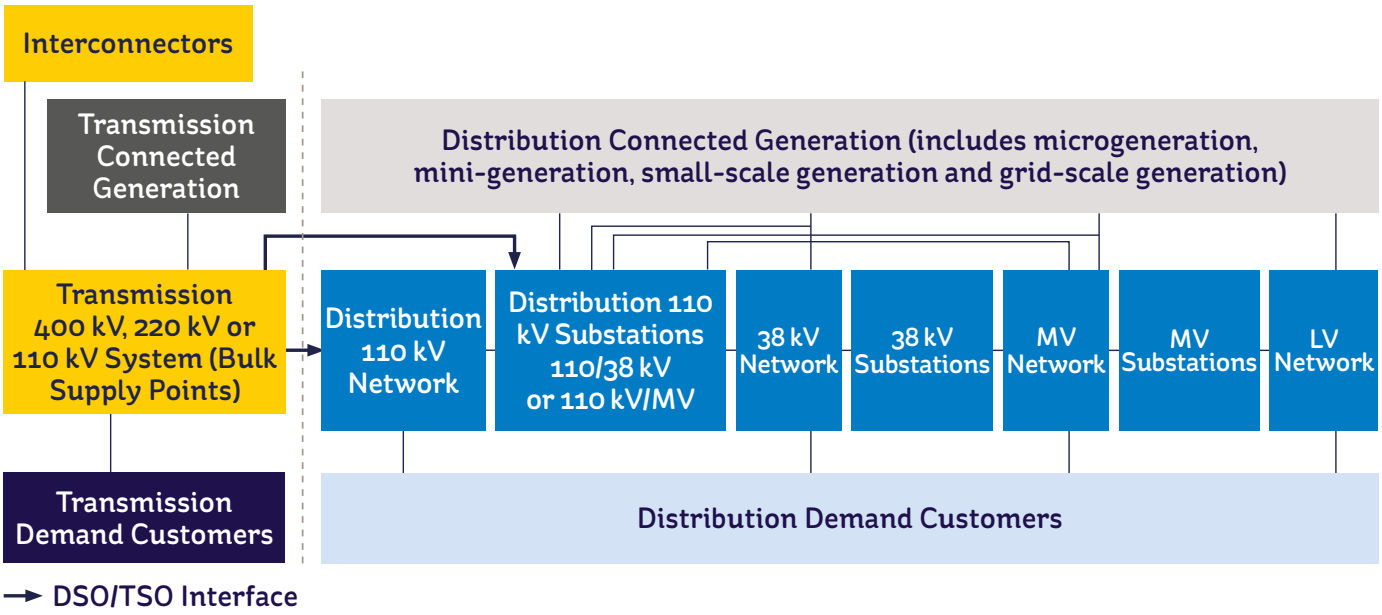


Executive Summary

ESB Networks' role and the Price Review process

ESB Networks is the electricity distribution system operator (DSO), distribution asset owner (DAO), and onshore transmission asset owner (TAO) in the Republic of Ireland. We work to meet the needs of all electricity customers in Ireland, regardless of supplier, connecting them to Ireland's clean electric future. As TAO, ESB Networks is responsible for building and maintaining the high voltage transmission system in line with requirements set out by EirGrid, the transmission system operator (TSO). As DAO and DSO, we carry out all functions relating to the electricity distribution system, including asset management, planning, construction, maintenance, and operation of the high, medium, and low voltage distribution network. Figure 1 below illustrates the structure of the electricity network and the interface between the transmission and distribution systems.

Figure 1: Structure of the electricity transmission and distribution systems



ESB Networks is licenced by the Commission for the Regulation of Utilities (CRU), which oversees our investment in the electricity network through a five-yearly Price Review process to ensure that it delivers value for customers. This business plan sets out our investment proposals to the CRU for Price Review 6 (PR6), covering the period 2026 to 2030 and building on the progress that we have made in previous Price Review periods.

Building on developments during PR5*

Significant geopolitical, demographic and social changes have occurred during the current Price Review period which have accelerated climate action, disrupted supply chains, driven up electricity prices, affected the availability and cost of capital, increased demand for network capacity and added to delivery risk.

Despite this volatility, the electricity sector stepped forward during PR5 to support customers and respond to a rapidly changing energy landscape, with ESB Networks playing a central enabling role. We are on track to deliver our largest ever capital investment programme (€5.0bn), with investments materially in line with what we had planned. Capital investment at the end of PR5 will amount to 97% of our projected programme, while operational expenditure is forecast at 106% of what was anticipated.

Over the course of PR5, we have increased total annual capital expenditure from €0.8bn in 2021 to over €1.1bn projected for 2024 (both in 2024 money) and have undertaken significant work to transform our delivery capability in anticipation of a much larger work programme in PR6. We have also made the network smarter and more flexible to meet the increasingly complex demands associated with decarbonisation and electrification, and to minimise the need for physical network reinforcements.

ESB Networks engaged Frontier Economics to conduct a comparative study assessing ESB Networks' efficiency compared to peer companies. This study has concluded that ESB Networks' cost performance was efficient across the PR5 period. Frontier found that our costs are, on average, 6.7% more efficient than the mean efficient level of GB DNOs. Their sensitivity scenario supports this, consistently showing that ESB Networks' total expenditure (totex) is at or below the mean efficiency level across 2021 to 2024.

To ensure that our capital investment programme in PR6 continues to optimise outcomes and benefits for customers, we used a standardised asset health and condition-based approach to target assets that are most at risk of failure. This approach is CNAIM (common network asset indices methodology) and is aligned with and approved by Ofgem in the UK. This allows us to objectively assess the health of assets and their risk of failure now and in the future and put forward investment proposals prioritised based on asset risk. We also completed cost-benefit analyses on the network investment programmes.

Our PR6 plan builds on developments during PR5 and sets out how we propose to efficiently develop and scale our investment programme to meet accelerated climate targets and support the needs of a much larger population over the next Price Review period.

**Unless otherwise stated, all monies outlined in this document are quoted in real 2024 terms*

PR6 Outlook

Ireland's electricity network is a critical component of our national infrastructure which underpins economic growth, sustains our modern economy, and supports the delivery of key policy objectives relating to housing, economic growth, and climate change. Substantial and ongoing investment is needed in the electricity network between now and 2040 to enable the delivery of targets contained in the National Development Plan, the draft National Planning Framework, Housing for All, the Climate Action Plan, and other key policies and frameworks. Based on projections in the draft National Planning Framework, the Irish population is forecast to grow by around 1 million people by 2040, requiring an additional 50,000 homes to be built each year throughout PR6.

An initial ramp-up and then progressive scaling of investment will also be needed between 2026 and 2040 to connect renewables, support the electrification of heating, transport, and industry, and maintain a secure, reliable, and resilient electricity network to meet the needs of customers.

The electricity network must be capable of meeting both peak demand and larger flows of electricity. We anticipate an increase in connection applications of all sizes, as well as higher levels of network utilisation by existing customers. This will require investment in additional network capacity at all voltage levels (high, medium and low voltage), as well as measures to increase the reliability and resilience of the existing network.

Considerable ongoing investment is needed to maintain the existing electricity network. Without ongoing investment, we will experience more asset failures which will result in an increased level of reactive asset replacements and unplanned customer interruptions. This will be compounded by risks associated with climate change, including faster vegetation growth, the emergence of invasive species (including woodpeckers), and more extreme weather events such as flooding and high winds. As usage of the network increases and people's dependence on electricity grows, more investment will be needed in asset replacement and maintenance. Measures to improve continuity of supply will also be required, including automated self-healing network technologies and more extensive vegetation management programmes.

By 2030, millions of devices including heat pumps, electric vehicles, battery storage, renewables, and smart meters will be connected to the electricity distribution network in line with the Government's Climate Action Plan (CAP24). The network must be capable of accommodating these devices and ready to handle much more complex flows of electricity across the system. This will require smarter and more flexible network operations, as well as close co-operation with the transmission system operator (EirGrid). Flexibility will help to overcome network constraints, capitalise on the availability of renewables, and minimise the need for new network capacity in the short term by shaving peak demand.

The National Energy Demand Strategy (NEDS) aims to achieve 20% to 30% flexibility in energy demand by 2030. Demand side management allows active energy customers to respond to signals and adjust their energy use, storage and local generation dynamically. The NEDS requires ESB Networks to enable circa 11% of this flexibility. Encouraging consumers to flex their electricity consumption in response to the needs of the network will require new flexibility products and markets, as well as sophisticated demand response programmes and technologies that can detect and react to local changes in usage. Advanced monitoring and control systems, digital systems and data management, and enhanced cyber security will be needed to handle huge volumes of digital data from numerous sources, including sensors and smart devices, to ensure reliable and efficient network operation.

As we undertake these investments, it is important to recognise that we are doing so in parallel with many other countries across the world. This will pose challenges in terms of resourcing, supply chain access, and access to capital. Securing funding certainty, building on the progress during PR5, and scaling up to deliver substantial and sustained levels of investment over time are essential in mitigating these risks and ensuring timely delivery of projects.

Putting customers at the heart of business planning and decision making

In developing our business plan for PR6, we have engaged extensively with customers and stakeholders through bilateral meetings, presentations, independent market research, and our PR6 Stakeholder Consultation Paper to understand their evolving needs and expectations. Through this process, we have gained insights into the priorities of our customers and stakeholders, which are reflected throughout our business plan.

Large customers and stakeholders have highlighted their dependence on the availability of network capacity to connect houses, support electrification, and deliver renewable projects. They want assurance that the capacity they need can be delivered efficiently, and at an appropriate pace and scale. They emphasise the need for rapid infrastructure delivery and support anticipatory investment.

Our domestic customers have told us that having **access to reliable electricity supply, renewable energy and tools to better manage their costs** are important to them. However, while approximately 70% have indicated that they would pay some additional weekly amount for those benefits, around 30% are opposed to taking on additional costs. Business customers are also resistant to taking on more costs, with SMEs in particular indicating that they cannot absorb higher electricity costs right now, as they are already struggling with rising expenses across the board.

We have carefully considered these insights and perspectives in developing our investment proposals and have sought to strike an appropriate balance in our plan that addresses the needs of all of our stakeholders and customers.

Strategic Commitments

This plan responds to the CRU's PR6 Strategy Paper which sets out clear outcomes for the networks companies to achieve during the Price Review period, including **decarbonised electricity, secure and resilient networks and supply,** and **empowered customers,** along with the following objectives to ensure delivery of these three outcomes:

- Deliver infrastructure at pace
- Enhance system efficiency
- Ensure compliance with security of supply standards
- Drive smarter, flexible, more digitally enabled networks
- Place customers at the heart of business planning and decision making

ESB Networks is committed to supporting these outcomes and objectives, and to deliver a Net Zero-ready energy network by 2040 in line with our Networks for Net Zero Strategy. A whole-of-system response is needed to support this, recognising the interconnected nature of the energy landscape and the need for coordinated action across the transmission and distribution networks, and across different sectors of the economy.

Key elements of our PR6 Plan

Our business plan is based on an ambitious investment scenario which reflects the strategic importance of electricity to Irish society and is designed to meet critical national policy objectives relating to housing, economic growth, and climate action. During PR6, we are proposing a no-regrets investment framework that will deliver greater value to customers by:

- Adopting a phased and targeted approach to increase network capacity, using data analytics to strategically focus investments on where the need for additional capacity is greatest and where our investment will deliver maximum impact.
- Deploying smart, flexible, and digitally enabled solutions to reduce peak demand and therefore minimise the amount of network reinforcements needed to add capacity. This will require investment in new operating systems, digital and data solutions, telecoms, and cyber security to enable active system management and customer participation.
- Safely increasing network utilisation (i.e. absorbing demand growth by increasing loading on existing assets) using an evidence-based approach to monitor asset condition and manage risk.
- Adopting an agile investment framework to manage uncertainty.

The following section outlines how the key elements of our PR6 investment programme will support the strategic outcomes and objectives identified by CRU in their PR6 Strategy Paper.

Reliable and resilient infrastructure

Increasing networks capacity:
The amount of electricity that the electricity distribution network can safely handle is determined by the capacity of network assets such as transformers, cables and conductors, and protection devices. If assets such as these become overloaded, it can lead to equipment damage, poor power quality, power outages, accelerated asset degradation, and safety risks. The Irish distribution network cannot, without additional investment in capacity, accommodate new housing schemes, industrial development, population growth, increasing volumes of renewables, and electricity demand growth from electrification. A number of our assets – particularly some of our high voltage (110 kV and 38 kV) stations – are overloaded due to rapid demand growth over the past decade. Current forecasted capacity requirements for 2030, based on national policy and growth targets, exceed current capacity in specific areas across the network. We are therefore proposing major investments in network infrastructure at all voltage levels (high, medium and low) including overhead lines, cables, transformers, and substations, with a particular focus on 110 kV stations to ensure adequate capacity to accommodate growing electricity demand. This investment is targeted where it is needed most today, while also creating capacity for future growth. We will also continue the conversion of 10 kV medium voltage (MV) network to 20 kV to reduce losses and provide additional capacity on the MV network.

Non-networks solutions:
Growing demand for electrical connections is driving the need for network capacity and reinforcements which take considerable time to complete. However, if customers are prepared to adapt their electricity usage patterns in response to an incentive (e.g. a flexibility payment), it may be possible to shift load away from peak times to delay or, in some cases, eliminate the need for traditional network reinforcements. To optimise our infrastructure investment decisions, ESB Networks uses the common evaluation methodology (CEM) tool to compare the value of flexibility services with traditional network reinforcements. This cost-benefit analysis tool was developed as part of the Energy Networks Association (ENA) Open Networks Project and is used by DNOs in Great Britain. Additionally, and in recognition of the capacity challenge facing the network, flexibility can also be used to provide capacity where traditional network reinforcement is particularly challenging or will not be completed in time to meeting growing demand needs. Several locations have been identified where demand growth and peak loading of the substation could be facilitated by a flexibility solution, such as battery storage.

A risk-based asset maintenance and replacement programme:
The reliability of the network and its ability to withstand future challenges is critical. Significant investment throughout PR6 will go towards maintaining the existing network to prevent the risk of equipment failure and ensure that customers have access to secure, continuous supplies of electricity. As customers adopt new low-carbon technologies, customer confidence in the network will become increasingly important. Without intervention, 57% of HV stations will be over 60 years old in 2040. In the context of this aging asset base, ESB Networks is proposing a range of risk-based maintenance and replacement programmes to minimise the likelihood of equipment failure and improve the network performance.

Using asset health models to objectively monitor condition, we plan to prioritise areas of greatest need based on known risk. In line with our 'Build Once for 2040' anticipatory investment approach, we propose to avoid piecemeal solutions and deliver future proofed maintenance and replacement programmes that will increase network resilience as we move towards 2050.

Major asset replacement programmes will focus on high voltage stations, wood poles, and overhead lines and conductors. In parallel with this, we plan to implement more extensive vegetation management and install automation devices on the medium voltage (MV) network to reduce the number and duration of unplanned customer outages.

Transmission Delivery:
In our role as TAO, we deliver all transmission infrastructure projects that are brought forward by EirGrid as TSO. Once these projects achieve consents, they are transferred to ESB Networks for delivery, where they go through four key steps: detailed design, procurement, construction, and commissioning. Our plan ensures that the reasonable needs identified by the TSO in terms of securing electricity supplies, renewables integration, and supporting new demand are met in an efficient and timely manner.

EirGrid and ESB Networks have taken a collaborative and data-driven approach to developing a PR6 investment programme that meets ambitious climate and energy policy goals. We are preparing to deliver a significantly increased work programme on behalf of the TSO, including delivery of 231 projects and development/delivery of a further 138. EirGrid has identified investment needs across all transmission voltage levels and in different parts of the country with the greatest needs being in Dublin and the east of the country. We plan to build new transmission capacity and refurbish existing assets. The size and scale of the infrastructure required is significant. It includes 27 new DSO substations to provide capacity to the distribution system, six transmission substations (including three new bulk supply substations), 90km of new 400 kV underground cable, and replacement of 55km of 220 kV underground cable in Dublin. As the TAO, we will continue to maintain transmission assets according to plans set out by the TSO. During 2025, as the Price Review process progresses, we will continue to review and update the transmission and large distribution project delivery plans.

ESB Networks is fully committed to the efficient delivery of the entire transmission programme in PR6 and is already implementing a range of initiatives to enable delivery. We will continue to coordinate closely with the TSO on key enabling structures including the joint outage transformation programme and development of an integrated transmission programme.

As DSO, ESB Networks is responsible for ensuring safe, reliable supplies of electricity to all customers connected to the distribution network. The transmission system supplies electricity to the distribution network via bulk supply points (BSPs), which are the interface points between the transmission and distribution system. We have collaborated with EirGrid, the TSO, to ensure that the BSPs required to meet the demands of distribution customers are included in their plans.

Decarbonised Electricity

Utility scale distributed generation:
We anticipate that approximately 4.4 GW of utility-scale renewable projects will connect to the distribution network during PR6, 1.6 GW of which was contracted in PR5. This will require capacity reinforcements at 25 substations, as well as the construction of five renewable hubs. To accelerate renewable connections, we plan to process two ECP (enduring connections policy) batches per year, and will work with the CRU, EirGrid, and wider stakeholders to further streamline connections and implement innovative solutions to help address capacity constraints.

Mini, Micro, and Small Scale Generation:
We anticipate applications for Mini, Micro, and Small Scale Generation will increase by about 30% annually due to technological improvements, enhanced government supports, and growing capacity and expertise across the industry. To support this growth and adapt to changing patterns of network usage, we plan to regularly review developments and respond as appropriate to ensure that the needs of customers and the network are being met. As part of our investment, we are planning to develop systems to capture and track data to enable accurate reporting against the Climate Action Plan target of over 2.5 GW of non-utility solar by 2030.

Preparing for the network of the future:
As the distribution network becomes more complex with the integration of renewable energy, electric vehicles, heat pumps, storage, and other distributed energy resources, ESB Networks will take on a more active role in managing energy flows to meet the requirements set out in the Clean Energy for All Europeans Package, the Climate Action Plan, and the National Energy Demand Strategy.

During PR6, we will continue to prepare for flexible network operations and flexibility markets by investing in telecoms infrastructure, new operating management systems, and data management and digitalisation. This is necessary to operate the system efficiently, and to manage flows of data and electricity between millions of distributed energy resources (i.e. wind farms, solar panels, heat pumps, EVs, smart meters, etc).

Through our newly established Distribution Markets and System Operations team, we propose to focus on the following three strands of activity:

- ***Smart+ and retail transformation:*** Our PR6 investments will build on the smart meter rollout and the smart metering operations centre (SMOC) and data access office to maximise smart meter capabilities and data use cases (in line with the Smart Meter Data Access Code).
- ***Operations transformation:*** We plan to undertake key operations systems upgrades, including enhanced monitoring and control, integration of new technologies, and improved security measures to support active network management.
- ***Flexibility market transformation:*** We plan to refine and develop our product offering (underpinned by extensive customer engagement) to build flexibility market liquidity. This growing market liquidity will be managed through investments in new front end and back end platforms/technologies.

Empowering Customers

Customer Experience:
The next decade will bring significant changes in how customers use electricity and interact with the electricity network, driven by the adoption of low-carbon technologies (LCTs) like heat pumps, electric vehicles, and smart meters.

We are planning further measures to enhance customer experience by digitising core customer journeys, launching flexibility products, and providing insights to customers on their electricity use, based on smart meter data. A key investment will be in our One Customer View (CRM) platform, which will give customers more choices on how and when they interact with us. We are seeking to continue to embed a customer-first culture, informed by an advanced 'voice of the customer' programme, and will provide enhanced agent support through the national customer contact centre (NCCC) in Wilton, Cork, which handles approximately 1.4 million customer calls, emails, and social media queries per year. We also propose to engage with vulnerable customers and customers at risk of being excluded from the energy transition to understand their unique needs, and ensure our services are inclusive and accessible.

We plan to adopt a customer centricity maturity framework as a tool to bring about higher levels of customer satisfaction and experience, ultimately driving a more customer-centric approach across ESB Networks.

Connecting new customers:
We anticipate a significant increase in new connection applications during PR6, driven by accelerating housing, growth, and electrification targets. The number of new customer connection applications rose from circa 30,000 per year in 2021 to circa 41,000 in 2023, and we expect this to increase to over 50,000 during PR6, driven by revised housing targets that are likely to be adopted over the life of the plan. In addition to connecting new homes, farms, and businesses, there is a target to complete up to 500,000 home retrofits by 2030 under the Climate Action Plan (CAP24). This will require ESB Networks to temporarily detach (and subsequently reattach) electrical cables to allow external insulation to be fitted. Connection applications from large customers are increasing across a number of sectors, and we await the outcome of a decision on extra-large energy users, including data centres, which has the potential to significantly impact on future network capacity requirements.

Our approach to delivery

Accelerating Delivery:
PR6 looks set to be the largest investment programme in ESB Networks' history and will require more than 500 major capital projects to be delivered. This scale of investment is necessary to meet demands on the electricity network arising from population growth, economic development and climate action. Scaling up to meet such an ambitious programme of investment would be challenging in the normal course of events, but the challenges are compounded by global competition for resources, supply chain disruptions, geopolitical instability, network (and outage) constraints, and aging infrastructure.

During PR6, we will continue to implement, refine, and expand measures to increase workforce resilience, enter into competitively procured framework contracts for advance procurement of materials, and implement new ways of working.

We plan to continue to adopt modern methods of construction including modularisation, shifting work from field to factory to accelerate delivery and reduce risk. We are also building a more resilient supply chain by diversifying our supplier base, standardising designs, undertaking advance ordering, and increasing our storage facilities to avoid unnecessary delays.

Anticipatory Investment:
In the context of accelerated housing, economic growth, and climate targets, it will be necessary to scale and maintain a very significant level of investment in the network from now to 2040. The most efficient way to do this is adopt an anticipatory investment approach ('Build Once for 2040'), where possible. This involves designing projects now to meet the anticipated needs of customers in 2040, even if the associated electricity demand is not likely to materialise in the near term. This is in line with EU electricity market design reforms and the EU Action Plan on Grids, which promote anticipatory investment as a way of accelerating climate action. In our PR6 plan, the investment to deliver additional network capacity (refer to Section 6.2) is based on a targeted investment approach, based on known capacity constraints today, as well as expected regional demand growth. We propose to use a 'Build Once for 2040' approach only where it makes sense to do so, to ensure that we do not over-invest during PR6.

Foundational Capabilities

Accelerating digital and data:
ESB Networks depends on core IT systems to operate and manage the network and fulfil our licence obligations. Substantial ongoing investment is needed to maintain these systems and keep them up to date. This is essential for business continuity, cyber security, and productivity. During PR6, we plan to leverage these existing investments in core IT systems to accelerate our use of digital and data, to enhance customer experience, improve network efficiency, and drive productivity. We are on a path to becoming a fully digitised utility, which will also provide new opportunities to use data to improve decision making and transparency. Investments in IT and new operating systems will also support the development of a smarter, more flexible electricity network by providing the capability to manage data and power flows, integrate more renewables, and empower customers through new flexibility markets. These systems will provide the foundations to manage complex flows of data and energy around the network and enable a range of customer centric use cases that will increase efficiency, support decision making and streamline delivery.

Stepping forward on safety and environmental sustainability:
The UN defines sustainability as meeting the needs of the present without compromising the ability of the future. While most of our PR6 investment will be targeted towards the three UN Sustainable Development Goals (7,9, and 13) where we can make the most tangible and lasting difference, we intend to embed sustainability at the core of everything that we do during PR6. Our recently published 'Networks for Nature' biodiversity strategy sets out our commitment to a regenerative approach to biodiversity and communities. We propose to show leadership by continuing to electrify our yellow van fleet, upgrade buildings to meet our energy efficiency targets, and invest in initiatives that protect the safety of the public and people who work on the network. We are also planning to enhance support for vulnerable customers and customers at risk of being left behind by the energy transition through the development of enhanced services. Maintaining our own workforce diversity is critical to supporting our diverse customer base, and we propose to drive out further initiatives to build diversity, equality, inclusion and belonging across our organisation.

Workforce Strategy:
To ensure we have the appropriate skills to deliver our PR6 programme, we have developed a workforce resilience strategy focusing on the acquisition, retention, and development of talent throughout the entire employee life cycle, from recruitment to retirement. The aim is to cultivate a resilient, skilled, adaptable, and diverse workforce capable of meeting the challenges of a rapidly changing industry. Our plan is focused on inclusive growth, ensuring that all employees have the opportunity to develop and progress within the organisation.

Proposed investment and managing uncertainty

Table 1 below provides an overview of investment planned for PR6, which shows we are working to deliver a programme totalling €13.4 bn. Having analysed the uncertainties and inherent project development and delivery risks of such a large programme, we are proposing an initial baseline investment of €10.1 bn over the Price Review period. Our proposal is that initial capital investment allowances are set at the lower amount of €10.1bn, which will be converted to revenue to allow us to finance our activities for PR6. In the event that risks do not materialise or are mitigated, we will be aiming to deliver as close to the total programme of €13.4 bn as possible.

We are proposing the use of an agile investment framework mechanism, whereby proposed expenditure above the €10.1bn baseline would be subject to approval by the CRU during the Price Review period. This would enable a more dynamic assessment of the total investment during the 2026 to 2030 period. The alternative approach would be to include the full €13.4 bn up front, which would be charged to customers from the outset, which we believe would not reflect the delivery risks inherent in the programme.

A significant proportion of the investment in the baseline scenario will go towards increasing capacity on the network to accommodate renewable generation and increasing demand associated with housing, economic growth, and meeting the electrification targets in the Climate Action Plan.

Table 1: Overview of investment planned for PR6: Numbers subject to rounding

Description (€' bn)	PR5 Determination	PR6 (Baseline)	PR6 (Baseline + AIF)
Empowering Customers (incl. New Business)	0.8	1.3	1.3
Distribution Markets and System Operation (DMSO)	1.2	1.0	1.2
Network Reinforcement	0.6	2.2	2.6
Generator Connections	0.2	0.3	0.4
Reliable and Resilient Infrastructure (Asset Management)	0.6	1.0	1.2
Transmission	1.4	3.4	5.9
Foundational Capabilities	0.4	0.8	0.8
Total	**5.2**	**10.1**	**13.4**

Financing the Plan

ESB Networks is entering into an extensive investment programme, which is far from 'business as usual'. This programme of investment will last significantly beyond PR6 and, due to its scale and strategic importance, ESB Networks must adapt to materially heightened risk in the process. ESB Networks' ability to deliver the scale of investment outlined in this plan will depend on our financial strength.

The landscape of capital markets has dramatically shifted since PR5. In response to a variety of global shocks, the period of ultra loose macroeconomic policy has ended. Over the last few years, there has been a significant rise in interest rates and the cost of borrowing.

These challenges are arriving at a time when investors have many competing opportunities (projects, companies and geographies) into which they can deploy capital, as countries all over the world also seek rapid progress towards a decarbonised future. As a result, electricity networks around the world are facing intense global competition for capital from a multitude of projects aimed at supporting each country's own decarbonisation efforts.

To fund this ambitious programme, ESB Networks must maintain continuous access to capital at reasonable rates. Setting an appropriate WACC at 4.23% (aligned with the target credit rating set at least at BBB+/A-) is essential to ensuring access to capital. Misalignment in allowed returns could jeopardise ESB Networks' ability to raise the necessary funds to the detriment of consumers. This is supported by clear legal obligations relating to financing capability, previous regulatory decisions and by credit ratings of similar network companies.

The baseline investment proposal delivers a plan that is deemed financeable from a Price Review perspective. When considering the 5 years of the Price Review period, the difference between the total estimated nominal cash outgoings and the total projected revenues is circa €4.6 bn. Keeping the gearing at 55% of the Regulated Asset Base, in accordance with the regulatory model, means that circa €3.7 bn can be financed through increased borrowings. This leaves a remaining funding requirement of circa €1 bn, which would ordinarily be addressed through equity.

The financeability of the baseline + AIF scenario remains unresolved in our business plan submission and will require consideration through the PR6 process. In addition, the residual funding requirement of circa €1 bn in the baseline plan, referred to above, would be significantly bigger under the baseline + AIF scenario.

The funding of investment in the networks is ultimately a matter for ESB as owner of the assets. ESB Networks envisages that these residual funding requirements, under both scenarios, will require resolution between ESB and ESB's Ministerial Stockholders before the final determination for PR6 is settled.

Impact on customers' bills

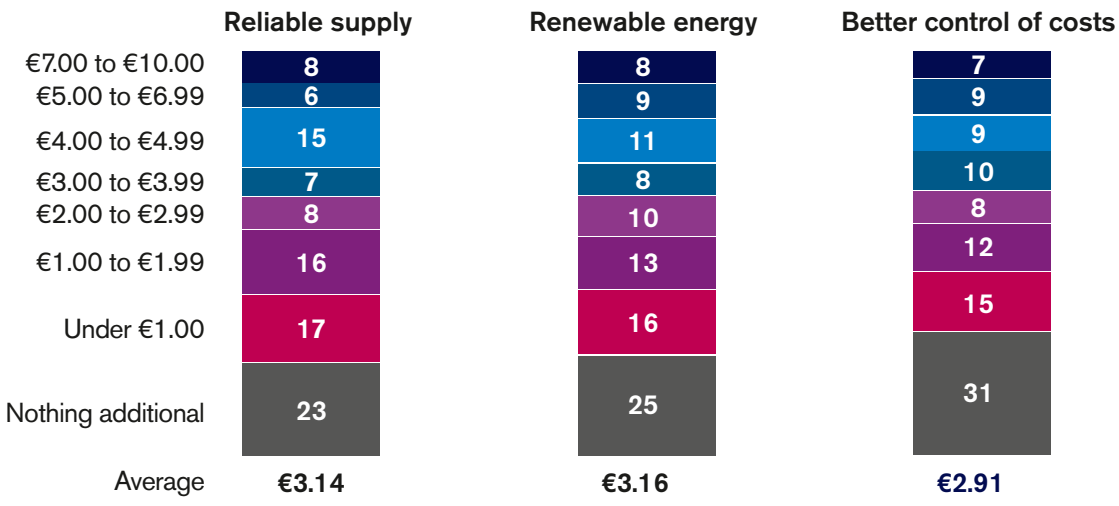
Ireland is going through a process of fundamentally recalibrating our energy system away from high carbon fossil fuels for heating and transport towards clean, sustainable electricity. This will result in significant societal benefits, including greater energy independence, air quality improvements, carbon reduction, and ultimately cost savings. However, substantial and sustained investment in the electricity network out to 2040 is needed to enable this transition.

We have listened carefully to what customers and stakeholders have told us about their needs and priorities, and their willingness to pay. We are acutely aware of the cost-of-living increases that customers have had to bear over the past few years and the impact that this has had on both domestic and business customers.

Figure 2 below illustrates the weekly amounts that domestic customers have indicated that they are willing to pay for reliable supply, access to renewable energy, and better control of their electricity costs.

Figure 2: Weekly amounts that domestic customers are willing to pay for reliable supply

A core group; one in four to 30% depending on the benefit assessed, is opposed to paying anything additional on a weekly basis to benefit from a more reliable network, access to renewable energy, or better control of costs



As noted above, 70% of customers have indicated that they would pay some additional weekly amount for those benefits, but around 30% have told us they are opposed to taking on any additional costs. Business customers are also resistant to taking on more costs, with SMEs in particular indicating that they cannot absorb higher electricity costs right now.

Given the scale of investment necessary to meet the needs of customers and stakeholders during PR6, it is important that we remain efficient and that we manage risks effectively to avoid placing undue costs on customers. It is for this reason that we are proposing the AIF outlined above, which allows for a very ambitious work programme during PR6 without committing customers to costs that may not materialise during PR6.

Under the regulatory model, investment in the electricity network is recovered through customer bills over the long term, which means that customers do not have to fund a peak in investment in the short term within a Price Review period. Notwithstanding this, our baseline investment scenario would result in an increase in distribution network charges on customers' bills, due to the overall scale of the investment programme.

The existing typical cost for a domestic customer for distribution charges to fund investment and operating costs for the electricity distribution network is circa €254 per year. This is a portion of a customer's total electricity bill, which is, on average, just over €1,900 including VAT per annum for a domestic customer . With an assumed distribution demand growth of circa 3% on average across PR6, there would be an average unit price increase of circa 33% for distribution charges across the period to 2030 under the proposed baseline investment scenario. This would bring the typical distribution network cost for domestic customers from €254 per year to €337 per year on average over the period. This represents an increase of circa €1.60 per customer per week over the period, prior to any inflation. Similar increases would be required for business customers connected to the distribution network.

This equates to approximately a 4.8% total increase in the annual overall electricity bill of a typical domestic customer across PR6 using today's estimated price of electricity. Any investment above our proposed baseline investment of €10.1bn (as we strive to deliver the full transmission and distribution programme) would further increase the impact on customers' bills.

We are forecasting that the additional circa 33% increase in distribution charges to customers during PR6 will cater for:

- Significant network reinforcements to provide capacity to connect houses, support economic growth, and advance electrification.
- Maintenance and replacement of existing network assets to ensure safe, reliable, and resilient electricity supplies for customers now and in the future.
- Implementation of automation technologies and improved vegetation management to reduce unplanned customer outages.
- Development of a smarter, more flexible network capable of safely and securely handling flows of electricity between millions of distributed devices (e.g. solar panels, EVs, heat pumps).
- New tools, products, and market structures to empower customers to take more control over their energy costs.

- Increased volumes of customer driven work, including new housing and business connections.
- Significant renewable generation connections, from domestic rooftop solar to large utility scale generation.

Ensuring efficiency

At the end of PR4, ESB Networks commissioned independent benchmarking of our relative costs compared to the costs incurred by the GB electricity distribution companies. That analysis confirmed that ESB Networks was efficient, relative to the average costs incurred by the GB distribution companies. As we transitioned into PR5, we substantially increased our scale of investment compared to PR4 (from €3.2bn in capital expenditure over PR4 to €5.0bn forecasted for PR5 – all 2024 money).

ESB Networks has commissioned a similar independent analysis to assess the efficiency of our costs during the PR5 period. This analysis has concluded that ESB Networks' PR5 costs are efficient, even with the step up in expenditure compared to PR4. Specifically, ESB Networks' total expenditure (excluding load-related capex) is on average 6.7% more efficient than the mean efficiency level of GB DNOs over the PR5 period.

For PR6, ESB Networks is seeking cost allowances that are materially above the base year costs due to several factors. Firstly, we plan to significantly scale up delivery across most existing work programmes and take on new activities. These include adding substantial MW of additional distribution capacity to manage increased total and peak demand and integrating more renewable energy – all significantly higher than in PR5. Additionally, there will be a greater number of new customer connections and an expanded transmission programme to support decarbonisation objectives. We are also establishing a new Distribution Markets and System Operation (DMSO) function.

Secondly, challenges in procuring external contract resources and security materials have escalated costs. These increases are the result of competitive procurement processes, which have ensured that the higher rates are market tested.

Nonetheless, we remain committed to maximising efficiencies by organising the business to deliver more quickly and cost effectively, leveraging cost savings from data and digitalisation initiatives, and utilising flexibility wherever possible.

Customer Benefits

Since our foundation, ESB Networks has always played a key role in Ireland's social and economic development. The investments we make during PR6 will address the immediate needs of customers and put in place the foundations for a clean electric future. We recognise our unique role as a catalyst for change and our responsibility to deliver core electricity infrastructure to meet the needs of Ireland's growing population and enable the transition to Net Zero by 2050. The key benefits of our plan are summarised below.

Reliable and resilient infrastructure

Our business plan provides for significant investment in network capacity reinforcements to enable the timely connection of renewable generators and accommodate growing demand for electricity from new housing developments, industrial growth, and the electrification of heat, transport and industry. This investment will reduce loading on network assets, reduce the risks associated with equipment failure, and provide targeted capacity in key high growth urban areas in line with growing customer demand.

The proposed capacity reinforcement works will provide capacity at all voltage levels, including large blocks of additional capacity headroom at new substations. This will enable us to speed up customer connections. The capacity added will include:

- 562 MW of firm transformer capacity at 110 kV in Dublin
- 1.1 GW of firm transformer capacity at 38 kV (nationwide)
- 1.5 GW of firm transformer capacity at medium voltage (nationwide)

As well as enabling more customer connections, the additional capacity on the system will allow more outages to take place. This will enable maintenance and asset replacement works which are necessary to improve the **safety, reliability, and resilience of the network**. This investment will also facilitate **electrification** by providing increased capacity at medium voltage level, and will ensure that voltage quality is maintained, ensuring that delivered power meets the required power quality standards. Upgrades to the MV network will increase efficiency by reducing network losses and will deliver environmental benefits.

In addition to capacity reinforcements, our plan includes significant investment in **network reliability and resilience**, which our customers and stakeholders have indicated is a priority. This investment (which includes targeted maintenance and asset replacement, the deployment of automation devices on the MV network, and increased vegetation management) will ensure that the electricity network will remain reliable and resilient, even in the face of increased demand and disruptive climate events.

This will contribute to a reduction in the frequency and duration of unplanned outages, so that by 2030, we plan to decrease customer minutes lost (CML) to 75 minutes per year and customer interruptions (CI) to 90 per year. This would be a 25% reduction on the average overall fault duration currently experienced by customers. Further detail on the specific programmes of work proposed to achieve this is included in Chapter 6. These investments will deliver a safer, more dependable electricity system.

Decarbonised energy

The investments we make during PR6 will directly support decarbonisation and assist in reducing Ireland's dependence on imported fossil fuels. Our investment will support the connection of 4.4 GW of utility-scale renewable generation projects to the distribution network, as well as 30% annual growth in Mini-Generation, Microgeneration, and Small-Scale Generation to the LV network. We will also connect customers to the transmission network, as directed by EirGrid, to support the CAP24 target of 22 GW of onshore renewable generation connected by 2030.

As well as delivering additional capacity to enable renewable connections, we plan to support customers by further streamlining processes for connecting renewable generation and moving to process two batches of enduring policy connection (EPC) applications per year to accelerate renewable connections.

The electrification of heat, transport, and industry is critical for the decarbonisation of society. Under this plan, we plan to continue working closely with EV charge point operators, housing developers, and large commercial customers to develop standards, solutions, and innovations to accelerate electrification and enable widespread LCT uptake.

Empowered customers

Our PR6 plan builds on developments in PR5, including the rollout of smart meters, the launch of the networks online account, and investments in digital and data to empower customers. By investing in new operating systems, cybersecurity, data and digitalisation, and customer engagement platforms, we will make it easier for customers to safely and securely interact with us in ways that suit them, whether that is through a digital channel or a human agent. All core customer journeys will be optimised by the end of PR6 to ensure more convenient, seamless, and simple interactions with ESB Networks. Our investments in **digital and data** will enable us to develop new tools, products, and insights to improve communications with customers and integrate processes to enhance customer experience. For example, we are targeting 80% proactive digital notifications for outages by the end of PR6 (up from 65% in PR5) to free up call centre agent time for more complex queries. We are also seeking to significantly reduce standard quotation timelines by streamlining processes. Electrification customers will benefit from improved access to data to inform decision making.

The impact of our investments in empowering customers will be measured by our customer satisfaction (CSAT) score. We are seeking to increase this to 83% by 2030, acknowledging that this will be challenging given the scale of our investment programme and the impact that this will have on customers.

Through investments in self-serve and digital tools, we will free up human agent time in the national customer contact centre (NCCC) to deal with more complex and time consuming queries, with a view to maintaining a 90% customer satisfaction score for the NCCC. By 2030, 80% of customers affected by an outage will get updates via the digital notifications app.

Smart flexible, digitally enabled network

Investments in IT, digital and data, cybersecurity, and the Distribution Markets and System Operation (DMSO) function will ensure that we are ready to efficiently operate the network of the future and empower customers to benefit fully from their role in providing flexibility to the system. By 2030, there will be millions of interconnected devices connected to the network (including heat pumps, EVs, batteries, and solar panels). The actions we take now will ensure that ESB Networks is prepared to take an active role in managing the flows of electricity between devices in a way that overcomes network constraints and capitalises on the availability of renewables. These investments will also enable customers to fully leverage the capability of their smart meters to take advantage of flexibility markets and make better decisions about their energy use.

Our Smart+ and meter transformation investments will ensure that customers can benefit from up to date smart meter technology, advanced insights about their energy use to help them make informed decisions and accurate payments for Microgeneration exports. It will also improve choice for customers by creating routes to market for new suppliers, increasing competition and enabling energy sharing. Investments in operational transformation will ensure that we can continue to provide a safe, secure, and reliable distribution system operation for customers.

Flexibility market transformation will create new revenue streams for customers and enable them to play their part in tackling climate change by engaging in flexibility initiatives and demand reduction events.

Environment, safety and sustainability

Our proposed approach to environment, safety, and sustainability will ensure that our operations can support and enable Ireland's transition to a clean electric future while also preserving our natural habitats and species and protecting the health and wellbeing of our people, contractors, and the communities we serve. Our 'Networks for Nature' biodiversity strategy 2024-2029, launched this year, underscores our commitment to integrating biodiversity considerations into all aspects of our business, and our commitment to a regenerative approach to nature and communities. Through the electrification of our yellow van fleet and energy efficiency upgrades to our buildings, we can demonstrate the benefits of electrification and deliver long term value for our customers and stakeholders.

Safety will remain front and centre of our work during PR6. As we scale up to deliver a much larger capital investment programme, we are proposing to undertake significant measures to protect the health, wellbeing, and safety of the public and the communities we serve. Our risk-based approach to asset maintenance and replacement will reduce risks associated with aging assets, while our public safety campaigns will help to ensure a high level of awareness around the risks and dangers associated with the electricity network.

Our commitment to achieving an incident- and accident-free workplace is reflected in our implementation of a 'just culture' framework, which promotes an atmosphere of trust and encourages open and honest reporting of incidents and errors. By implementing a 'just culture', ESB Networks aims to foster a positive safety culture, enhance employee engagement, and improve overall safety performance.

Table 2: Linking key investments to key customer benefits

Investment Area	Safe, Reliable and Resilient Network	Decarbonised Energy	Empowered Customers	Smart, Flexible Digitally enabled Network	Environmental, Safety and Sustainability
Empowering Customers (incl. New Business)	Yes	Yes	Yes		
Distribution Markets and System Operation		Yes	Yes	Yes	
Network Capacity Reinforcements	Yes	Yes	Yes	Yes	
Generator Connections		Yes			
Strategic Asset Management	Yes			Yes	Yes
Transmission Delivery	Yes	Yes	Yes		
IT and Telecoms	Yes	Yes	Yes	Yes	Yes
Other		Yes		Yes	Yes

Outputs

Category	Benefits	Metrics
Safe, Reliable and Resilient Network 	Additional network capacity Asset health improvement Resilience to extreme weather events Reduction in frequency and duration of unplanned outages	• Over 500 capital projects delivered • 562 MW of firm transformer capacity at 110 kV (Dublin) • 1.1 GW of offirm transformer capacity at 38 kV (nationwide) • 1.5 GW of firm transformer capacity at medium voltage (Nationwide) • 743 MVA of LV capacity • 6 x 110 kV line refurbishment projects • 15 x 38 kV substations uprated • 18 x new 38 kV substations energised (11 driven by capacity and 7 driven by asset life) • 16 x 110 kV substations uprated (including 5 renewable hubs) • 27 x new 110 kV substations energised • 75 customer minutes lost, 90 customer interruptions • 45,725 MV pole replacements • 4,550 LV pole replacements • 2,257km MV conductor replacement • 9,000km of MV network converted to 20 kV • 231 transmission projects • 138 additional transmission projects progressed • Robust cybersecurity system
	Public safety work programmes	• Delivery of the rural and urban public safety hazard patrol programme
	Response to storm events	• Respond to all storm events with continued emphasis on public safety and restoring power as soon as possible
	Load index management	• 100% of current LI4 and LI5 110 kV substations reinforced

Category	Benefits	Metrics
Decarbonised Energy 	Reduced dependence on imported fossil fuels Renewable generation	• 4.4 GW of renewable generation connected at distribution level • Support the CAP24 target of 17 GW of onshore renewable generation connected by 2030 (transmission and distribution) *This will be dependent on renewable project development and delivery timelines as well as transmission and distribution project delivery and risk management.* • 255 new renewable connections, hubs, and reinforcement projects (estimate) • Forecasted 40,000 Microgeneration connections per year along with continued growth in Mini-Generation and Small-Scale Generation
	Flexibility	• ~11.3% additional flexibility delivered per the National Energy Demand Strategy • ~4.2% additional flexibility delivered under Area 1 – smart services (implicit flexibility) • ~3.9% additional flexibility delivered under Area 2 – demand flexibility and response (explicit flexibility) • ~3.2% additional flexibility delivered under Area 3 – new demand connections (non-firm flexible connections) • New operating management system • 12 year cyclical replacement programme for smart meters commenced
Empowered Customers and Enhanced Customer Experience 	Personalised and proactive communications, especially during outages and planned maintenance	• 50,000 homes (G1/G2) customers connected per annum • 83% customer satisfaction by 2030 • Maintain 90% national customer contact centre satisfaction • Empower between 176,000 and 236,000 existing customers to be low-carbon technology (LCT) ready for 2040 • 1 million EV/680k eHeat (this will be dependent on customer adoption) • 80% of customers to get proactive notifications about outages through digital app • Fair and inclusive services, support for vulnerable customers

Category	Benefits	Metrics
Smart, Flexible and Digitally Enabled Network 	Smart technologies to optimise network performance and support future energy demands (electrification), openness, and transparency Implementing innovative solutions and technologies to reduce operating costs and improve efficiency	• Integration of data, tools, and systems to enhance organisation effectiveness to serve our customers • Data at the point of need for customers and employees • Improved digital collaboration between customers and ESB Networks, and also across business teams • Self-serve options for customers • Centralised, standardised approach to key business processes, facilitating transparency
	Driving innovation in the energy sector	• Pilot projects and collaboration with industry stakeholders
Environmental, Safety and Sustainability 	Reducing environmental impact of network operations, including biodiversity and carbon reduction	• 69% of yellow van fleet electrified • 51% reduction in carbon emissions from building • Annual CSRD report • Implement biodiversity net gain on our projects as per 'Networks for Nature' biodiversity strategy • Continue to work internally and with our contract partners to achieve excellence in safety performance

Navigating our plan

In the following chapters, we have set out how we plan to address the strategic outcomes and objectives identified by CRU in their PR6 Strategy Paper and meet the current and future needs of our customers.

- **Chapter 1** sets out our role and strategic ambition and outlines our approach to developing this business plan to meet the **strategic outcomes** and **objectives** identified by the CRU for PR6.
- **Chapter 2** outlines how we have put the **needs and expectations of customers at the heart of our planning and decision making** for PR6 through an extensive customer research and stakeholder engagement programme.
- **Chapter 3** outlines the progress we have made during PR5, which will act as the foundation for the delivery of our PR6 programme of investment.
- **Chapter 4** lists the external developments which have shaped the development of our plan and sets out our outlook for PR6. It also identifies the national policy targets and regulations that our plan seeks to support, and sets out our **assumptions, investment scenario**, and proposed approach to **managing uncertainty**. This is a key chapter which recognises the challenges and inherent delivery risks associated with our plan and proposes an agile investment framework to manage uncertainty and protect customers.
- **Chapters 5** provides a high level summary of our proposed investment during PR6, as well as the associated outputs and customer benefits.
- **Chapters 6, 7, and 8** set out how we intend to meet the strategic outcomes stipulated by the CRU in their PR6 Strategy Paper, namely:
  - **Chapter 6 – Safe, reliable, and resilient infrastructure:** This chapter recognises that the transition to a low-carbon future powered by clean electricity requires a network that is reliable and resilient to the impacts of climate change and disruptive events such as storms and cyber threats. It also recognises the need to invest in additional capacity to connect renewable generation and accommodate demand associated with population growth, new housing developments, economic growth, and the electrification of heat, transport, and industry. It outlines ESB Networks' approach to asset replacement and maintenance to ensure **compliance with security of supply standards**. Chapter 6 also outlines our close collaboration with EirGrid to develop an approach to our PR6 submission.
  - **Chapter 7 – Decarbonised electricity:** This chapter outlines our plans to support decarbonisation by connecting renewable generation and by fundamentally changing the way we operate the electricity network so that we can overcome local constraints and capitalise on the availability of renewables, including rooftop solar. This includes our plans to **drive smarter, flexible, more digitally enabled networks,** and to establish **flexibility** markets and products to enable our customers to benefit from this. Significant investment in IT and digital and data will be needed to enable this smarter, more sustainable network of the future.

– **Chapter 8 – Empowered customers:** This chapter reflects our commitment to working alongside customers and communities and supporting them to achieve Net Zero. We intend to use data and digital technologies to deliver convenient and personalised customer experiences, and to develop insight-driven services to meet diverse and evolving customer needs. We also plan to put in place solutions for our networks customers to enable the electrification of heat and transport. We will make it easy for customers and communities to participate in markets for flexibility and make active choices in their use of energy.

- **Chapter 9** outlines our strategy to deliver infrastructure efficiently during PR6 to enable a much larger programme of investment. It outlines our 'Build Once for 2040' approach to **anticipatory investment**.
- **Chapter 10** summarises the foundational capabilities underpinning our plan, including our workforce resilience strategy, our approach to safety, stakeholder engagement and sustainability, our innovation focus, and our approach to accelerating **digital and data** and innovation to **drive smarter, flexible, more digitally enabled networks, enhance system efficiency**, and improve **transparency.**
- **Chapter 11** explains our approach to **efficiently financing** our plan and sets out the impact of the proposed investment programme on customers' bills.
- **Chapter 12** contains a review of **efficiency** in PR5 and our approach to sustaining this in PR6.
- **Chapter 13** outlines the expected **impact on customers' bills** as a result of the proposed investment.

This business plan is supported by 76 technical annexes, which outline in detail our investment plans relating to specific areas of activity. These outline proposed expenditure, performance metrics, and targets relating to our role as DSO and TAO. Retrospective narratives relating to expenditure and performance for PR5 have also been prepared.

Note: *all monies referenced in this document are stated in real 2024 terms unless otherwise stated. Due to rounding of the proposed investment figures, the sum of each row in the investment tables in this document may appear slightly higher or lower than the stated table totals.*

1 Introduction

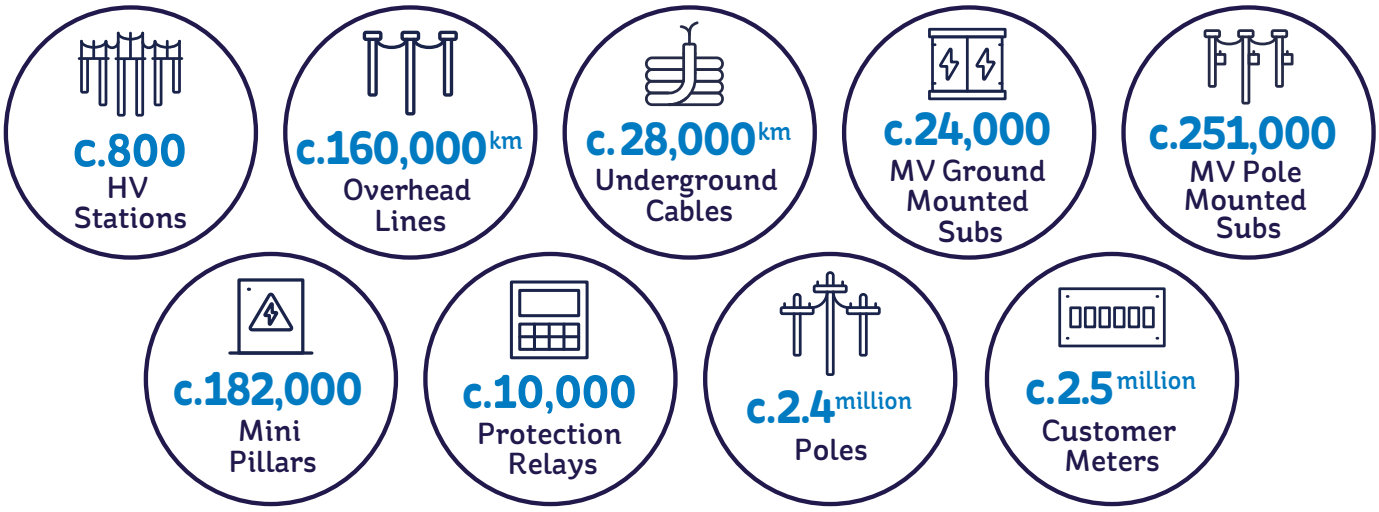
1.1 ESB Networks' role

ESB Networks is the electricity distribution system operator (DSO), distribution asset owner (DAO), and onshore transmission asset owner (TAO) in the Republic of Ireland, licenced by the Commission for the Regulation of Utilities. We work to meet the needs of all electricity customers in Ireland, regardless of supplier, connecting them to Ireland's clean electric future.

As onshore TAO, ESB Networks is responsible for building and maintaining the high voltage transmission system in line with requirements set out by EirGrid, the transmission system operator (TSO). As DAO and DSO, we carry out all functions relating to the electricity distribution system, including asset management, planning, construction, maintenance, and operation of the high, medium, and low voltage distribution network.

For almost 100 years, ESB Networks has been at the forefront of delivering reliable, high-quality power to homes and businesses across Ireland, helping to meet the needs of customers and support wider social and economic development. We invest in the electricity network on behalf of all electricity customers, with average annual investments of €0.8 bn over the past five years across all of our work programmes.

The amount of electricity that the electricity network can handle is determined by the capacity of equipment on the system, including the size of transformers, cables and conductors, and substations. The TSO (EirGrid) and the DSO (ESB Networks) are responsible for planning the required capacity reinforcements needed, and for managing the flows of electricity across their respective networks to overcome constraints, optimise efficiency, and ensure that electricity is available where and when it is needed.



The electricity transmission and distribution networks comprise circa 160,000km of overhead networks, 28,000km of underground cables, and over 800 high voltage substations, serving more than 2.4 million demand customers. The total value of ESB Network's regulated asset base is €10.6 bn. ESB Networks is responsible for managing and maintaining these assets to ensure safe and secure electricity supplies for all customers.

In addition to providing reliable and resilient network infrastructure, ESB Networks supports the electricity retail market through the ringfenced meter registration system operator (MRSO) and retail market design service (RMDS) and underpins the wholesale single electricity market through the provision of aggregated electricity meter data. This is a key role in enabling a competitive electricity market in Ireland.

Explainer: Transmission and distribution systems

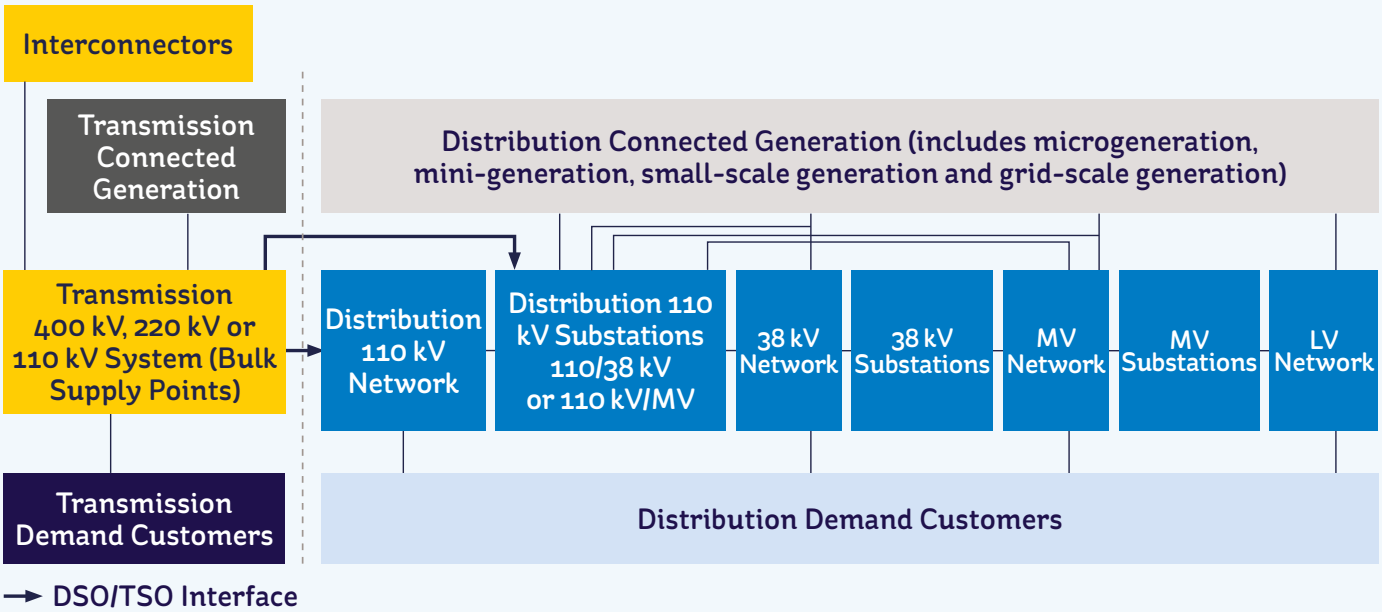
The transmission system transports electricity over long distances from power plants to substations near populated areas. It operates at very high voltage levels to reduce energy losses during transmission. In Ireland, the transmission system operates at voltage levels of 110 kV, 220 kV, and 400 kV, and generally is made up of high voltage substations, underground cables, and overhead lines.

The distribution system connects to the transmission system at substations known as bulk supply points. Here, high-voltage electricity from the transmission system is converted to lower voltages for distribution to customers across Ireland. Bulk supply points typically convert electricity from 110 kV to 38 kV.

The distribution system distributes energy from the transmission network and from generators connected at distribution level (mainly renewables) to homes, farms, and businesses across Ireland. The distribution system consists mainly of wood poles, overhead lines, underground cables, and substations, and operates at voltage levels ranging from 110 kV to 230 V. Substations play a critical role in ensuring that electricity is efficiently and safely transferred from the transmission system to customers, via the distribution system.

Figure 3 below demonstrates the voltage levels pertaining to the transmission network and the distribution network.

Figure 3: Structure of the transmission and distribution networks

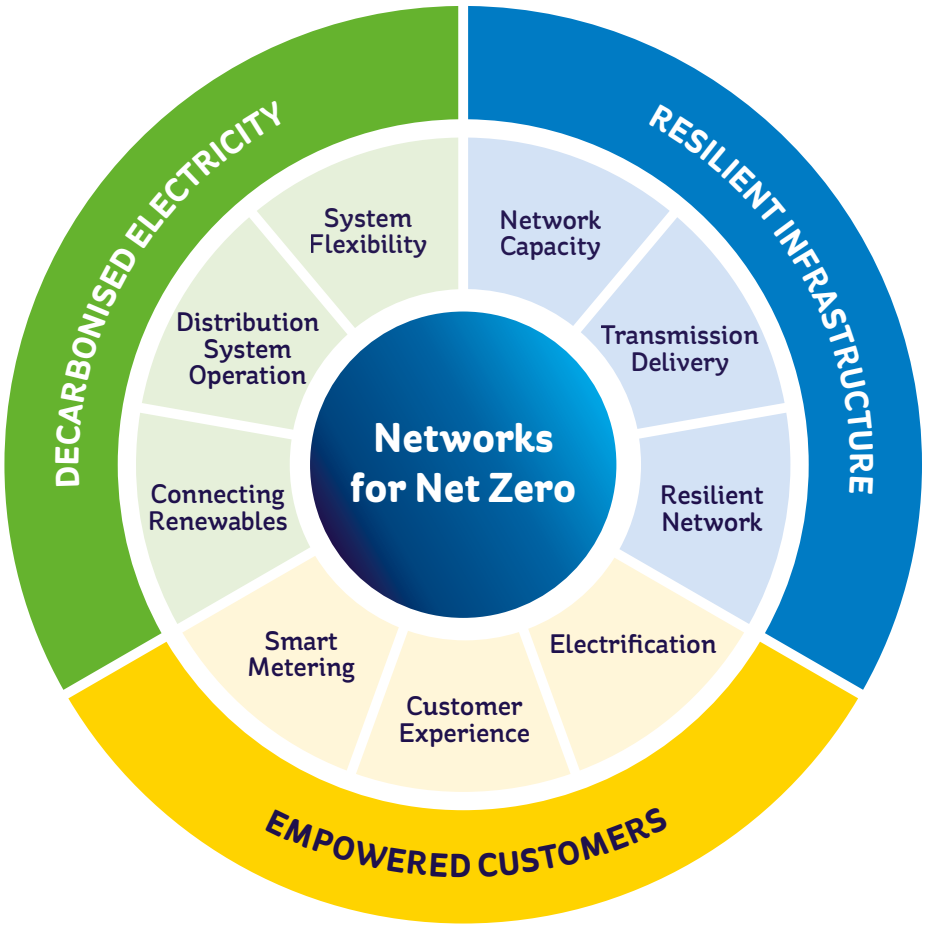


1.2 Our strategic ambition

As the need for sustainable infrastructure to support Ireland's growing population increases in urgency, it is incumbent on ESB Networks to ensure that the electricity network can meet the evolving needs of customers and support critical national policy targets relating to housing, economic and industrial growth, infrastructure development, transport, and climate change.

We are committed to taking all feasible steps to provide a safe, reliable, and efficient network with the appropriate capacity, flexibility, and resilience to meet these objectives. In 2023, we published our Networks for Net Zero Strategy which sets out the actions we believe are necessary to create a Net Zero-ready electricity network by 2040. Our strategy is structured around three key strategic objectives: decarbonised electricity, resilient infrastructure, and empowered customers. These align with the PR6 outcomes identified by the CRU in their PR6 Strategy Paper.

Figure 3: Structure of the transmission and distribution networks



This will require investment during PR6 that is materially bigger in scale and ambition than any previous Price Review period. The investments we make between 2026 and 2030 are critical to achieving our shared ambition, and we look forward to playing a central role in building a cleaner, more sustainable energy future for Ireland.

Explainer: Net Zero-ready electricity network

A Net Zero-ready electricity network refers to an electricity system that is prepared to support the transition to Net Zero carbon emissions. This means the network is designed and equipped to handle the integration of renewable energy sources, such as wind and solar, and to facilitate the electrification of other sectors like transportation and heating.

Key aspects of a Net Zero-ready electricity network include:

Decarbonised electricity:
The network must be capable of accommodating high levels of renewable energy, ensuring that electricity generation is sustainable and has minimal carbon emissions.

Empowered customers:
Customers should have the tools and information they need to make informed decisions about their energy use, participate in energy markets, and support the transition to renewable energy.

Resilient infrastructure:
The network must be robust and adaptable, able to withstand and recover from disruptions such as extreme weather events and cyber threats. This includes upgrading infrastructure to increase capacity and reliability.

Overall, the goal is to create an electricity network that not only supports current energy needs but also facilitates the broader transition to a low-carbon future, ultimately helping to achieve Net Zero carbon emissions by a specified target year – in this case, 2040.

1.3 The Price Review process

Every five years, ESB Networks is required to submit a business plan to the Commission for the Regulation of Utilities (CRU) outlining the investments we propose to make in the electricity network to fulfil our licence obligations as distribution system operator (DSO), distribution asset owner (DAO), and onshore transmission asset owner (TAO). The submission of our PR6 business plan, which is approved and overseen by the CRU, is a key part of the regulatory process which serves to protect customers by controlling the revenues that ESB Networks can recover from electricity consumers through their bills.

In April 2024, the CRU issued its Price Review 6 Strategy Paper setting out the objectives and principles that will guide its regulatory framework for ESB Networks for the period 2026 to 2030.

Figure 5: CRU outcomes and objectives

We have developed our PR6 business plan in response to this and based on feedback from our stakeholders and customers, setting out evidenced-based expenditure proposals to meet the needs of customers and enable the transformation of Ireland's energy system. Our plan includes costs for building, safely operating, and maintaining the electricity system in Ireland to meet the existing and future needs of customers and wider society.

We have put significant preparation into the development of the plan to ensure the proposed investment supports Ireland's policy targets, while seeking to balance this investment with the impact on customers' bills. We welcome further engagement with the CRU in relation to our proposals over the coming weeks.

1.4 Our approach to developing our PR6 business plan

Since the development of our PR5 plan five years ago, the external context in which we operate has fundamentally changed. Geopolitical instability, unprecedented population growth, extreme weather events, volatile energy prices, technological advances, and the Covid-19 pandemic have altered customer expectations and patterns of behaviour, which have implications for the electricity network and for our customers and stakeholders.

New policies and regulations emerging in response to these societal shifts have accelerated the need for climate action, housing, and economic growth targets, driving demand for new electricity connections and network capacity*.

In developing our PR6 business plan, we have considered a broad range of factors that will influence our investments over the coming decade and the direction of our business plan. These are covered in detail later in our plan, and summarised below:

- ***Customer needs and expectations:*** We have engaged extensively with customers and stakeholders through bilateral meetings, focus groups, and our recent PR6 stakeholder consultation. This has given us insights into their priorities and the areas of focus for our plan.
- ***CRU*** Price Review 6 Strategy Paper: The CRU published their PR6 Strategy Paper in April 2024. Our plans address the PR6 outcomes and objectives set out in this paper.
- ***Policy and regulation:*** Developments in policy and regulation have accelerated targets relating to housing, infrastructure, economic growth, and climate change. Our plan seeks to support national and European policy objectives and regulations, including Housing for All, Project Ireland 2040, the National Planning Framework (draft), the Alternative Fuels Infrastructure Regulation, the EU Green Deal, and the national Climate Action Plan. Our working assumption is that the revised housing targets of 50,000 home completions per year set out in the draft National Planning Framework will be adopted.
- ***Accelerated climate targets:*** Since 2020, both the EU and Ireland have intensified their climate policy efforts, and there is now a legally binding target for Ireland to reach Net Zero by no later than 2050. Since the publication of the first Climate Action Plan in 2019, there have been significant revisions and increased ambition relating to climate targets. The target percentage of electricity demand to come from renewables rose from 70% to 80%, five-year carbon budgets were introduced, and the target for heat pump installations grew from 400,000 to 680,000. The ambition for solar grew from 1.5 GW to 8 GW, and the target for onshore wind grew from 8.2 GW to 9GW. These accelerated targets are driving the need for sustained and substantial investment in the electricity network. Ireland is committed to achieving a 51% reduction in emissions from 2021 to 2030, and to achieving Net Zero emissions no later than 2050.

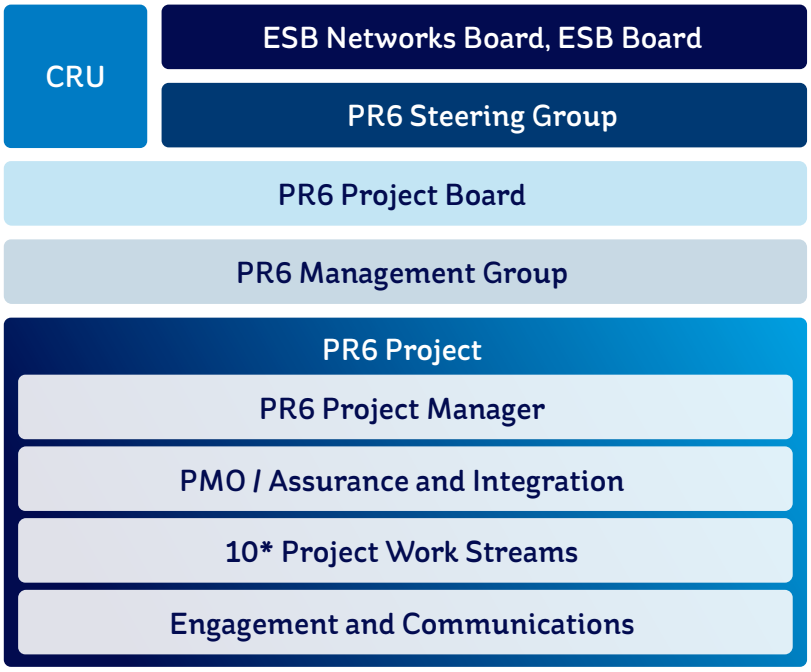
** New connections applications rose from 14,000 in 2014 in the aftermath impact of the Global Financial Crisis, to over 40,000 in 2023.*

- ***Geopolitical and demographic changes:*** Geopolitical and demographic changes, including Russia's invasion of Ukraine, conflict in the Middle East, population growth in Ireland, and the continuing impact of Covid-19 on supply chains, have shaped the context for our plan, and impacted directly on customers. We have taken these changes into account and the long term impacts they will have on our operating environment.
- ***Energy sector trends:*** We have taken into account emerging trends and technology developments across the UK and European energy sectors that address common challenges in developing this plan.
- ***PR5 developments:*** Our plan builds on the substantial progress made during PR5, which has laid the foundations for future network development, particularly in areas such as smart meter deployment, flexibility, digital and data, modularisation, and advanced asset management.
- ***Deliverability:*** Given the unprecedented scale of investment required across the distribution and transmission systems during PR6, our plan considers bottom up risks that could impact on the deliverability of our plan, including supply chain disruption, resource constraints, planning disruptions, and contractor availability.
- ***Impact on customers' bills:*** Electricity customers have experienced extreme energy price volatility in recent years, which has contributed to a cost of living crisis. We are very conscious of the challenges that customers have faced and have considered the impact on customers' bills in developing this plan.
- ***Uncertainty:*** There remains a high level of uncertainty regarding the exact pathway to Net Zero and the location of new generation and demand. We have recognised this in our plan and our approach to managing uncertainty and adapting to unforeseen requirements.

1.5 Governance and oversight of our plan

We established a robust governance framework to clarify roles and responsibilities relating to the development of our business plan, along with a formal and accountable reporting structure.

An overview of the project structure is illustrated below.



1.5.1 Management group

The management group had responsibility for measuring and monitoring the progress of the programme against expectations, and for providing direction and leadership when deviations occurred.

The group was responsible for:

- Assisting with solving all risks, assumptions, issues, and dependencies that may have been raised through the project team.
- Ensuring all risks, assumptions, issues, and dependencies were escalated to the project board where required.
- Ensuring that all milestones and activities required to deliver the project were identified, scheduled, and monitored.
- Providing motivation and guidance for the project team.

1.5.2 Project board

The role of the board was to manage and monitor the progress of the PR5 lookback and PR6 business plan across all respective workstreams, ensuring delivery at pace which aligned to desired business outcomes. The project board provided challenge, direction, and support to both the delivery of PR6 and to ensuring the programme was aligned to ESB Networks' Networks for Net Zero Strategy. It also assisted in unlocking barriers experienced by the project team. The members of the project board acted as subject matter experts in directing action on any conflicts that may have surfaced in deliveries and priorities.

1.5.3 Executive steering group

The steering group had a collective responsibility to provide direction in relation to the plan, its communication strategy, and the ratification of key decisions required to deliver the project. The steering group was responsible for:

- Ensuring the project was delivered at pace and influenced the strategy if appropriate.
- Validating the project was delivering in line with ESB Networks' strategic objectives.
- Being a point of escalation for major risks, issues, and management of cross-business interdependencies with the objective of providing solutions.
- Ensuring appropriate resources were available to the project to meet the agreed timelines.

1.5.4 ESB Networks DAC Board

The ESB Networks DAC Board had overall responsibility for the preparation and submission of the business plan. The Board was kept up to date during the development of the plan, with significant engagement on all key aspects of the submission. The ESB Networks DAC Board signed off the final position of the business plan and recommended the plan to the ESB Board for approval. The ESB Board had overall responsibility for approving the plan due to the financial commitments it contains. Following approval from both boards, the business plan was submitted to the CRU.

1.5.5 The Commission for the Regulation of Utilities (CRU)

- As the economic regulator of the electricity network operators (ESB Networks and EirGrid), the CRU's role is to protect electricity customers by ensuring that the network companies spend customers' money appropriately and efficiently to deliver necessary services and make necessary investments in infrastructure.
- The CRU sets Price Reviews on a five yearly basis, which determines the revenues that the network companies can recover from electricity customers through network tariffs. The network tariffs recover the cost of building, safely operating and maintaining the electricity system in Ireland. The revenue allowances are collected from suppliers via the use of system charges and charges per unit of electricity that they buy, which is then passed on to customers in their electricity bills.
- As with all Price Reviews, the CRU will undertake a detailed analysis of the network companies' business cases. This includes benchmarking assessments, calculating of efficiency challenges, determining the cost of capital, and the establishment of a regulatory framework to adjust allowed revenues and monitor ongoing performance.
- Once ESB Networks submits its business case (in the form of this plan) to the CRU, there will be detailed engagement with CRU and their consultants who will assess, question, and challenge the contents of the plan on behalf of customers. ESB Networks is committed to engaging fully in this process and providing all information needed by CRU to achieve a final determination for PR6 and an approved investment plan for 2026 to 2030.

2

Listening to Customers and Stakeholders

2.1 Engagement process

The investments we make in the electricity distribution and transmission network during PR6 will have far reaching implications for customers and wider society that will last far beyond 2030. Our 2.5 million customers depend on us to provide the essential infrastructure they need to support domestic, commercial, and national policy objectives now and in the future.

Over recent years, we have engaged extensively with customers and stakeholders to understand their needs and get their input on a range of issues including capacity, flexibility, innovation, safety, and electrification. We have used this feedback to shape our strategic direction and inform the development of this business plan. In addition, we have formally engaged with customers, stakeholders, and communities across Ireland in the preparation of this plan. We have included the key points raised through this process in Section 2.2 and will publish the full report from Ipsos B&A on our website to ensure full transparency.

The process for engaging with customers and stakeholders is summarised below:

- ***Stakeholder consultation paper:*** In July, we published our ESB Networks Investment Plan Approach for Price Review 6 (DOC-280624-HYT) stakeholder consultation paper inviting feedback from stakeholders on our investment approach to developing and delivering our PR6 plan.
- ***Stakeholder webinar:*** Following the publication of our stakeholder consultation paper, we invited stakeholders to attend a webinar on 23 August where we provided a summary of our proposed investment approach, and invited questions through an open Q&A. The webinar was attended by 57 stakeholders representing 34 individual industry groups.

Figure 6: Organisations that attended our stakeholder consultation webinar

- ***Bilateral meetings:*** Bilateral meetings took place with a wide range of customers and stakeholder groups, including the ESRI, Department of Housing, Irish Ports Association, SEAI, and the Irish Home Builders Association. We also engaged with a number of UK distribution network organisations and are working very closely with EirGrid on an ongoing basis in relation to the development of our plan.
- ***Industry presentations:*** We have presented at a number of industry events on our plans for PR6, including:
  - Construction Industry Federation, Annual Conference at Croke Park, Sept 24th
  - Energy Transition Summit at Croke Park, Sept 26th
  - ISEA, Annual Solar Conference at the RDS, Oct 1st
  - Cybersecurity Conference at Croke Park, October 15th
  - National Infrastructure Symposium at TUD, Grangegorman, Oct 14th
- ***Customer research:*** A comprehensive programme of customer research was carried out by Ipsos B&A, an external market research agency. This included focus groups with representative groups of customers, stakeholders, and the general public across a range of demographics, including medically vulnerable groups and people at risk of fuel poverty. It also included quantitative research surveys with the general public and in depth interviews with stakeholder representatives.

2.2 Stakeholder and customer priorities

2.2.1 Stakeholder consultation responses

We received 26 responses to our Investment Plan Approach for PR6 Stakeholder Consultation (DOC-280624-HYT), published on 12 July.

Respondents broadly support ESB Networks' PR6 investment plan approach for its alignment with policy objectives, emphasising rapid infrastructure deployment, stakeholder engagement, and anticipatory investment to achieve renewable energy targets. Concerns were raised about aligning with updated housing targets, incorporating industrial demand growth, and addressing past challenges like planning procedures and smart meter uptake. Recommendations included considering the implications of the upcoming EU Energy Performance of Buildings Directive, future work practices, and community-level energy solutions to ensure a resilient grid infrastructure.

There is a strong showing of support by respondents for the PR6 plan's focus on improving the electricity network's resilience, safety, and reliability through strategic infrastructure investments, asset enhancements, and advanced technologies. However, respondents also highlight the need for prioritised grid infrastructure investments, particularly in underdeveloped regions, and advocate for innovative approaches to enhance grid resilience and security. Sustainability and climate action are emphasised as core principles, with recommendations for integrating hydrogen energy and extending wind farm planning permissions to align with national and global sustainability goals.

There is wide support among respondents for proposals on decarbonising electricity and developing a flexible energy system aligned with Ireland's climate goals, with particular interest in smart EV charging infrastructure and vehicle-to-grid systems. Respondents recommend accelerated grid infrastructure development, transparency in grid development plans, and robust risk management strategies to ensure effective implementation and stakeholder confidence. Additionally, respondents advocate for strategic investment in offshore wind energy and grid resilience measures to maximise economic opportunities and energy stability.

Respondents express strong support for ESB Networks' commitment to customer empowerment, highlighting the importance of advanced digital solutions, enhanced communication channels, and vulnerable customer support. They call for a more detailed framework for community engagement, a review of smart meter adoption barriers among customers, and standardised timelines for connection processes to improve service delivery. Additionally, respondents highlight the need for transparency, customer protection from rising costs, and clarity on data ownership to ensure effective implementation of these initiatives.

There is broad support by respondents for the proposals to strengthen ESB Networks' internal capabilities, stressing that workforce development, digital transformation, and sustainability are critical to managing Ireland's energy transition. They advocate for continuous innovation, smart charging, and microgrid implementation, alongside a robust resource scaling strategy to address skills shortages and supply chain challenges. Collaborative innovation projects such as HGV electrification and vehicle-to-grid charging are proposed to accelerate EV infrastructure rollout, supported by data sharing and analytics to enhance infrastructure efficiency.

Respondents commend the detailed planning in ESB Networks' proposal, outlining the necessity of government support and funding to achieve the plan's goals amid a competitive capital and infrastructure investment landscape. They stress ongoing collaboration with public and private stakeholders and highlight the need for clear governance on data ownership. Additional recommendations include diversifying energy sources, promoting hybrid grid connections, and ensuring competent management of the expanding high voltage network.

> ***"EirGrid and ESB Networks have executed excellent work to maximise the utility of our existing grid, but the reality now is that Ireland requires a significant expansion of its grid infrastructure."***
> *Engineers Ireland – Powering Ireland: An Electrical Energy Review*

Figure 7: Organisations that responded to our stakeholder consultation

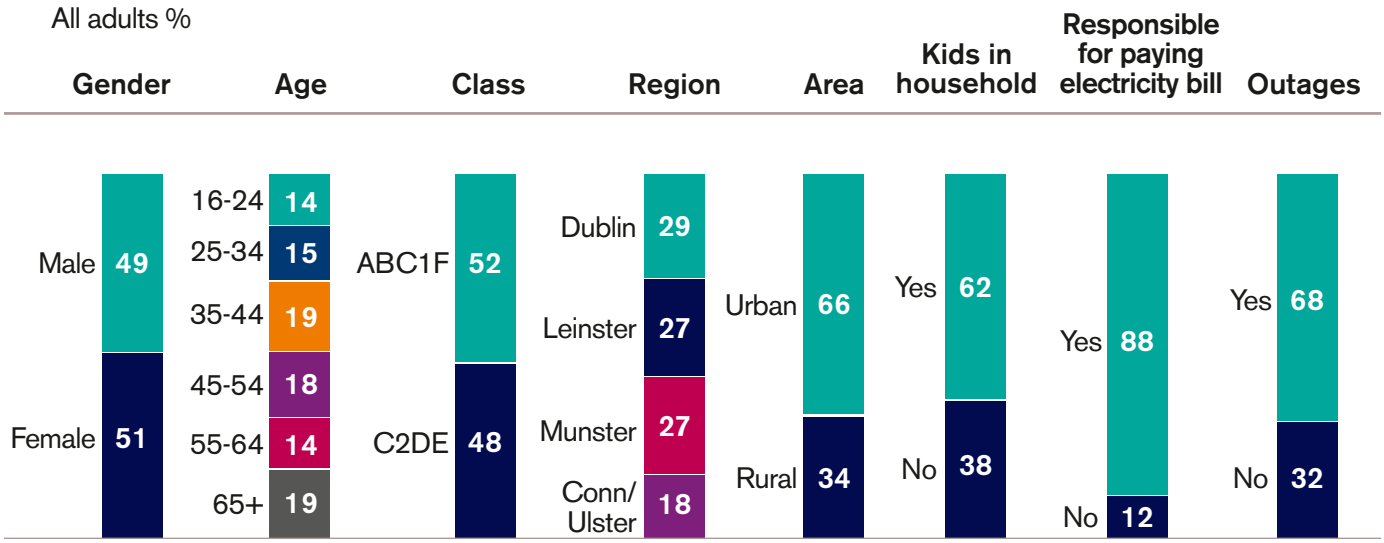
2.2.2 Independent customer feedback process

An independent market research agency, Ipsos B&A, undertook comprehensive customer research on our behalf. Table 3 outlines the structure of this programme.

Table 3: Overview of customer research programme

	Customers		Stakeholders	
	Consumers	**SME and large business**	**County councils, representative bodies, business interest groups, and energy industry bodies and suppliers**	**Contractors**
Qualitative Research Fieldwork: May to July 2024	10 face-to-face focus groups – mix of genders, life stages, social grades, and locations	4 online focus groups – mix of business types, turnovers, employee numbers, and locations	8 online in depth interviews	4 online in depth interviews
Quantitative Research Fieldwork: 8th to 15th July 2024	Questions included on Ipsos B&A online barometer which interviews a nationally representative sample of n=1,138 adults, 16+ years Margin of error at 95% CL is +/-3.2%.			

Figure 8: Breakdown of nationally representative survey of 1138 adults +16 years

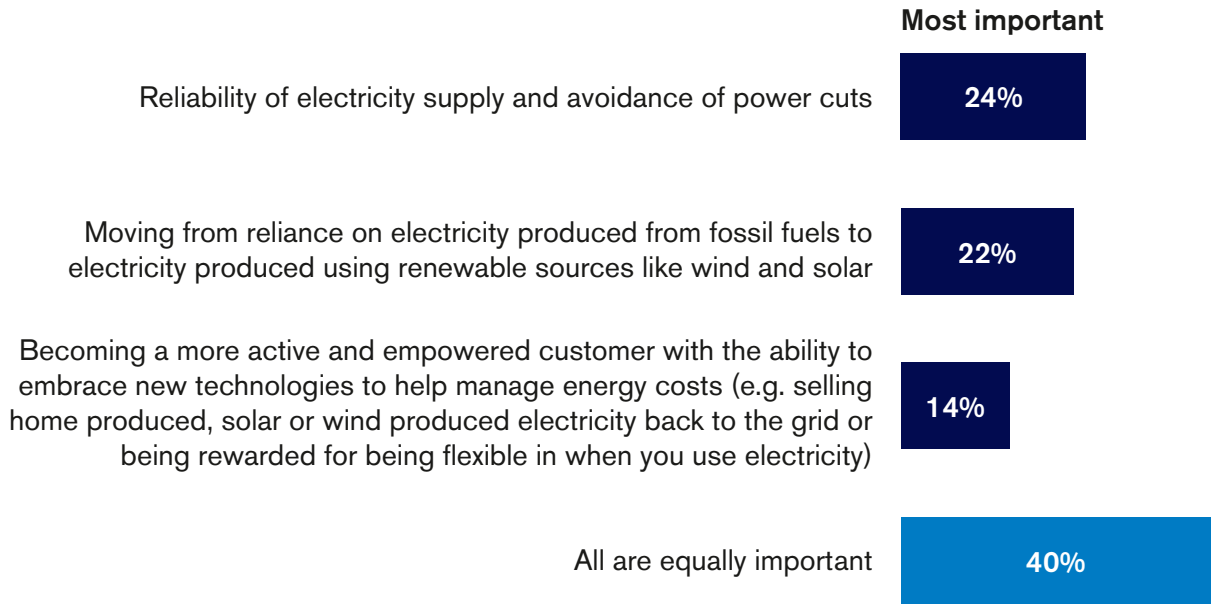


Profile of sample base: All respondents n-1138

2.2.3 Key insights from Ipsos B&A research

Ipsos B&A has summarised the insights arising from the customer research below, covering all of the key points raised:

Figure 9: Customers' views on the importance of aspects of electricity supply



Reliability of supply is the most important aspect for consumers, followed by access to renewable energy.

ESB Networks

- There is a general awareness of ESB Networks' role in maintaining electricity infrastructure but limited detailed understanding of specific responsibilities.
- Associations centre on maintaining and upgrading the national network, power outage management, and managing new connections.
- Among customers, the brand has strong brand associations: reliable, trustworthy, and established.

Energy saving

- There is a growing trend of households adopting a range of energy saving measures, encompassing both small-scale habits and significant home improvements. The escalating cost of energy is driving this shift in consumer behaviour.
- However, the energy savvy cohort demonstrates an increasing awareness of environmental issues and a desire to become 'prosumers'.
- Cost, the convenience factor, and deeply ingrained habits pose challenges (especially among families and the farming cohort) and addressing the barriers through targeted interventions, incentives, and education will be essential.

Information

- There is a strong interest among stakeholders for increased information and transparency. Consumers expressed a strong desire for clear, easily digestible data on their individual energy usage patterns and actionable insights on how they can modify their behaviours to achieve cost savings.
- The majority believe ESB Networks should take on a leading role in educating consumers about energy efficiency and conservation. As a trusted and impartial entity, ESB Networks is perceived by consumers to be well positioned to provide unbiased advice and practical tips on optimising energy consumption.

Future of electricity

- Consumers believe that the demand for electricity is set to grow significantly due to drivers including population growth, adoption of electric vehicles, the growth of data centres, and the electrification of the economy.
- However, there is a lack of awareness regarding the potential impact on the electricity network. Only a minority demonstrated an understanding of the challenges that the network may face, such as increased risk of outages and the possible fluctuations in power quality.
- It will be critical to educate consumers to facilitate their understanding of necessary price increases and planned outages in the future.

Solar panels

- Solar panels are widely perceived as an attractive option for self-generations of electricity. Benefits include reduced reliance on the network, lower long term energy costs, and a sense of environmental responsibility.
- However, a significant barrier to widespread adoption is the high upfront costs associated with purchasing and installing solar panels. A perception of complexity and time investment appears to also be a deterrent for many.

> ***"Again, it's around incentive, or how are you going to get people to change their households without … being able to afford to generate their own electricity? That's the biggest challenge."***
> *Young family, Dublin*

- The concept of selling electricity back to the network is a highly appealing prospect, but a lack of understanding on the mechanics indicates a need for clearer communication and education on the topic.

Decarbonising electricity

- Consumers strongly support ESB Networks' plans to decarbonise the electricity system by enabling more renewable generation. All believe it is crucial for both achieving energy independence and addressing pressing environmental concerns.
- However, concerns regarding the potential impacts of wind farms on local communities is evident. Issues such as visual impact, noise pollution, and potential effect on local ecosystems need to be addressed.
- Community engagement will be critical in fostering public acceptance of renewable energy infrastructure.

Resilient network

- Strengthening the network to prevent future power outages as demand grows is seen as fundamental.
- Power outages, while rare, are seen as increasingly unacceptable as electricity dependence grows. It is fundamental for the growth of the economy to support those living in rural locations and protect more vulnerable customers.
- Consumers overwhelmingly expect ESB Networks to take a proactive approach in investing in network infrastructure to ensure resilience and minimise the risk of future outages, and query as to why they should have to shoulder the costs.
- ESB Networks is held in high regard for its effective handling of critical customer needs, such as power outage restoration and new connection installations.

Empowered customers

- Consumers desire personalisation and greater clarity over their electricity usage. While awareness of smart meters is high, it is often associated with negativity. A fresh, honest, and educational campaign is required to garner trust in smart meters.
- There is a strong desire for increased interaction and communication, particularly in the areas of education, usage, insights, cost-saving strategies, and transparency regarding price increases.

> ***"If they told people [that] over 10 years, you're going to save 10 grand if you've got this asset, they would probably be more inclined to invest, because they can see 'I'm going to save this much over 10 years, I'm going forward. I don't' have to pay for electricity anymore'."*** *Family, 30 to 55, Galway*

General willingness to pay

- Consumers recognise the importance of the initiatives; however, they are hesitant to bear the full cost burden.
- Consumers express a strong belief that ESB Networks, electricity suppliers, large energy users, and the government should contribute more to these efforts, citing high profits and tax revenues as potential sources of funding.

> ***"Could the electricity companies, with their massive profit, not give a bit more, instead of charging the customer more? Just the electricity companies maybe, up the percentage, out of the amount we pay: so, we get a two grand, maybe 20% goes to the ESB, that would be a massive jump, so maybe 17% to the ESB, not 14%, but we don't pay any more."*** *Pre family, 20 – 34, Dublin*
>
> ***"It's a nice idea. But then again, are they targeting corporations in the same way?"*** *Vulnerable Customer*

- Any price increases will need to be clearly communicated and denote a clear benefit/reward to the consumer.

Willingness to pay for benefits of a strengthened network

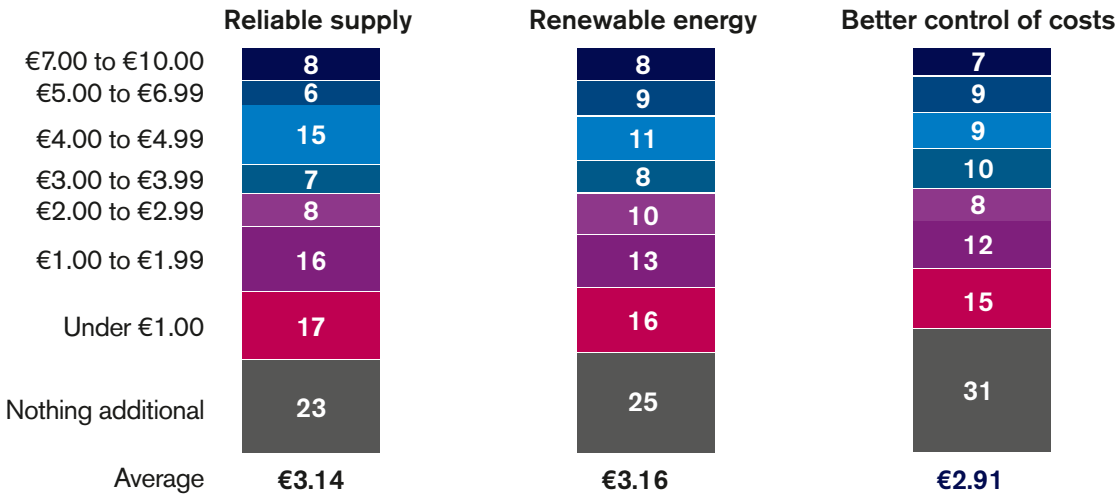
- A nationally representative sample of adults 16+ (n=1,138 respondents) identified that three in five are aware that a proportion of their bill is directed to ESB Networks to enable them to operate, upgrade and develop the electricity network. However, there is a great deal of uncertainty as to what the amount is.

> ***"I never knew about it; you don't see it on the bill. It seems fair enough for the work they do, I suppose."*** *Family, 30 to 35, Galway*
>
> ***"They're investing for the future, so they should have people buying into what they are doing."*** *Young family, Dublin*

- There is a lot of variability across customers in the additional amount they are willing to pay for reliable supply, renewable energy, and better control of costs. In Ipsos B&A's survey, it was identified that 70% are willing to pay something additional for all the three benefits described.
- On average, they are willing to pay:
  - An additional weekly fee of €3.14 for reliable supply
  - An additional weekly fee of €3.16 for renewable energy
  - An additional weekly fee of €2.91 for better control of costs
- In summary, 33% of people are willing to pay an additional weekly fee between 1 cent and €1.99 for reliable supply, 29% for renewable energy, and 27% for better control of costs.

Figure 10: Weekly amounts that domestic customers have indicated that they are willing to pay for reliable supply

A core group; one in four to 30% depending on the benefit assessed, is opposed to paying anything additional on a weekly basis to benefit from a more reliable network, access to renewable energy, or better control of costs



Small increase: "***I think, looking at the amount that we're paying on our bill, I think like an extra 2% to 3% would probably be bearable. But like, I think people will kind of accept it. Like if it was going to jump 5 to 10%, I think people kind of will go, prices are going up again, do you know but I think people in terms of power outages, I know I'd rather pay it***" *Pre family, 20 to 34, Dublin*

- 30% of people are willing to pay an additional weekly fee between €2.00 and €4.99 for reliable supply, 29% for renewable energy, and 27% for better control of costs.
- A minority of people are willing to pay between €5.00 and €10.00 for the same benefits: 14% are willing to pay an additional weekly fee of between €5.00 and €10.00 for reliable supply, 17% are willing to pay that amount for renewable energy, and 16% are willing to pay that amount for better control of costs.
- It is important to note that a core group (25% to 30% of those surveyed) selected a 0% increase, expressing the belief that the primary responsibility for this investment should fall on suppliers. There is a prevailing perception among consumers that they will ultimately bear the cost of this investment through increased bills from their suppliers.

Not willing to pay: "***Just when you're taxed through the roof already, you're paying USC, for way too long than you should be, you know what I mean, there's no comeback there. So, it's just people are not willing to. I don't think they're willing to pay any more.***" *Young family, Dublin*

"The suppliers have a record profit, made crazy profits, so shouldn't they foot the bill?" *Family, 30 to 55, Galway*

- Consumers prioritise the reliability of energy supply and renewable energy as paramount considerations. In future communications regarding necessary network investments, it is crucial to emphasise these two key aspects.
- Consumer willingness to accept price increases is directly correlated with the transparency and visibility of the impact of their investment. Regardless of the percentage increase, customers require clear evidence of how their financial contributions are being utilised. It is essential that any additional costs be progressively allocated and explicitly linked to demonstrable long term savings and benefits.

> ***"If someone comes in and tells you they're going to do this, that, and the other, and it doesn't happen, there's no comeback or feedback on it. You have to be very careful as I said, you have to be believing in the whole thing."*** *Empty nester, Athlone*

- To garner consumer support for price adjustments, there is a critical need for targeted awareness campaigns and educational initiatives in this specific area. These efforts will help consumers understand the necessity and value of their increased financial commitment to energy infrastructure improvements.

Deliverability

- ESB Networks does exude confidence and trust, however some express scepticism about ESB Networks' ability to deliver the scale of change required for Net Zero, given past examples of delayed and over-budget semi-state projects in Ireland.
- Credible interim targets alongside technology and industry partnerships will build confidence.
- It will be crucial to communicate past success stories and inform consumers of the steps ESB Networks has taken to date in achieving the goal of Net Zero. It is important to bring consumers on the ESB Networks Net Zero journey.

In Summary

- Power outages, while rare, are seen as increasingly unacceptable as electricity dependence grows. Strengthening the network to prevent future power outages and protect more vulnerable customers as demand grows is seen as fundamental.
- There is strong support for the low-carbon energy transition, but consumers are acutely concerned about the costs involved and are resistant to bearing additional costs without clear benefits.
- There is a desire to see ESB Networks take a more visible educational and leadership role on the energy transition.
- Transparent communication, information sharing, fair cost-sharing, and a responsive service are key to securing buy-in.

Informing consumers can impact on behaviour: ***"Okay, when you mentioned that at the very start tonight, my immediate thing is: 'no way, I pay enough'. My mind has changed slightly, but I do think that prices will reduce in a few years' time when this comes. I wouldn't mind paying a few extra quid until this comes."*** *Family, 30-55, Galway*

- ESB Networks will need to demonstrate value for money and show tangible progress to sustain public backing for ESB Networks' Net Zero strategy.
- Transparency to build trust needs to be front and centre
- For many, a lack of trust is clouding their willingness to pay. Therefore, there needs to be an evidence-based approach with customers to win their trust and get them on board.
- Demonstrating value for money and long term savings is key to building public confidence. Consumers want to see more proactive communication from ESB Networks on their investment plans, the rationale for any bill increases, and the direct benefits to customers.
- Providing consumers with clearer information on how their bills are calculated and where ESB Networks' portion is invested is seen as essential for justifying any cost increases.

More education required: ***"Well, before the conversation, I wouldn't, but after saying all that about hospitals, I mean, we just told everyone these things that we need to do. €100 a year, I would happily pay for something that's quite serious in that regard. I think there should be better education around it. And the realisation that this is the reality of the world that we're in. It's not like we're screwing you over, it's like: 'we are in trouble, we need to'."*** *Pre family, 20 – 34, Dublin*

- ESB Networks needs to provide frequent progress updates and reassurances of where their money is going to get consumer buy-in and maintain their engagement.

Business customers' attitudes towards pricing

- There is pushback on the idea of an increase on electricity bills to fund network improvements.
- As ESB Networks is state-owned, many feel that the Government should be funding more of the infrastructure investments, rather than passing costs onto consumers
- Many feel that the current percentage of their bill that is going towards infrastructure development is already sufficient.
- SMEs, in particular, feel that they cannot absorb higher electricity costs right now, as they are already struggling with rising expenses across the board. There was a sentiment among SMEs that they always seem to get hit with increased charges, while larger corporations can better cope.

2.3 Integrating customer and stakeholder feedback into our PR6 plan

To ensure that we put **customers and stakeholders at the heart of our business planning**, we established an internal process for integrating the feedback from our customer research and stakeholder consultation into our business planning process. This involved mapping feedback and specific points arising from the research to relevant areas of the business. Each of the relevant business units were required to fully consider and, as far as possible, to address the issues and priorities raised by stakeholders and customers within their PR6 plans.

The table below highlights key themes emerging from the stakeholder feedback and where these are addressed in the plan.

Table 4: Key themes emerging from the stakeholder feedback and where these are addressed in the plan

Stakeholder and Customer Feedback	Chapter Reference
Align plan with policy objectives, including updated housing targets, industrial demand growth, and climate action.	Section 4.4 – Policies and frameworks Section 6.2 – Distribution network capacity Section 8.1 – Customer experience Section 7.2 – Distribution system of the future
Improve resilience, safety, and reliability through strategic infrastructure investments, asset enhancements, and advanced technologies. Prioritise underdeveloped regions and provide transparency on grid development plans.	Section 6.2 – Distribution network capacity Section 6.3 – Reliability and resilience Section 6.4 – Transmission
Empower customers through enhanced digital solutions, communication channels, transparency, and vulnerable customer support. Provide standardised timelines for connection processes to improve service delivery.	Section 8.1 – Customer experience Section 8.2 – Electrification Section 10.5 – Accelerate digital and data

Stakeholder and Customer Feedback	Chapter Reference
Deliverability: Adopt future work practices to accelerate delivery, address skills shortages and supply chain challenges, and adopt anticipatory investment. Adopt robust risk management strategies to ensure effective implementation and stakeholder confidence.	Section 9.3 – Workforce resilience Section 9 – Accelerating delivery
Smart meters: Address low uptake of smart meters. Provide transparency and clarity on data ownership to overcome barriers.	Section 7.2 - Distribution system of the future Section 10.5- Accelerate digital and data
Engagement: Ensure ongoing collaboration, engagement, and communications with public and private stakeholders. Enhance community engagement and consider community energy schemes.	Section 7.1 – Connecting renewables Section 8.1 – Customer experience Section 8.3 – Electrification Section 10.8 – Stakeholder and community engagement Section 10.4 – Innovation
Reinforce grid to support connection of offshore energy, hydrogen, and wind farms to maximise economic opportunities.	Section 6.4 – Transmission Section 7.1 – Connecting renewables
Decarbonise electricity and develop a flexible energy system aligned with Ireland's climate goals, with particular interest in smart EV charging infrastructure and vehicle-to-grid systems.	Section 7.1 – Connecting renewables Section 7.2 – Distribution system of the future Section 10.4 – Innovation
Consider importance of government support and funding to achieve the plan's goals.	Chapter 11 – Financing Our Plan
Progress continuous innovation, smart charging, microgrid implementation, digital transformation, and sustainability.	Section 10.5 - Accelerate digital and data Section 10.4 – Innovation Section 10.2 – Sustainability
Consider implications of upcoming EU Energy Performance of Buildings Directive.	Section 6.2 – Distribution network capacity Section 8.3 – Electrification Section 10.4 – Innovation
Minimise impact on customer bills and protect customers from rising costs.	Section 4.7 – Managing uncertainty Section 13 – Impact on customer bills

The table below outlines where the key themes and issues that emerged from the customer research are addressed in our plans.

Table 5: Key themes and issues that emerged from the customer research and where they are addressed in our plans

Customer Requirement	Chapter Reference
Transparency: Clear, personalised, and easily digestible data on individual energy usage patterns, and actionable insights on how customers can modify their behaviours to achieve cost savings.	Section 7.2 – Distribution system of the future Section 8.1 – Customer experience Section 10.5 – Accelerate digital and data
Reliability and resilience: Customers expect ESB Networks to proactively invest to ensure reliability of energy supply. Power outages, while rare, are seen as increasingly unacceptable as electricity dependence grows.	Section 6.3 – Reliability and resilience Section 8.1 – Customer experience
Evidence of impact: Customers want ESB Networks to demonstrate value for money and show tangible progress.	Chapter 3 – Progress During PR5 Section 10.8 – Stakeholder and community engagement
Customer support: Provide support for those living in rural locations and for vulnerable customers.	Section 8.1 – Customer experience Section 10.4 – Innovation
Prosumer opportunities: Information and education on selling energy back to the network and becoming a 'prosumer'.	Chapter 7 – Decarbonised Electricity Section 10.8 – Stakeholder and community engagement
Transparency: Clear information about price increases and how customers' contributions are delivering benefits.	Section 13 – Impact on customer bills Section 5.3.6 – Customer benefits
Decarbonised energy: Consumers believe connecting renewables is crucial for achieving energy independence and addressing environmental concerns.	Section 7.1 – Connecting renewables
Delivery: Evidence that ESB Networks' can deliver the scale of change required for Net Zero.	Chapter 9 – Accelerating Delivery
Impact of infrastructure: Understanding of the impact of infrastructure on local communities	Section 10.8 – Stakeholder and community engagement

2.4 Conclusion

We recognise that the future of energy is changing rapidly and that we need to be ready to meet new challenges. To prepare for this, we need a deep understanding of the needs and expectations of our customers, and the challenges they face.

Larger customers and stakeholders have highlighted their dependence on the availability of network capacity to connect houses, advance electrification, and deliver renewable projects. They want assurance that the capacity they need can be delivered efficiently, and at an appropriate scale and pace. They emphasise the need for rapid infrastructure delivery and support anticipatory investment.

Our domestic customers have told us that having a **reliable electricity supply, access to renewable energy, and being able to better control their costs** are important to them. However, while approximately 70% have indicated that they would pay some additional weekly amount for those benefits, around 30% have told us they are opposed to taking on any additional costs. Business customers are also resistant to taking on more costs, with SMEs in particular indicating that they cannot absorb higher electricity costs right now, as they are already struggling with rising expenses across the board.

We have listened carefully to what customers and stakeholders have told us about their needs and priorities, and their willingness to pay. We are acutely aware of the cost of living increases that customers have had to bear over the past few years, and the impact that this has had on both domestic and business customers.

We have responded by designing a plan that seeks to balance these priorities, investing in infrastructure to maintain reliable electricity supplies, enable housing targets, and support the delivery of the Climate Action Plan, while also ensuring that projects are delivered as cost effectively as possible and at an appropriate pace.

The insights that our customers and stakeholders have shared provide important context for our business plan, including our investment and financing approach. By publishing this plan on our website, we hope to enhance transparency around our planning approach, and the trade-offs we have made to balance the needs of all of our stakeholders.

We thank everyone who participated in this research for the important contribution they have made to shaping every aspect of our plan.

3

Progress During PR5

3.1 Introduction

Despite a very dynamic, uncertain, and disrupted environment during PR5, ESB Networks made significant progress in delivering on our regulatory commitments, with investments materially in line with what we had planned. We are forecasting that our capital investment out-turn at the end of PR5 will amount to 97% of our projected programme, while operational expenditure will amount to 106% of what was anticipated. Over the course of PR5, we have increased total annual capital expenditure from €0.8 bn in 2021 to over €1.1 bn projected for 2024 and have undertaken significant work to transform our delivery capability in anticipation of a much larger work programme in PR6.

Note that unless otherwise stated, all monies outlined in this document are quoted in real 2024 terms.

While numerous milestones and targets were reached during PR5, as outlined later in this section of our plan, our key achievements can be summed up as follows:

1. With forecast capital investment of €5.0 bn delivering on key targets, PR5 represents our largest investment programme to date and is evidence of our ability to scale up to deliver further growth in investment during PR6.
2. Through the smart meter rollout, National Networks, Local Connections (NNLC) programme, and investments in digital, data, and cybersecurity, we have put in place the foundations to make the network smarter and more flexible, ensuring that it is capable of meeting increasingly complex operational demands and minimising the need for physical network reinforcements.
3. We delivered record investment while maintaining efficiency. ESB Networks was found to be efficient in PR4, and despite the challenges of PR5 in terms of Covid-19, the increased cost of living, and record investment, we have continued to demonstrate our ability to deliver ambitious investment plans which deliver value for money for customers.
4. We supported considerable growth in the connection of renewable and battery storage projects, passing the milestones of 6 GW of renewables connected to the network in 2024, 1 GW of solar, 1 GW of energy storage, and 112,000 rooftop solar installations.
5. During PR5, we adapted quickly to changing circumstances and responded where necessary to national policy priorities – for example, by reallocating resources to connect thermal generation to provide vital security of supply in line with the National Energy Security Framework. We did this in an extremely challenging environment, without materially impacting on the delivery of our planned work programme, with the exception of a small number of programmes, which are detailed in section 3.2.10.

ESB Networks engaged Frontier Economics to conduct a comparative study assessing ESB Networks' efficiency compared to peer companies. This analysis has concluded that ESB Networks' cost performance was efficient across the PR5 period. Frontier found that our costs are, on average, 6.7% more efficient than the mean efficiency level of GB DNOs. Their sensitivity scenario supports this, consistently showing that ESB Networks' total expenditure (totex) is at or below the mean efficiency level across 2021 to 2024.

3.2 Key achievements during PR5

We have made very strong progress across the board in delivering our planned investment programme for PR5 and in some cases, such as Microgeneration, smart metering, and new customer connections, we are ahead of expectations.

3.2.1 Reliable and resilient infrastructure

We have progressed a wide range of programmes and initiatives to improve the reliability and resilience of the network during PR5, including:

- Connection of 853.5 MW of thermal generation and 608 MW of battery energy storage to deliver crucial energy security for Ireland.
- Secured CRU approval for **planning standard changes** to increase firm capacity to 130% of single transformer and solar diversity. This has the potential to release 1.5 GW and 0.2 GW respectively of generation capacity on distribution transformers where electricity demand is connected.
- Delivered HV station projects and 38 kV overhead line projects at Kilcoole 38 kV station, Adamstown 110 kV station, Grangecastle 110 kV station, Corduff 110 kV/MV, Mullagharlin 110 kV station, Portlaoise 38 kV/MV, and Rathkeale 38 kV/MV to facilitate economic growth, provide new connections, and improve security of supply for customers.
- Developed an integrated approach to asset management, which considers assets across their full life cycle from network development planning through to optimised delivery, building on our ISO 550001 accreditation, which is an externally audited and internationally recognised asset management standard.
- Delivered HV system reinforcements to meet specific customer needs, including a new 110 kV station for a hospital in South County Dublin and the new Walterstown 110 kV station driven by the electrification of rail.
- Delivered 2,825km of MV network from 10 kV to 20 kV, to provide significant additional capacity at MV level (note that this overall programme is behind schedule and measures to address this are outlined in section 3.2.10 below).
- Implemented a comprehensive timber-cutting review, culminating in the successful tendering and award of a new timber-cutting framework. The awarded tender, which aims to clear all timber growth that could lead to safety issues and unreliability of the network, is currently being implemented and will see additional new timber-cutting companies and additional arborists managing the vegetation that grows adjacent to our network.
- Implemented an extensive programme to reduce the number and duration of unplanned power outages and improve overall network performance. This has involved the installation of automation devices on the MV network, as well as extensive timber cutting and asset maintenance and replacement programmes, focused on the worst-performing circuits and worst-served customers. We expect to see the benefits of this programme, which we plan to continue in PR6, result in improved network reliability during PR6.

- Implemented **revised standards for designing new LV networks**. The after diversity maximum demand (ADMD) standard was increased from 2.5 kW to 5.5 kW in 2019 to futureproof new-build connections. This has now been implemented in all new homes to ensure that they are LCT-ready.
- Developed a standardised asset health and condition-based approach to targeting assets that are most at risk of failure. This approach is CNAIM (common network asset indices methodology) aligned and approved by Ofgem in the UK . Common network asset indices provide an indication of the risk of condition-based failure of network assets and allow us to objectively assess the health of assets and their risk of failure now and in the future.

3.2.2 Decarbonised electricity

- Enabling the decarbonisation of the electricity system is a core element of our Networks for Net Zero Strategy and a central pillar of our PR5 programme. Since 2021, we have undertaken a significant programme of work to streamline and improve the process for connecting renewable customers at distribution level and at transmission level on behalf of the TSO.

Connecting renewables

- It is estimated that circa 957 MW of renewable energy (RES) generation will connect at distribution level by the end of PR5, furthering Ireland's clean energy objectives. There are now renewables totalling over 6.4 GW connected to the electricity system (including transmission, distribution, and non-utility-scale renewables). The CAP24 target is for 17 GW of onshore renewables by 2030.
- Introduced the option of non-firm access (NFA) for utility-scale generators who were prepared to accept a connection on the condition that they would disconnect if the normal configuration of the network was interrupted (for example, by a planned or fault-related outage). The first of these projects was successfully energised in October 2024.
- Initiated a pilot to facilitate early access to the distribution network on a flexible basis for generation projects. Wind, solar, and community energy projects are participating in the pilot. Of their total output of circa 40 MW, circa 5.65 MW is contracted on a flexible basis, with the first flexible access project energised in October 2024.
- Undertook a review and redesign of the entire connection process for utility-scale distributed generators to streamline work and provide a range of benefits to customers, including improved communications, greater cost certainty, and fewer modifications post offer. For example, the lean cell scoping team has fast-tracked customer project scopes by working in parallel with the connection offer phase to commencement of construction, which has saved 12 months from typical project programmes.
- Introduced customer meetings and clinics at key points in the project life cycle to give customers the opportunity to make informed decisions, and the option of amending or withdrawing their applications as they receive more information about the potential cost of connection.

- Developed an 'available capacity map' that shows the capacity available on all three-phase LV, MV, and HV DSO substations, and a new online minimum cost calculator to provide customers with an estimate of the minimum cost for the dedicated connection works for a generator >200 kW connecting to the distribution system.
- Recruited additional commissioners to ensure that the connection and integration of renewable generation to the distribution network could progress at pace. Commissioners are skilled specialists that 'commission' or activate new control systems and electrical safety and protection systems. They are critical to the successful deployment and integration of renewable generation, ensuring that projects are completed efficiently, safely, and in compliance with all relevant standards and regulations.
- Undertook extensive upgrades to our telecoms systems to ensure reliable and real-time communication between generators and the electricity network operators, allowing network operators to monitor and control the flow of electricity so that the network remains stable and efficient. This is important for managing the variability and intermittency of renewable energy sources, with the ESB Networks telecoms network representing a critical part of our overall electricity infrastructure.
- To support the rapid growth of rooftop solar installations, we have simplified the application process for Microgeneration. This has allowed us to efficiently handle over 112,000 applications. Looking ahead, we anticipate processing 55,000 applications annually between 2027 and 2030, with the total installed capacity expected to reach 2 GW by 2030, up from the present 600 MW.
- We implemented a smart metering solution that enables customers to receive payments for the electricity they export to the distribution network from their rooftop solar panels. For those without a smart meter, ESB Networks introduced an interim solution to ensure they are compensated for their exported electricity.
- Introduced new streamlined applications processes for Mini-Generation and Small-Scale Generation. Over 1,340 Mini-Generation customers (>50 kW) and over 215 Small-Scale Generation customers (up to 200 kW) – with a total capacity of 62 MW have connected via this process, with application numbers continuing to increase.
- With EirGrid, we secured agreement from the CRU to develop five pilot **renewable energy hubs** in Ireland to make it easier for renewable energy projects to connect to the electricity network – particularly smaller projects, such as community energy projects.
- Developed an MV embedded generation interface protection (EGIP) **standard modular substation** for renewable connections (1 MW to 20 MW), resulting in reduced substation footprint, shorter construction time on site, and less need for commissioning work on site, providing customers with certainty on the design and build requirements for MV EGIP connections. All five of the initial batch of modules that were procured have been allocated and we expect this will become the default connection methodology for MV connected renewable generators.

Driving smarter, flexible, more digitally enabled networks

Throughout PR5, we have been investing in systems and processes to enable a smarter, flexible, more digitally enabled network, by rolling out smart meters and supporting systems, developing new flexibility products and market structures, and preparing for active management of the distribution network. Key initiatives included:

- We are on track to deploy 2 million single-phase smart meters to customers across Ireland by 2025, providing them with accurate billing and access to half-hourly insights about their energy use.
- The smart metering operations centre (SMOC) ensures that the data collected and processed from smart meters is validated and accurate, and also implements cybersecurity measures to protect smart meter data and maintain the integrity of the smart meter system. The smart meter data system (SMDS) supports all activities relating to the processing, management, and storage of smart meter data and events. This is one of the largest IT systems in the country, comparable to the IT infrastructure used by major financial institutions, processing over half a billion meter readings annually. This data feeds into the retail market systems, which coordinate transactions between suppliers and handle 30 million market messages annually. It also feeds into the customer online account to make half-hourly usage data available to smart meter customers.
- Together, the SMOC and the SMDS play a crucial role in ensuring accurate measurement and recording of electricity usage, which is essential for billing, Microgeneration payments energy management, and supporting various smart grid functionalities.
- Invested in core operations infrastructure, cybersecurity, and systems to fulfil our DSO licence obligation to operate, ensuring the maintenance of and, as necessary, development of a safe, secure, reliable, economical, and efficient electricity distribution system.
- Established the Distribution Markets and System Operation (DMSO) function to ensure an integrated design across distribution markets (retail and flexibility) and system operation in response to legislative, regulatory, and policy developments.
- Established the structures for monitoring, forecasting, and managing energy flexibility at a local level through the National Networks, Local Connections (NN,LC) programme. This has laid the foundations for introducing non-wires solutions and creating local flexibility markets.
- Developed new flexibility products including the 'Is This a Good Time?' domestic product and 'Beat the Peak' business product, which are educating and informing domestic and commercial customers about demand side flexibility and providing them with opportunities to participate. Around 18,500 domestic customers took part in the 'Is This a Good Time?' pilot from October 2022 to March 2023. The second iteration of this product commenced in April 2023 and sees circa 24,500 participants signed up.
- Secured approval to procure 500 MW of storage to help address local network constraints.
- Introduced **flexible (non-firm) generation connections** to facilitate early connection of distribution-connected renewables, without the need for deep reinforcement works to add capacity (or significant shallow works) and competed our first flexible generation connection in 2024.
- Initiated a timed connections innovation trial, a simple form of flexibility that could enable faster connection for companies willing to limit their use of electricity at specific times.

Innovation case study: National smart metering programme (NSMP)

ESB Networks is leading a national programme to replace meters in homes, farms, and businesses with next generation smart meters. This programme is a key enabler of the Irish Government's Climate Action Plan. To date, over 1.85 million meters have been replaced, and we are on track to exceed the EU target to have 80% smart meters installed by June 2025.

The rollout of smart meters has already delivered extensive customer benefits and also lays the foundation to deliver much greater value to customers in the future as more functions are enabled.

The smart meter programme has enabled:

- Smart tariff offerings by suppliers, with 22% of customers now availing of a smart service or a smart tariff.
- Remote meter reading: Over 19.6 million bimonthly reads have taken place since go-live, providing accurate billing data for over 97% of smart meter customers. These customers no longer need to rely on estimated bills or submit their meter readings manually.
- Accurate payments for over 100,000 Microgeneration customers with rooftop solar.
- Detailed and personalised insights regarding customers' electricity use through the networks online account, which provides half-hourly interval data on electricity consumption and generation. Since it was launched, 142,000 people have registered to use the online account, and there have been 1.3 million logins with 20% of customers checking the portal weekly.
- Downloadable files providing half-hourly interval data on customers' electricity consumption and generation, which customers can use to find the best tariff from suppliers.
- Like for like replacement of day/night meters with smart meters, and a process to replace night storage heating meters that are no longer in use.
- 375,000 customers have availed of half-hourly interval data for smart services and tariffs. 49,000 customers have availed of day/night/peak smart standard tariffs.
- Over 520,000 on-demand reads from smart meters to support the change of supplier and change of legal entity retail market processes.
- Remote switching capability enabling suppliers to offer a smart pay as you go (PAYG) product to customers. This especially benefits fuel-poor customers with PAYG meters by facilitating easier switching between suppliers to avail of lower tariffs.
- Secure management of data to ensure compliance with all data privacy laws and protect customer personal data.

To support these customer benefits, ESB Networks has implemented extremely sophisticated IT and data processing systems with extensive processing power to ensure that data flows securely through to suppliers for accurate billing and payments, and to customers through the networks online account.

ESB Networks has also engaged extensively with customers through public information and advertising campaigns to ensure the smooth rollout of smart meters. Campaigns to promote the benefits and opportunities for customers arising from smart meters are planned for the remainder of PR5. Over one in five customers with a smart meter is now availing of a smart meter tariff or service.

We have also led industry forums and working groups to ensure alignment with supplier system and process development and provided ongoing support for supplier queries throughout the national smart metering programme to ensure its success.

Consumer surveys conducted throughout the programme demonstrate that customer awareness is rising, and that sentiment towards the programme is positive. This is further supported by the average 95% customer satisfaction rating of the meter exchange process.

3.2.3 Empowered customers

Customers have always been central to our business. As the energy transition progresses, ESB Networks has been investing in measures to empower customers to adopt new technologies and take on a more active role within the electricity system. Our key achievements during PR5 include:

- We have connected over 135,000 homes, farms, and businesses to date since the start of PR5. We forecast that this will increase to close to 200,000 by the end of 2025. This represents an overall increase of approximately 50% on the previous Price Review period, which saw a total of 131,000 connections over the five years. All new domestic customer connections are designed to meet the revised design standard which ensures that they are ready for low-carbon technology (LCT) adoption.
- Continued to streamline and digitise customer services: 91% of domestic, business, and developer customers now apply for connections online, compared to 48% in 2020.
- Completed a root and brand review of the national customer contact centre (NCCC) following Covid-19, and implemented a programme to improve systems, processes, training, and organisational structure. This led to a significant increase in customer contact service level performance from 86% in 2022, trending upwards to 91% in 2023, and forecast to remain above the CRU target of 90% in 2024.
- Reduced calls into the contact centre by providing information to 2.6 million customers (65% of all customers affected by an outage) via the PowerCheck app (based on 2023 figures).
- Handled 1.4 million customer contacts via the NCCC, dealing with increasingly complex customer queries relating to new technologies (e.g. smart meters, Microgeneration, feed-in tariffs, etc.) which require ever more skilled and knowledgeable customer service agents and longer call handling times.
- Handled an increased volume of queries and work requests relating to connections, outage management, voltage queries, and other key customer journeys. Note that as the volume and complexity of customer-related work has increased, our customer satisfaction scores have declined. We reached our target in 2021, were slightly under target in 2022, and were under by 2% in 2023. In 2024, we forecast being behind target by 5%.

- Developed a structured customer improvement programme to drive a sustained focus on improving the customer experience and satisfaction rates, and a customer transformation programme to improve our online self-serve options.
- Developed the networks online account, where customers can now access insights about their energy use and access core services in response to a growing demand for digital self-serve solutions for customers. To date, 135,000 customers have registered for the networks online account, and there have been 1.3 million logins since it went live, with 20% of customers logging in on a weekly basis.
- Developed a standard compact module for EV charge point operators (CPO) to replace the need for block-built substations, reducing the size of the footprint required and the cost for developers. 22 of these modules have already been energised.
- Developed new guidelines and standards for EV charge point operators and housing developers to provide clarity and guidance on requirements for EV infrastructure deployment.
- Developed an **online connection screening tool** to assist electrification customers to identify suitable sites for development, and piloted a more **detailed connection screening service** for EV charge point operators.
- Amended the Customer Code of Practice, with new provisions to enable two LV connections to allow customers to choose separate suppliers for their household and EV electricity supplies.
- Developed a 300 kVA pole-mounted transformer – a first for European utilities – to support increased loads from electrification while avoiding the work and costs associated with installing a ground-mounted unit substation.

3.2.4 Foundational capabilities

We have invested in organisational capability to ensure that we have the skills, scale, and systems necessary to meet the evolving needs of customers and society as outlined below.

3.2.5 Workforce strategy

We have invested in organisational capability to ensure that we have the skills, scale, and systems necessary to meet the evolving needs of customers and society as outlined below.

- Developed a new delivery strategy to accelerate the pace of infrastructure delivery for the remainder of PR5 and into PR6.
- Established contractor frameworks totalling almost €4.4bn to support the achievement of our 2030 targets, including a doubling of our electrical contractor capacity.
- Recruited over 1,200 new employees since 2022, resulting in a net increase of over 500 employees during PR5.
- Adopted robust succession planning processes to prepare for a high level of retirements, ensuring knowledge transfer and business continuity.
- Increased the numbers of new people joining the first year of the ESB Networks electrical apprenticeship programme to 96 in 2022 and saw a further ramp-up to 108 in 2024.

- Significantly increased training days delivered by the networks training centre to more than double the level delivered in 2021.
- Since 2021, employee engagement has increased year on year from 6.7 to 7.5, which is in the mid-range for the energy and utilities sector.

3.2.6 Efficient delivery

To support a significant increase in investment between PR4 and PR5, and in anticipation of a further step change in PR6, we have put in place a range of measures to accelerate the pace of deliverability:

- We continued to develop our supply chain management approach to accelerate the ramp-up of key materials, such as electricity poles and ground-mounted and pole-mounted transformers. This included advance ordering long lead time equipment.
- Standardised our high voltage distribution substation designs at 110 kV and 38 kV level to help deliver more modular solutions at scale.
- Engaged with key stakeholders (such as local authorities) to give early visibility of our programme of work and network development requirements, to identify suitable locations for new developments, aligning our plans with regional development and in preparation for planning submissions.
- Created and expanded key business units to maximise delivery potential and growth, including the National Programme Delivery team, the Transmission 2030 team, and contracting partners group.
- Deployed contractors to undertake the replacement of low voltage (LV) underground assets – in particular, mini-pillar and Magnefix replacement programmes – resulting in ESB Networks exceeding delivery targets around this key public safety programme.

3.2.7 Accelerating digital and data and innovation

- Established a new **data strategy** to leverage digital and data across business functions to support customer centricity, inform decision making, and drive efficiencies.
- Drove network innovation through over 50 separate innovation projects. This involved trialling, evaluating, and, where appropriate, implementing new technologies and solutions to improve customer experience and enhance network efficiency.
- Developed a new value framework and investment decision making support tool to quantify the value of proposed network investments.
- These investments and innovations during PR5 have laid the foundations to deliver our Networks for Net Zero Strategy and achieve the outcomes and objectives set by the CRU for PR6.
- Looking ahead, we propose to build on developments in PR5 to accelerate infrastructure delivery, empower customers, and prepare for the network of the future where we will play a much more active role in managing flows of energy between millions of connected devices.

3.2.8 Measures to address programmes that are behind schedule

This section outlines the factors that have led to a small number of programmes falling behind schedule and the measures that ESB Networks has taken to address these.

- ***20 kV conversion:*** This is a critical programme for adding capacity to the MV network. Approximately 2,825km of the 20 kV conversion programme was delivered in PR5. In 2022, we have reorganised and created a dedicated 20 kV conversion team specialising in the planning, development, and delivery of 20 kV projects. We are also working closely with the Department of Enterprise, Trade and Employment to secure visas for overseas contractors, and have reorganised internal resources to accelerate this programme over the remainder of PR5 and into PR6.
- ***Low voltage system improvement (LVSI):*** This programme, which seeks to prepare the LV network for widespread LCT use, has not progressed as planned due to a number of factors. These include the sporadic layout of the LV network (which often requires bespoke design solutions), the disruptive nature of the work (which can involve civil works on private property), and the lack of data on LCT uptake. In light of these issues, we adapted this programme during PR5 to deal with the actual needs of customers as they arose – for example, in response to a new connection application or a reported voltage issue. We have developed a new design standard, which means we now uprate all customers connected to the same LV transformer when we are responding to an individual customer request. We have outlined our approach to LVSI for PR6 in Section 6.2.
- ***Vegetation management:*** An ongoing programme of timber cutting is required to manage vegetation growth on the network. This is necessary to ensure that trees and other vegetation do not come into contact with overhead lines, causing unplanned outages. Restricted availability of timber contracting resources and increased vegetation growth caused by global warming have resulted in significant under delivery of the LV and MV timber-cutting programme during PR5, leading to increased faults on the network. We have implemented a comprehensive timber-cutting review, culminating in the successful tendering and award of a new timber-cutting framework, which aims to clear all timber growth that could lead to safety issues and unreliability of the network. We are also using drone technology and data analytics to target timber cutting towards areas of greatest need.
- ***Planned low voltage current transformer (LV CT) metering:*** LV CT meters are used primarily for business and commercial customers to measure high current loads. They are being replaced as part of a wider programme to enhance the safety, reliability, and accuracy of the metering system. Competing priorities for resources during PR5 resulted in delays to the planned replacement programme, which we are seeking to address by redeploying existing and contracted resources from the smart meter programme as it nears completion.

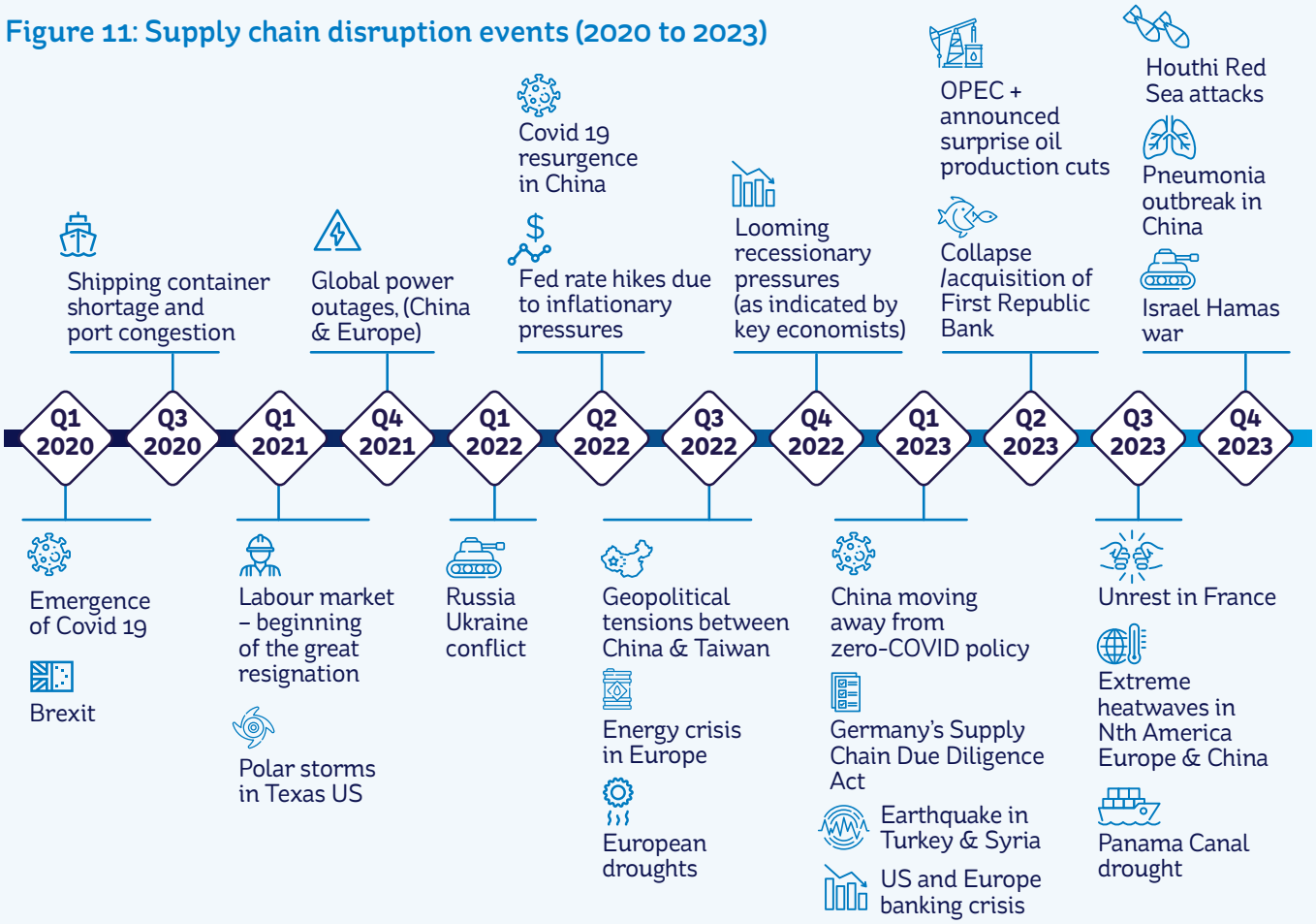
4 Outlook For PR6

4.1 External environment

Significant changes in our external environment over the past five years have accelerated housing and climate targets and have influenced the direction of our business plan.

- Ireland's population grew by 8% between 2016 and 2022, with more than 5 million people recorded in the census for the first time since 1881. Based on projections in the draft National Planning Framework, the Irish population is expected to grow by circa 1 million by 2040. The Government's Project Ireland 2040 plan and the draft National Planning Framework set out the framework for investment to support this expansion, focusing on the creation of new jobs, housing, public transport, regional connectivity, and environmental sustainability.
- The global landscape has been significantly reshaped by external factors including the Covid-19 pandemic, geopolitical instability, and a period of intense inflationary pressure. The Russian invasion of Ukraine led to heightened energy security concerns, disruptions in global energy supplies, and volatile energy prices, highlighting the need for a more resilient energy system. The Covid-19 pandemic altered energy consumption patterns and highlighted the need for greater agility and adaptability. High energy inflation contributed to a cost of living crisis and impacted the cost of delivering energy projects, influencing investment decisions and operational costs. Average household electricity prices in Ireland increased from circa 22 to 24 cents per kWh in 2019 to circa 34 to 36 cents in 2024. These challenges all underscore the urgency and importance of strategic planning and investment during PR6 to ensure a reliable, safe, and cost-effective energy future.
- Advances in technology, hybrid working, and increasing concern about energy security and climate change have influenced customer behaviours, with significant uptake in Microgeneration (there are now over 100,000 domestic solar installations in Ireland), higher dependence on electricity for those working from home, and increased expectations around the use and availability of digital and data.
- Capital markets have shifted dramatically since the start of PR5 in response to a variety of global shocks, and the period of ultra loose macroeconomic policy has ended. In July 2022, interest rates rose for the first time in 11 years due to monetary policy changes to counter inflationary pressures. More recently inflation has started to fall, but central banks are still proceeding with caution and the cost of borrowing remains high.
- Climate change is significantly impacting Ireland, leading to noticeable shifts in weather patterns and environmental conditions. Over the past century, Ireland's average temperature has increased by approximately 0.9°C, with projections indicating further rises of 1.0°C to 1.6°C by mid-century. This warming trend is accompanied by increased rainfall (particularly in winter and autumn), more frequent heavy precipitation events, and the emergence of invasive species (e.g. woodpeckers). These factors are contributing to increased unplanned power outages caused by faults on the network. Sea levels around Ireland are also rising, contributing to coastal erosion and increased flooding risks. The increased frequency of severe weather events due to climate change has caused extensive damage to the electricity network during PR5 and is impacting on the resilience of the network. It is also contributing to greater public awareness of the need for urgent climate action.

Figure 11: Supply chain disruption events (2020 to 2023)



These developments have brought about major changes in policy and regulation at both national and European level, including the following:

- The **Government's Project Ireland 2040** plan and the draft **National Planning Framework (NPF)** set out the framework for investment to support population growth, focusing on the creation of new jobs, housing, public transport, regional connectivity, and environment sustainability. The draft NPF was published for public consultation in July 2024 and includes the requirement to increase housing targets to 50,000 home completions per year.
- The **Housing for All** plan, introduced in 2021, is a multi-annual plan to deliver more homes to meet Ireland's housing needs. Although not yet announced, we anticipate that the housing targets will be revised upwards to 50,000 homes per year from 2025, as proposed in the draft NPF.
- The **National Energy Security Framework (NESF)**, published in June 2022, sets out the Irish Government's response to Ireland's energy security needs, particularly in the context of the Russian invasion of Ukraine. The framework focuses on managing impacts on consumers and businesses, ensuring energy security in the near term, and enhancing energy independence by reducing dependence on imported fossil fuels. The NESF set out a number of key actions, including: response 11, which called for review and revision of electricity emergency plans; response 14, to prepare the electricity system and plan for potential disruptions to supplies of natural gas, and manage potential impacts on final electricity consumers; and response 15, which required the prioritised implementation of the programme of work set out by the CRU to ensure security of electricity supply, including the connection of temporary emergency generation.

- In July 2021, the European Commission adopted Fit for 55, a package of legislative proposals that outlines the EU's goal to reduce emissions by at least 55% by 2030 and for the EU to be climate neutral by 2050. In May the following year, the REPowerEU plan was published to address the energy market disruptions caused by Russia's invasion of Ukraine through a range of measures which aim to increase the resilience, security, and sustainability of the EU's energy system by decreasing dependence on fossil fuels and increasing the uptake of renewables, energy efficiency, and energy storage capacity.
- In 2019, the Irish Government published the first Climate Action Plan (CAP), setting out Ireland's ambition to significantly reduce greenhouse gas emissions and transition to a climate-resilient, environmentally sustainable, and climate-neutral economy by 2050. The plan has subsequently been revised with accelerated targets in CAP21, CAP23, and CAP24. Under CAP, there are targets for 80% of electricity demand to be met by 2030, 9 GW of onshore wind capacity, 8 GW of solar, and more than 5 GW of offshore wind. CAP24 has objectives to have circa 1 million EVs and 680,000 heat pumps connected to the system by 2030 and sets a target of 20% to 30% for demand side flexibility.
- The **Climate Action and Low-Carbon Development (Amendment) Act 2021** put Ireland on a legally binding course to transition to Net Zero no later than 2050, and to a 51% reduction in emissions by the end of 2030.
- The Alternative Fuels Infrastructure Regulation (AFIR) is a key part of the EU's Fit for 55 package and seeks to promote the use of alternative fuels in the transport sector by setting mandatory targets for the rollout of recharging and refuelling infrastructure across the EU. Its main objectives are to ensure a sufficient infrastructure network for the recharging or refuelling of road vehicles and vessels with alternative fuels, to provide alternatives to the use of onboard engines powered by fossil fuels for vessels at berth or stationary aircraft, and to achieve full interoperability and user-friendliness of the infrastructure. The regulation mandates that member states ensure the deployment of recharging stations for cars, vans, and heavy duty vehicles along the EU's main transport corridors (the TEN-T network) by 2025 and 2030. It also requires the deployment of hydrogen refuelling stations and shore-side electricity supply for larger seagoing vessels and stationary aircraft.

These developments have increased the scale, speed, and complexity of the energy transition. High levels of wind, solar, and storage are connecting to the distribution network and significant demand for new network capacity is arising from multiple sectors, including data centres, housing, transport, and industry. The investments we make in the period ahead will be crucial in developing the electricity network that Ireland needs for a sustainable, secure, and affordable energy future.

4.2 Our outlook for PR6

As the pace and intensity of the energy transition increases through PR6, the management of the distribution network will become significantly more complex as more low-carbon devices are added to the system. Meanwhile, policies targeting accelerated climate action and infrastructure development to support population growth will continue to drive significant demand for network capacity across all sectors. A comprehensive approach (combining advanced technology, regulatory adaptation, enhanced consumer engagement, and significant investment in infrastructure) will be needed to effectively manage this complexity.

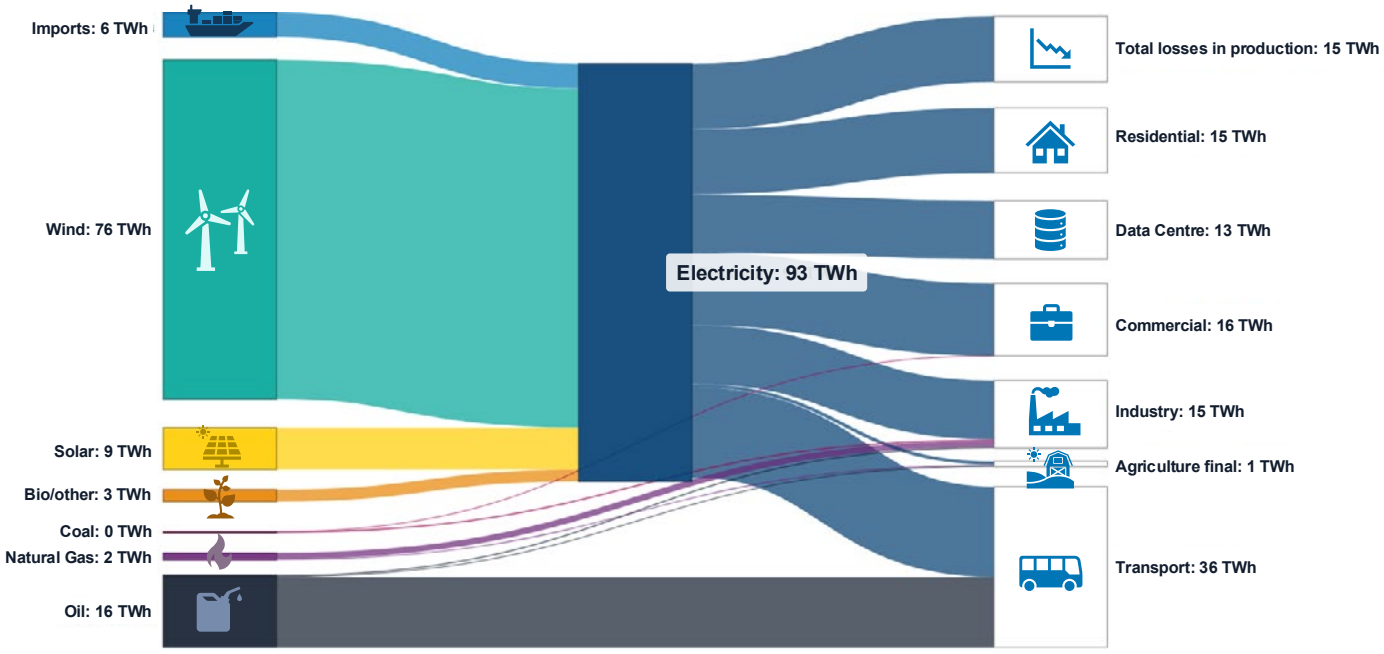
As we undertake these investments, it is critical to recognise that we are doing so alongside many other countries around the world. According to EurElectric's Grids for Speed study, distribution network investments must increase from an average of €33 bn to €67 bn per year from 2025 to 2050. This simultaneous demand for resources poses significant challenges in terms of cost management and supply chain access. Therefore, securing funding certainty and starting as soon as possible are essential to mitigating these risks and ensuring timely delivery of projects.

Below we highlight some of the key trends we anticipate during PR6 and outline the implications for the network and our PR6 programme.

Transformed energy landscape

Achieving Net Zero by 2050 will require a profound transformation in the way we produce, use, and transport energy. The future landscape of the energy system will differ markedly in 2040 from today's system.

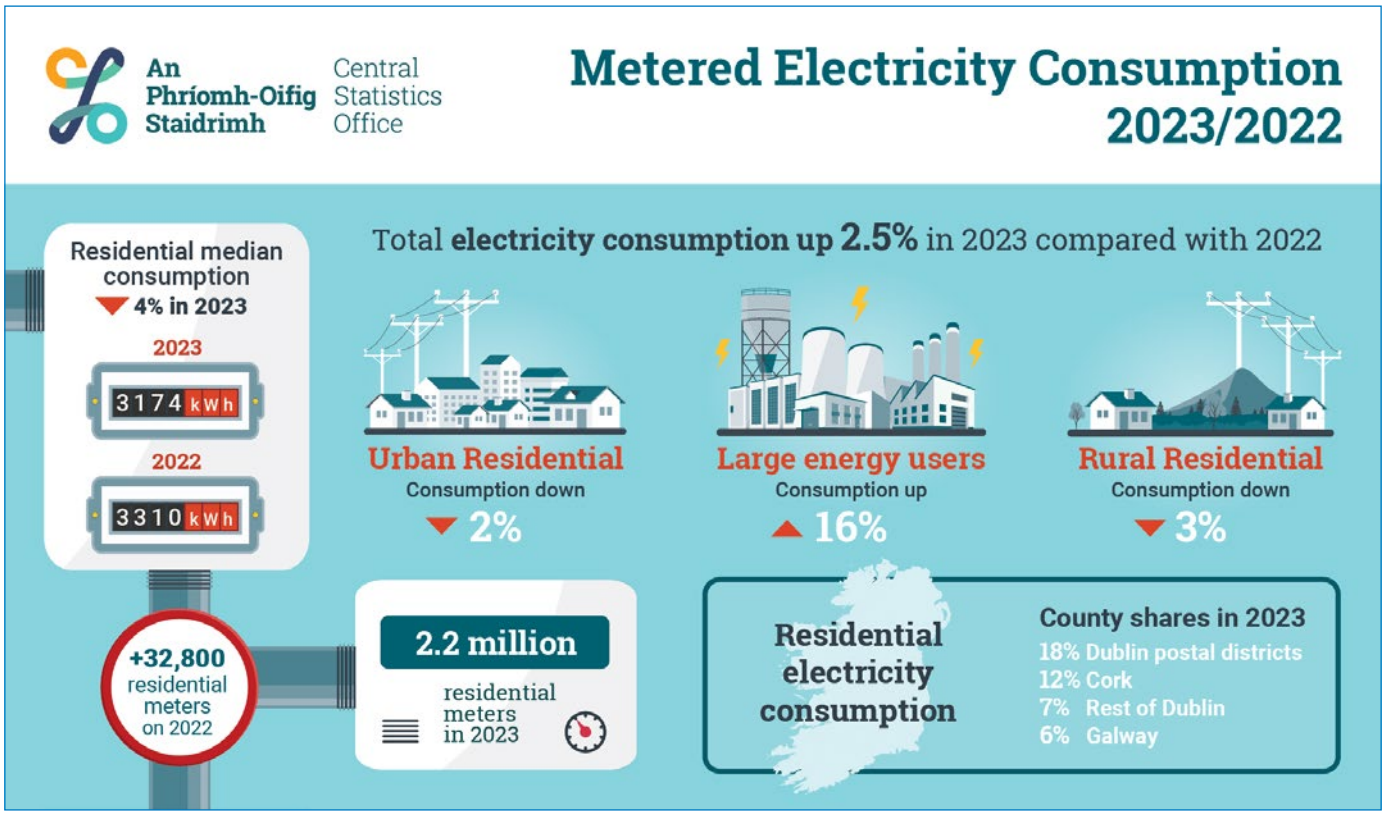
Figure 12: The future landscape of the energy system



Growing demand for network capacity

Electricity demand will rise significantly, driven by population growth, ambitious housing targets, economic development, and the uptake of new low-carbon technologies in line with the Climate Action Plan. This will drive the need for new network reinforcements to add capacity.

Figure 13: Metered electricity consumption, 2023/2022



Distributed generation (DG)

In line with the objectives in CAP24, we anticipate large-scale connection of distributed energy resources (DERs) like solar panels, wind turbines, and battery storage systems, often installed at the consumer level (e.g. rooftop solar) to the network. This will require increased connection capacity, more sophisticated management of bidirectional power flows, improved network connectivity, and more flexible ways of operating the system to manage the flow of electricity across the network.

Demand response and flexibility

Customers of all sizes have a role to play in providing network flexibility, and will seek to benefit from this, but this must be supported through new flexibility products and market structures. Encouraging consumers to shift their energy usage in response to network constraints or the availability of renewables will require sophisticated demand response programmes and technologies. Working with electricity suppliers, ESB Networks may need to facilitate real-time pricing incentives. This will require the development of common standards and automation systems to effectively manage the network.

New customer connections
New connections are a core part of our service to customers and vital to the delivery of national policy objectives. For PR6, we anticipate that housing targets will be revised upwards in line with the draft National Planning Framework to 50,000 homes per year. In anticipation of this, our plan assumes that ESB Networks will scale up to meet this requirement, building on a period of steady growth in recent years. We have engaged extensively with local and national bodies (including local authorities, the Construction Industry Federation, and other stakeholders) to meet this demand, and will continue to do so during PR6. In anticipation of widespread electrification of transport and heating, we amended the design standard for new home connections in 2019 to ensure that these homes are provided with sufficient network capacity from the outset to accommodate EV and heat pump uptake. In addition to new homes, we also intend to facilitate home retrofits and growing demand for industrial, commercial, and key infrastructure connections, including public EV charge points, Dart+, and Metro North.

Advanced network infrastructure
The development of smart networks (which use digital communication technology to detect and react to local changes in usage) adds significant complexity in terms of data management and cybersecurity. ESB Networks will need to increase investment in advanced monitoring and control systems, digital systems, and data management to handle huge volumes of digital data from numerous sources, including sensors and smart devices, to ensure reliable and efficient network operation. This is essential in enabling the electricity network to operate more flexibly and empower customers to use energy in a way that promotes decarbonisation, maximises the use of existing network, and capitalises on the availability of renewable generation.

Energy storage integration
The widespread adoption of energy storage solutions (such as batteries) to stabilise the network and store excess renewable energy introduces new dynamics in energy flow and storage management. Coordinating the charging and discharging cycles of numerous storage systems requires advanced algorithms and predictive analytics.

Electric vehicle (EV) charging
The Alternative Fuels Infrastructure Regulation (AFIR) sets minimum targets for the development of public recharging infrastructure to support electric vehicle uptake. Many EV recharging sites involve large spot loads which require significant network capacity. This is challenging, especially in areas where local demand has historically been very low (e.g. motorway service stations).

Evolving regulation and market changes
Significant changes in policy and regulation have arisen over the course of PR5 in response to demographic and geopolitical changes. Given the uncertainty surrounding the pathway to Net Zero, it is likely that we will need to adapt our plan as further policies, regulations, and market structures emerge at both national and EU level, which could impact on network management strategies and investment decisions.

Climate adaptability

As weather events and other disruptions become more frequent, enhancing the network's resilience to known and unknown challenges is paramount. Investments in system reinforcement, resilient network programmes, automated fault detection, and recovery systems are necessary to maintain service continuity and quality.

Cybersecurity

The digitalisation of the network and the associated capture of data from a variety of sources will bring significant cybersecurity risks, particularly in the context of widespread geopolitical instability. This will necessitate robust measures to protect against cyberattacks and ensure data privacy. It also means designing for cybersecurity, prioritising security from the outset, and ensuring that it is a fundamental aspect of how we design our network and our IT systems. ESB Networks is committed to ensuring the most robust and comprehensive cybersecurity strategies are in place, and to regularly updating them to counter emerging threats for safe network operation.

XLEU review

In recent years, extra-large energy users (XLEUs), including data centres, have absorbed significant amounts of available capacity on the electricity network. Data centres used 21% of Ireland's total electricity in 2023 – an increase of 20% on the previous year – and data centre demand as a percentage of total electricity consumption will continue to grow significantly out to 2030, based on contracts already in place. In 2021, CRU issued a direction to the system operators (EirGrid and ESB Networks) requiring us to assess new connection applications from data centres against a set of criteria, including location and the availability of onsite generation. Further review of the connection policy for such extra-large energy users is ongoing and we plan to assess this policy when it is finalised.

International perspective on anticipatory investment

Successive international reports have highlighted the need for a step change in investment in network infrastructure to achieve Net Zero targets. A summary of some of the key findings is outlined below:

IEA – 'Electricity Grids and Secure Energy Transitions' (October 2023)
This report identifies the need to double investment in Europe's distribution networks by 2030 to enable the adoption of digital grid technologies, and to manage increasing amounts of distributed renewable energy. www.iea.org/reports/electricity-2024)

"To meet national climate targets, grid investment needs to nearly double by 2030 to over USD 600 bn per year after over a decade of stagnation at the global level, with emphasis on digitalising and modernising distribution grids." ... "Delays in grid investment and reform would substantially increase global carbon dioxide (CO2) emissions, slowing energy transitions and putting the 1.5°C goal out of reach." ... "Grid expansion and modernisation needs to happen at speed and scale, and building new grids needs to go hand in hand with improved use of existing infrastructure and new technologies. Policy makers can speed up progress on grids by ensuring regulatory risk assessments allow for anticipatory investments, streamlining administrative processes, fostering societal support, and ensuring there are incentives for better use of existing infrastructure, as well as for new capacity."
The Electricity Grids and Secure Energy Transitions Report International Energy Agency Report 2023

Eurelectric – Grids for Speeds (May 2024)
Eurelectric's Grids for Speed study states that investment in distribution grids across Europe should increase from an average of €33 bn to €67 bn per year from 2025 to 2050 to enable Europe's energy transition. The report emphasises that the current capacity of the grid is insufficient to meet higher decarbonisation targets and mass electrification. It calls for anticipatory investments, longer term grid planning, digitalisation, flexibility, and more advanced data exchange to futureproof the electricity network. This significant increase is necessary to modernise aging infrastructure, integrate more renewable energy sources, and support the electrification of transport, heating, and industrial processes. The report also calls for adjustments to the current regulatory framework to support the necessary grid acceleration. It suggests a forward-looking approach that enables anticipatory investments and addresses supply chain challenges, including materials, manufacturing, permitting, and talent acquisition. (Grids for speed - Eurelectric Power Summit 2024)

EU Action Plan for Grids

The European Commission published the EU Action Plan for Grids in 2023, which recognises that interconnected and robust energy networks are the backbone of the EU's internal energy market and key to enabling climate goals. It states that electricity consumption is expected to rise by approximately 60% by 2030 and identifies the need for €584 bn of investment in electricity networks this decade to address aging infrastructure, enable decarbonisation, and meet future energy demands. The plan highlights the need for anticipatory investments and long term planning to accelerate the uptake of renewables and support the decarbonisation of the electricity sector. (Actions to accelerate the roll-out of electricity grids (europa.eu))

Frontier Economics research on anticipatory investment

Research conducted by Frontier Economics and IAEW RWTH Aachen in Germany and Austria, and extrapolated for an Irish context, shows that the Irish distribution network is likely to face asymmetric risks of under-investment compared to over-investment. The asymmetric cost of under-investment has also been echoed in other recent studies, such as by Eurelectric, which noted that "anticipatory no-regrets investment is the most cost effective strategy for building our distribution grid capability that are fit for a decarbonised future".

Anticipatory investment

Traditionally, investments in electricity networks have been focused on the **least cost technically acceptable** solution. In other words, doing only what is necessary right now to achieve the minimum desired outcome. However, in the context of accelerated housing, economic growth, and climate targets, it will be necessary to scale and maintain a very significant level of investment in the network from now to 2040 to keep pace with the level of change required.

The most efficient way to do this is adopt an anticipatory investment approach ('Build Once for 2040'), where possible. This involves designing projects now to meet the anticipated needs of customers in 2040, even if the associated demand is not likely to materialise in the near term. It reduces the risk of revisiting the same part of the network several times and investing incrementally as new capacity is required. This would be inefficient, particularly where there are resourcing and supply chain risks. Anticipatory investment is in line with EU electricity market design reforms and the EU Action Plan on Grids, which promote anticipatory investment as a way of accelerating climate action.

In our PR6 plan, the investment to deliver additional network capacity (refer to Section 6.2) is based on a targeted investment approach, based on known capacity constraints today as well as expected regional demand growth. We propose to use a "Build Once for 2040" approach only where it makes sense to do so, to ensure that we do not over-invest during PR6.

Sustainability

The UN defines sustainability as meeting the needs of the present without compromising the ability of the future. The world has already exceeded six of the planetary boundaries within which humanity can continue to develop and thrive. ESB Networks is aware of the impact our activities have on people and the environment. While most of our PR6 investment will be targeted towards the three **UN Sustainable Development Goals (7, 9, and 13)** where we can make the most tangible and lasting difference, it is imperative that sustainability is embedded at the core of everything that we do.

Conclusion

Overall, we believe that the pace and intensity of the energy transition will increase throughout PR6 as sectors increasingly look to electrification to meet their carbon reduction targets. As more distributed energy resources connect to the network, the management of the distribution network will become increasingly complex. This will require a comprehensive investment response, combining advanced technology, regulatory adaptation, enhanced consumer engagement, and investment in infrastructure to effectively manage this complexity. A considerable increase in investment in both digital and physical infrastructure is needed to decarbonise electricity, maintain energy security and resilience, and to meet the needs of customers in the years ahead.

4.3 Whole-of-system approach

Across the board, substantial investment in infrastructure is needed to achieve national policy objectives and meet the needs of a substantially larger population. This will require whole-of-system thinking and close cross sectoral collaboration between the energy sector and others to maximise the opportunity for success.

We are very conscious of the reliance that other sectors have on the electricity network in providing the required connections and capacity to support national targets. The draft National Planning Framework identifies the need for housing to accommodate approximately 50,000 additional households per annum out to 2040 (National Policy Objective 43). Approximately 1 MVA of public EV charging infrastructure is also required under the Alternative Fuel Infrastructure Regulation (AFIR), in addition to a range of climate targets set out in CAP24, including a target to meet 80% of electricity demand from renewables by 2030. PR6 will therefore require an unprecedented level of investment in network infrastructure, which must be delivered in an exceptionally short timeframe.

We have collaborated closely with EirGrid, the transmission system operator, in the development of this plan to get a whole-of-system perspective on the full scale of work required during PR6 across both the transmission and distribution networks. Our structures for engagement with EirGrid are covered in Chapter 6 of this plan and summarised below.

- A joint work programme for efficient and coordinated operation of the transmission and distribution networks through the joint system operator programme (See section 7.2.5).
- Transmission programme development and delivery brings to life coordination between EirGrid's TSO role and the role of ESB Networks as TAO. This is set out in Section 6.4 of the plan. This also includes coordination between EirGrid's offshore TAO role and ESB Networks' onshore TAO role.
- Joint working between EirGrid and ESB Networks at a working level in both organisations is part of the day to day engagement required to operate the network, connect customers, increase renewables, deliver security of supply projects, prepare for system emergencies, agree common technical standards, deliver maintenance programmes, innovate, and plan for the future.

Our plan is designed to enable us to deliver a very extensive work programme at pace, taking into account uncertainties relating to delivery risk (e.g. land access, planning delays, supply chain disruption) and the timing and location of new customer demand.

The investments we make during PR6 will have a lasting impact that extends far beyond the electricity sector, and it is essential that we work in lockstep with policy makers, regulators, customers, communities, and other stakeholders to deliver the changes that are needed.

We are depending on all of our stakeholders (including supply chain partners, contractors, local authorities, government agencies, customers, and communities) to work with us to overcome barriers, find solutions, and advocate positively for electricity infrastructure in order to meet our shared objectives.

4.4 Policies and frameworks

ESB Networks' business plan for PR6 will support the delivery of key national and EU policies and frameworks, which are described in Section 4.1 above. These are essential to achieving economic growth, accelerating climate action, and meeting the needs of a rapidly growing population.

While we will respond to any relevant developments in Government policy over the life of the PR6, this plan has been specifically designed to support progress against the following policies and targets:

Policy	Chapter Reference	Relevant Targets
The Climate Action and Low-Carbon Development (Amendment) Act 2021.	Net Zero economy	• Net Zero by 2050 • 51% reduction in emissions by 2030
The Climate Action Plan 2024	Net Zero by 2050 51% emissions reduction by 2030	• 80% of electricity demand from renewable sources • circa 845,000 electric vehicles (domestic) • 95,000 commercial electric vans • 680,000 heat pumps • 10% reduction in emissions from industry • 20% to 30% flexibility • 500,000 home retrofits to BER B2
Housing for All	Housing development	• 50,000 homes per year (anticipated)
Alternative Fuels Infrastructure Regulation	Fit for 55 package – climate neutrality by 2050	• For publicly available electric recharging infrastructure for light duty road vehicles (LDV, cars, and vans), the regulation sets out mandatory national fleet-based targets (for every battery electric light duty vehicle, a total power output of at least 1.3 kW must be provided through publicly accessible recharging stations, while for every plug-in hybrid light-duty vehicle, a total power output of at least 0.8 kW must be provided). • In addition, it sets out distance-based targets for light duty and heavy duty road vehicles on both TEN-T core and comprehensive network, which for core network equates to EV recharging stations every 60km on TEN-T network for cars and trucks. • Sea ports (TEN-T): >90% of container and passenger ships to have access to shore side electricity supply. • Inland waterway ports: At least one installation providing shore side electricity by 2030. • Airports: Electricity supply for all aircraft stands by 2030.

Policy	Chapter Reference	Relevant Targets
Project Ireland 2040 (comprising the National Development Framework and National Development Plan 2021 – 2030)	Baseline population growth scenario >6.1m by 2030	• Balanced regional development • Sustainable population growth • Infrastructure development • Climate action and adaptability • Economic competitiveness • Social infrastructure and quality of life • Culture and heritage preservation
Sectoral Emissions Ceiling (SEC)	Reduce emissions from manufacturing	• 35% reduction in emissions from manufacturing
REDIII Directive	Development of clean energy across all sectors of the EU economy	• Overall renewable energy target of at least 42.5%, binding at EU level by 2030 but aiming for 45%
National Energy Security Framework Ireland	Address Ireland's energy security needs	• Manage impact on consumers and business • Ensure security of supply in the near term • Reduce dependency on imported fossil fuels

There is uncertainty about the pace and pathway for the achievement of some of the policy targets included in this table. Given this uncertainty, we have set out our assumptions, investment scenario, and proposals for an agile investment framework to manage uncertainty in the following sections.

4.5 Assumptions

The targets and objectives set out in Section 4.4 above (policies and frameworks) form the basis of our assumptions for PR6. We have set out further details below in relation to these, as well as other assumptions that are relevant to our plan.

- The Climate Action Plan targets for the electrification of heat and transport will be accommodated through existing network capacity and targeted network capacity reinforcements which are required, based on known needs today. Even if the levels of heat pump and EV uptake do not meet the targets for 2030, consistent investment in LV network is needed throughout PR6, PR7, and PR8 to deliver a Net Zero-ready network by 2040.
- By 2030, a reduction in peak electricity usage of 11.3% is forecast, enabled by flexible demand on the distribution system in line with the National Energy Demand Strategy. Flexibility will release between 500 MW and 900 MW of additional capacity on the network and will help delay or avoid the need for additional network investment.
- By 2030, we will have installed circa 2.6 million smart meters as part of our metering programmes. During PR6, we will commence a 12 year cyclical replacement programme for smart meters, providing the necessary data and services to empower customers.
- The EV public recharging capacity requirements will be 790 MW.
- The contribution of residential, commercial, and industrial heat (including district heating) to consumption will be 10 TWh in 2030.
- There will be an estimated 435,000 Microgeneration customers, with an installed capacity of circa 2 GW and a self-consumption of circa 1,117 GWh, and circa 602 GWh exported.
- There will be circa 9,000 Mini-Generation customers, with an installed capacity of circa 300 MW and a self-consumption of circa 130 GWh.
- There will be circa 2,200 Small-Scale Generation customers, with an installed capacity of circa 253 MW and a self-consumption of circa 140 GWh.
- There will be an estimated 2,200 non-exporting generators with an installed capacity of 197 MW.
- There will be average electricity demand growth of circa 3% on the distribution network across PR6, with lower growth in the earlier years and higher growth assumed as we get to 2030.
- Data centres will comprise ~7% of the distribution load in 2030. This is based on existing connection agreements that were put in place prior to the CRU direction to system operators in 2021, and on estimated data centre utilisation based on historic distribution system data. No new data centres were considered in our PR6 submission, and all new data centre connection applications will be assessed based on any future CRU direction*.

** CRU Direction to the System Operators related to Data Centre grid connection processing Ref.: CRU/21/124 Published: 23rd November 2021.*

The CRU Strategy Paper includes a requirement for the networks companies to base their forecasted expenditure on similar planning assumptions. Our high level planning assumptions, which are broadly aligned with the TSO, are set out above. We are operating in a complex environment with many planning variables which are outside of our control, making it difficult to accurately predict future decarbonisation pathways and scenarios.

Our assumptions should therefore be viewed as inputs to the planned investment programme presented for PR6. During the review and engagement with CRU and other stakeholders, there may be a need to further review these assumptions before the final determination for PR6 is approved.

Sections 4.7 and 4.8 discuss the need for agility and responsiveness during PR6 to invest appropriately given the conditions that emerge in the earlier years of the Price Review.

4.6 Investment scenario

Our business plan outlines an ambitious investment scenario which reflects the strategic importance of electricity to Irish society and is designed to meet critical national policy objectives relating to housing, economic growth, and climate action. It recognises that substantial and sustained investment is needed in the transmission and distribution systems throughout PR6, with further progressive scaling beyond that to meet 2040 targets.

During PR6, we are proposing a no-regrets investment framework that will deliver greater value to customers by:

- Adopting a phased and targeted approach to increase network capacity, using data analytics to strategically focus investments on where the need for additional capacity is greatest and where our investment will deliver maximum benefit.
- Deploying smart, flexible, and digitally enabled solutions to reduce peak demand and therefore minimise the amount of network reinforcements needed to add capacity. This will require investment in new operating systems, digital and data solutions, telecoms, and cybersecurity to enable active system management and customer participation.
- Safely increasing network utilisation (i.e. absorbing demand growth by increasing loading on existing assets) using an evidence-based approach to monitor asset condition and manage risk.
- Adopting an agile investment framework to manage uncertainty. This also means being agile during the early years of PR6 to adapt to the emerging conditions, and adapting the plan as needed. Further detail on this is provided in the following section.

Figure 14: Investment framework

4.7 Managing uncertainty

There is a high level of uncertainty around where and when new demand for capacity will materialise, how policy changes will impact on targets, and a range of other variables which make it difficult to accurately predict the exact locations and timings for investment in the network. Similarly, there is a high degree of uncertainty around how quickly we can deliver infrastructure in the context of supply chain disruptions, resource constraints, public resistance to new infrastructure, challenges in securing transmission outages, and a range of other factors.

This means we cannot predict with certainty the scale of costs that will materialise during PR6, or the precise timescale. In the context of such uncertainty, ESB Networks is proposing to use an agile and dynamic investment framework for a portion of the capital investment programme. This approach will ensure that customers do not pay upfront for projects that may not materialise during the Price Review period, but that all of the projects needed to meet customer needs and national policy targets remain in scope.

The total value of the proposed investment scenario outlined in this plan amounts to €13.4 bn. Taking into consideration the uncertainty and the possibility that some of these costs may not materialise as expected in PR6, we are proposing a baseline investment programme of €10.1 bn. We are proposing to seek approval for some or all of the remaining €3.3 bn under the AIF, depending on the progress made in the early years of PR6, when there is confidence that the programme risks are sufficiently reduced.

- ***Baseline investment programme:*** Our core investment programme makes provision for projects that will proceed with a reasonable degree of certainty based on a data-driven, bottom-up, risk-informed view. It also includes projects that may be at an early stage of development but are critical to national energy security, including bulk supply points (see section 6.4). All of this investment will be required by 2030 to meet the needs of customers. Within our baseline investment scenario, we plan to begin development work on a range of projects, so they are in a position to proceed at pace when and if the need arises.
- ***Agile investment framework:*** The proposed agile investment framework will be used to bring forward additional funding to enable continued investment in critical energy projects as confidence grows that risks are being mitigated and that the appropriate level of progress is being achieved.

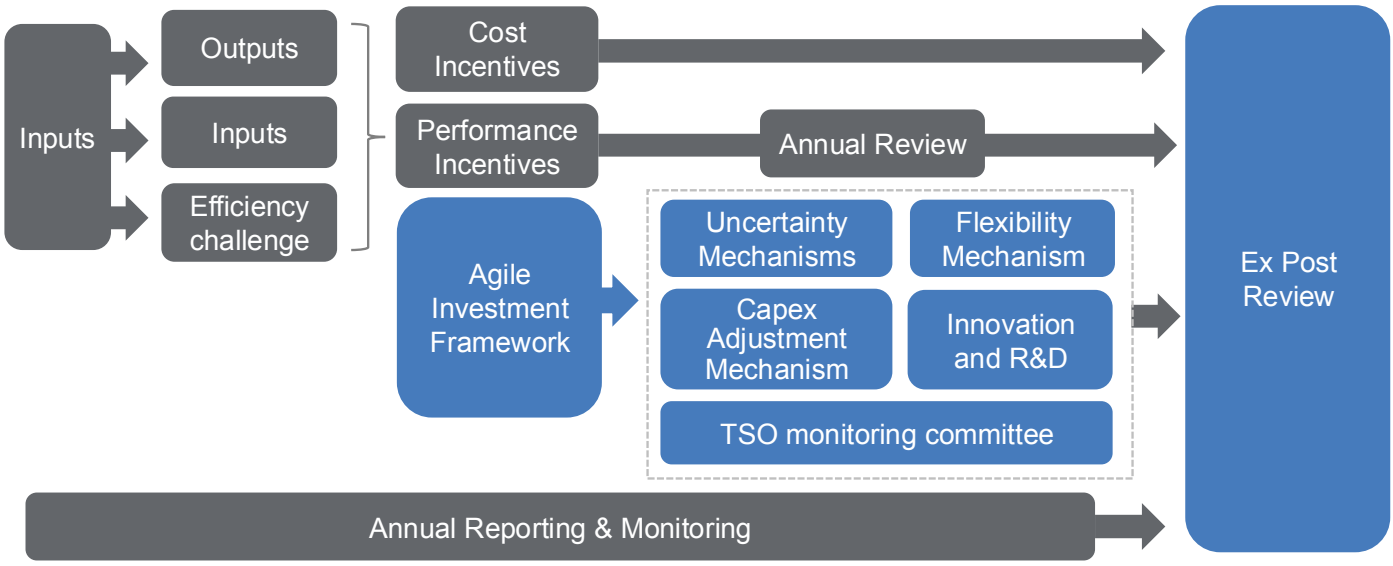
This agile approach will result in lower network charges for customers until such time as it is clear that the full investment programme can be delivered. It will allow us to drive forward at pace to deliver on the full scope of work required, while at the same time protecting customers by ensuring that they are not required to pay upfront for projects that have higher delivery risk.

This agile approach acknowledges the inherent uncertainty of risks associated with project delivery of this scale, using a bottom-up approach to identifying deliverability risks which focused on:
1) development risks (including resourcing and contracting, supply chain, project maturity, planning and consenting, and access) and
2) outage performance risks (looking at project type, outage availability, utilisation and performance).

4.8 Agile investment framework

An AIF mechanism was put in place for PR5 and was used to manage uncertain investment under the National Networks, Local Connections programme. We are proposing to use a similar mechanism under PR6. In addition, a new version of the AIF is proposed, with a specific ruleset to be agreed with the CRU for transmission and distribution network capital investment projects. We plan to submit a separate paper to the CRU (following the submission of our business plan) with a proposal on how the AIF could operate in practice.

Figure 15: Agile investment framework



5

Summary of Investment and Benefits

5.1 Capital investment

In this section, we have provided a high-level overview of the investment programme required during PR6 to meet the needs of customers, communities, and stakeholders

As outlined earlier in Section 4.6, the total value of the proposed investment scenario amounts to €13.4 bn. Taking into consideration the uncertainty outlined above and the possibility that some of these costs may not materialise as expected in PR6, we have outlined a baseline investment programme of €10.1 bn. Our baseline investment programme will seek to progress **all** required projects and includes a risk factoring approach across the project portfolio, resulting in the lower baseline value of €10.1bn. For example, projects that are more mature and ready for construction have a greater chance of completion during PR6 than projects that are very early in the development phase. The drawdown of investment under the agile investment framework would be requested depending on the progress made in the early years of PR6, when there is confidence that the programme risks are sufficiently reduced, and earlier stage projects have made sufficient progress.

Table 6: Proposed PR6 capital investment programme

Description (€' bn)	PR5 Determination	PR6 (Baseline)	PR6 (Baseline + AIF)
Empowering Customers (incl. New Business)	0.8	1.3	1.3
Distribution Markets and System Operation (DMSO)	1.2	1.0	1.2
Network Reinforcement	0.6	2.2	2.6
Generator Connections	0.2	0.3	0.4
Reliable and Resilient Infrastructure (Asset Management)	0.6	1.0	1.2
Transmission	1.4	3.4	5.9
Foundational Capabilities*	0.4	0.8	0.8
Total	**5.2**	**10.1**	**13.4**

* *Foundational capabilities include environment, property, IT, wayleaves, fleet and equipment, and telecoms. Numbers subject to rounding.*

The proposed investment represents a significant ramp-up from the previous Price Review period and will deliver:

- Significant network capacity reinforcements to provide capacity to connect houses, support economic growth, and advance electrification.
- Maintenance and replacement of existing network assets to ensure safe, reliable, and resilient electricity supplies for customers now and in the future.
- Implementation of automation technologies and improved vegetation management to reduce unplanned customer outages.
- Establishment of a new Distribution Markets and System Operation function.
- Development of a smarter, more flexible network, capable of safely and securely handling flows of electricity between millions of distributed devices (e.g. solar panels, EVs, heat pumps).
- New tools, products, and market structures to empower customers to take more control over their energy costs.
- Increased volumes of customer-driven work, including new housing connections and line diversions.
- Significant renewable generation connections to meet the CAP targets (across Microgeneration, Mini-Generation, Small-Scale Generation and utility-scale renewable generation).

5.2 Operational expenditure

A range of factors is driving increases in operational expenditure in PR6, including significant increases in timber cutting and other maintenance activities to ensure the reliability and safety of the network. Fault maintenance costs are also increasing due to the regularity of extreme weather events in recent years causing higher than expected numbers of faults on the network. Investments in customer service to improve service delivery and communications will also contribute to operational costs.

Activities to enable flexibility and improve network operations including enhanced network modelling, increases in meter operations, and market related transactions will also contribute to higher operational expenditure.

Table 7: Factors driving increases in operational expenditure in PR6

Description (€' bn)	PR5 Determination	PR6	Reference	Key Drivers
Distribution Planned Maintenance and Operations	0.5	0.8	Section 6.3	Increase in timber-cutting volumes and contractual rates
Transmission Maintenance and Operations	0.2	0.2	Section 6.4 Transmission	Requirements of the transmission system operator
Distribution Fault Maintenance	0.2	0.3	Section 6.3	Aging infrastructure and impact of vegetation and wildlife on MV network
Distribution Network Operations, Future Network/DMSO	0.4	0.8	Section 7.2	Business as usual, plus increases in metering, operations, control rooms costs, and market transformation services
Customer Services	0.1	0.2	Section 8.1	Increased investment to improve customer experience and empower customers
Asset Management	0.1	0.1	Chapter 6	
Telecoms	0.05	0.1	Chapter 10	
Other (incl. Network Rates)	0.8	0.9	Chapter 10	Increase in networks global rates valuations
Environment and Safety Management	0.1	0.1	Chapter 10	
Total	**2.4**	**3.4**		

5.3 Cost-benefit framework

ESB Networks is committed to ensuring that the investments we make in the electricity distribution network over PR6 deliver tangible and lasting benefits to our customers, stakeholders, and communities around Ireland. During PR5, we have made significant progress in developing our asset health models. Work programmes are recommended based on the experience and judgement of specialist engineers, as well as using standardised asset health and condition-based approaches to target assets that are most at risk of failure. This approach is CNAIM (common network asset indices methodology) aligned and approved by Ofgem in the UK. This allows us to objectively assess the health of assets and their risk of failure now and in the future.

We have developed a value framework and investment decision making support tool to support decision making and to assess and compare value outcomes associated with infrastructure projects. We have assessed the asset-based programmes using this approach, which we plan to further develop during PR6 in advance of PR7.

This assessment includes the following considerations:

- Key performance indicators and corresponding results (value-based outcome measures as defined in the value framework)
- Cost of investment proposal (operational expenditure and capital expenditure)
- Value of risk(s) mitigated by investments (health index, cost, optimised investment timing)
- Cost avoided (operational expenditure and capital expenditure) by mitigation investment

Our value-based decision making process enables ESB Networks to quantify costs and monetised benefits associated with the reduction in network risk arising from proposed investments. This allows us to take an evidence-based approach to decision making and make risk-informed decisions to prioritise work.

5.3.1 Reliable and resilient infrastructure

Our business plan provides for significant investment in network capacity reinforcements to enable the timely connection of renewable generators, and to accommodate growing demand for electricity from new housing developments, industrial growth, and the electrification of heat, transport and industry. This investment will reduce loading on network assets, reduce the risks associated with equipment failure, and provide targeted capacity in key high growth urban areas in line with growing customer demand.

The proposed capacity reinforcement works will provide urgently needed capacity at all voltage levels, including large blocks of additional capacity headroom at new stations. This will reduce complexity and enable us to speed up customer connections. The capacity added will include:

- 562 MW of firm transformer capacity at 110 kV in Dublin
- 1.1 GW of firm transformer capacity at 38 kV (nationwide)
- 1.5 GW of firm transformer capacity at medium voltage (nationwide)

As well as enabling more customer connections, the additional capacity on the system will allow more outages to take place. This will enable maintenance and asset replacement works which are necessary to improve the **safety, reliability, and resilience of the network**. This investment will also facilitate **electrification** by providing increased capacity at medium voltage level, and will **ensure that voltage quality** is maintained, ensuring that delivered power meets the required **power quality standards**. Upgrades of the MV network will **increase efficiency** by reducing network losses and will deliver environmental benefits.

In addition to capacity reinforcements, our plan includes significant investment in **network reliability and resilience**, which our customers and stakeholders have indicated is a priority. This investment – which includes targeted asset replacement, the deployment of automation devices on the MV network, and increased vegetation management – will ensure that the electricity network will remain reliable and resilient, even in the face of increased demand and disruptive climate events. This will contribute to a reduction in the frequency and duration of unplanned outages, so that by 2030, customer minutes lost (CML) will decrease to 75 minutes per year and customer interruptions (CI) will decrease to 90 per year. Further detail on the specific programmes of work proposed to achieve this is included in Section 6.3. These investments will deliver a safer, more dependable electricity system, and help to provide customers with the confidence to adopt new low-carbon technologies.

5.3.2 Decarbonised electricity

The investments we make during PR6 will directly support decarbonisation and assist in reducing Ireland's dependence on imported fossil fuels. Our investment will support the connection of 4.4 GW of utility-scale renewable generation projects to the distribution network, as well as 30% annual growth in Mini-Generation, Microgeneration, and Small-Scale Generation to the LV network. We will also connect customers to the transmission network, as directed by EirGrid, to support the CAP24 target of 22 GW of renewable generation connected by 2030.

As well as delivering additional capacity to enable renewable connections, we plan to support customers by further streamlining processes for connecting renewable generation, and by moving to process two batches of enduring policy connection (EPC) applications per year to accelerate renewable connections.

The electrification of heat, transport, and industry is critical for the decarbonisation of society. Under this plan, we plan to continue working closely with EV charge point operators, housing developers, and large commercial customers to develop standards, solutions, and innovations to accelerate electrification and enable widespread LCT uptake.

5.3.3 Empowered customers

Our PR6 plan builds on developments in PR5, including the rollout of smart meters, the launch of the networks online account, and investments in digital and data to empower customers. By investing in new operating systems, cybersecurity, data and digitalisation, and customer engagement platforms, we will make it easier for customers to safely and securely interact with us in ways that suit them, whether that is through a digital channel or a human agent. All core customer journeys will be optimised by the end of PR6 to ensure more convenient, seamless, and simple interactions with ESB Networks. Our investments in **digital and data** will enable us to develop new tools, products, and insights to improve communications with customers and integrate processes to enhance customer experience. For example, we are targeting 80% proactive digital notifications for outages by the end of PR6 (up from 65% in PR5) to free up call centre agent time for more complex queries. We are also seeking to significantly reduce standard quotation timelines by streamlining processes using digital and data.

Customer benefits arising from digital and data include:

- Predictable response times on applications, service requests or queries.
- A personalised service through digital notification.
- Self-service options using digital service requests.
- Self-serve options for different types of connections.
- Transparency and predictability on the status of new connections, network development, renewable connections, and other customer services.
- Trusted data and insights to assist in decision making.
- Improved customer experience, as call centre agents can access digital knowledge base.
- Faster repair of faults due to better data.
- Fewer planned outages.

The impact of our investments in empowering customers will be measured by our customer satisfaction (CSAT) score. We are seeking to increase this to 83% by 2030, acknowledging that this will be challenging given the scale of our investment programme and the impact that this will have on customers.

Through investments in self-serve and digital tools, we will free up human agent time in the national customer contact centre (NCCC) to deal with more complex and time consuming queries, with a view to maintaining a 90% customer satisfaction score for the NCCC. By 2030, 80% of customers affected by an outage will get updates via the digital notifications app.

5.3.4 Smart, flexible, and digitally enabled network

Investments in IT, digital and data, cybersecurity, and the Distribution Markets and System Operation (DMSO) function will ensure that we are ready to efficiently operate the network of the future and empower customers to benefit fully from their role in providing flexibility to the system. By 2030, there will be millions of interconnected devices connected to the network (including heat pumps, EVs, batteries, and solar panels). The actions we take now will ensure that ESB Networks is prepared to take an active role in managing the flows of electricity between devices in a way that overcomes network constraints and capitalises on the availability of renewables. These investments will also enable customers to fully leverage the capability of their smart meters to take advantage of flexibility markets and make better decisions about their energy use.

Our **Smart+ and meter transformation** investments will ensure that customers can benefit from up to date smart meter technology, advanced insights about their energy use to help them make informed decisions, and accurate payments for Microgeneration exports. They will also improve choice for customers by creating routes to market for new suppliers, increasing competition, and enabling energy sharing. Investments in **operational transformation** will ensure that we can continue to provide a safe, secure, and reliable distribution system operation for customers.

Flexibility market transformation will create new revenue streams for customers and enable them to play their part in tackling climate change by engaging in flexibility initiatives and demand reduction events.

5.3.5 Environment, safety, and sustainability

Our proposed approach to environment, safety, and sustainability will ensure that our operations can support and enable Ireland's transition to a clean electric future while also preserving our natural habitat and species, and protecting the health and wellbeing of our people, contractors, and the communities we serve. Our 'Networks for Nature' biodiversity strategy 2024-2029 , launched this year, underscores our commitment to integrating biodiversity considerations into all aspects of our business, and our commitment to a regenerative approach to nature and communities. Through the electrification of our yellow van fleet and energy efficiency upgrades to our buildings, we can demonstrate the benefits of electrification and deliver long term value for our customers and stakeholders.

Safety will remain front and centre of our work during PR6. As we scale up to deliver a much larger capital investment programme, we are proposing to undertake significant measures to protect the health, wellbeing, and safety of the public and the communities we serve. Our risk-based approach to asset maintenance and replacement will reduce risks associated with aging assets, while our public safety campaigns will help to ensure a high level of awareness around the risks and dangers associated with the electricity network.

Our commitment to achieving an incident- and accident-free workplace is reflected in our implementation of a 'just culture' framework, which promotes an atmosphere of trust and encourages open and honest reporting of incidents and errors. By implementing a 'just culture', ESB Networks aim to foster a positive safety culture, enhance employee engagement, and improve overall safety performance.

Table 8: Linking key investments to key customer benefits

Investment Area	Safe, Reliable and Resilient Network	Decarbonised Energy	Empowered Customers	Smart, Flexible Digitally enabled Network	Environmental, Safety and Sustainability
Empowering Customers (incl. New Business)	Yes	Yes	Yes		
Distribution Markets and System Operation		Yes	Yes	Yes	
Network Capacity Reinforcements	Yes	Yes	Yes	Yes	
Generator Connections		Yes			
Strategic Asset Management	Yes			Yes	Yes
Transmission Delivery	Yes	Yes	Yes		
IT and Telecoms	Yes	Yes	Yes	Yes	Yes
Other		Yes		Yes	Yes

5.4 Summary of outputs

Our proposed total investment programme of €13.4 bn (baseline investment plus agile investment framework) is designed to deliver tangible outputs and benefits for customers. We have critically evaluated the investment needed to deliver the outputs listed below and have proposed an agile investment framework that will enable us to deliver the full programme of work. However, this is a very stretching and ambitious programme, and we face significant competition for resources from other countries and sectors who are seeking to deliver their own Net Zero objectives. Given the scale and the inherent challenges, uncertainties, and risks involved, we may need to revise the outputs in this plan in response to external developments or to respond to new policy priorities as the need arises.

Category	Benefits	Metrics
Safe, Reliable and Resilient Network 	Additional network capacity Asset health improvement Resilience to extreme weather events Reduction in frequency and duration of unplanned outages	• Over 500 capital projects delivered • 562 MW of firm transformer capacity at 110 kV (Dublin) • 1.1 GW of firm transformer capacity at 38 kV (nationwide) • 1.5 GW of firm transformer capacity at medium voltage (Nationwide) • 743 MVA of LV capacity • 6 x 110 kV line refurbishment projects • 15 x 38 kV substations uprated • 18 x new 38 kV substations energised (11 driven by capacity and 7 driven by asset life) • 16 x 110 kV station uprated (including 5 renewable hubs) • 27 x new 110 kV substations energised • 75 customer minutes lost, 90 customer interruptions • 45,725 MV pole replacements • 4,550 LV pole replacements • 2,257km MV conductor replacement • 9,000km of MV network converted to 20 kV • 231 transmission projects • 138 additional transmission projects progressed • Robust cybersecurity system
	Public safety work programmes	• Delivery of the rural and urban public safety hazard patrol programme
	Response to storm events	• Respond to all storm events with continued emphasis on public safety and restoring power as soon as possible
	Load index management	• 100% of current LI4 and LI5 110 kV substations reinforced

Category	Benefits	Metrics
Decarbonised Energy 	Reduced dependence on imported fossil fuels Renewable generation	• 4.4 GW of renewable generation connected at distribution level • Support the CAP24 target of 17 GW of onshore renewable generation connected by 2030 (transmission and distribution) *This will be dependent on renewable project development and delivery timelines as well as transmission and distribution project delivery and risk management.* • 255 new renewable connections, hubs, and reinforcement projects (estimate) • Forecasted 40,000 Microgeneration connections per year along with continued growth in Mini-Generation and Small-Scale Generation
	Flexibility	• ~11.3% additional flexibility delivered per the National Energy Demand Strategy • ~4.2% additional flexibility delivered under Area 1 – smart services (implicit flexibility) • ~3.9% additional flexibility delivered under Area 2 – demand flexibility and response (explicit flexibility) • ~3.2% additional flexibility delivered under Area 3 – new demand connections (non-firm flexible connections) • New operating management system • 12 year cyclical replacement programme for smart meters commenced
Empowered Customers and Enhanced Customer Experience 	Personalised and proactive communications, especially during outages and planned maintenance	• 50,000 homes (G1/G2) customers connected per annum • 83% customer satisfaction by 2030 • Maintain 90% national customer contact centre satisfaction • Empower between 176,000 and 236,000 existing customers to be low-carbon technology (LCT) ready for 2040 • 1 million EV/680k eHeat (this will be dependent on customer adoption) • 80% of customers to get proactive notifications about outages through digital app • Fair and inclusive services, support for vulnerable customers

Category	Benefits	Metrics
Smart, Flexible and Digitally Enabled Network 	Smart technologies to optimise network performance and support future energy demands (electrification), openness, and transparency Implementing innovative solutions and technologies to reduce operating costs and improve efficiency	• Integration of data, tools, and systems to enhance organisation effectiveness to serve our customers • Data at the point of need for customers and employees • Improved digital collaboration between customers and ESB Networks, and also across business teams • Self-serve options for customers • Centralised, standardised approach to key business processes, facilitating transparency
	Driving innovation in the energy sector	• Pilot projects and collaboration with industry stakeholders
Environmental, Safety and Sustainability 	Reducing environmental impact of network operations, including biodiversity and carbon reduction	• 69% of yellow van fleet electrified • 51% reduction in carbon emissions from building • Annual CSRD report • Implement biodiversity net gain on our projects as per 'Networks for Nature' biodiversity strategy • Continue to work internally and with our contract partners to achieve excellence in safety performance

6

Safe, Reliable, and Resilient Infrastructure

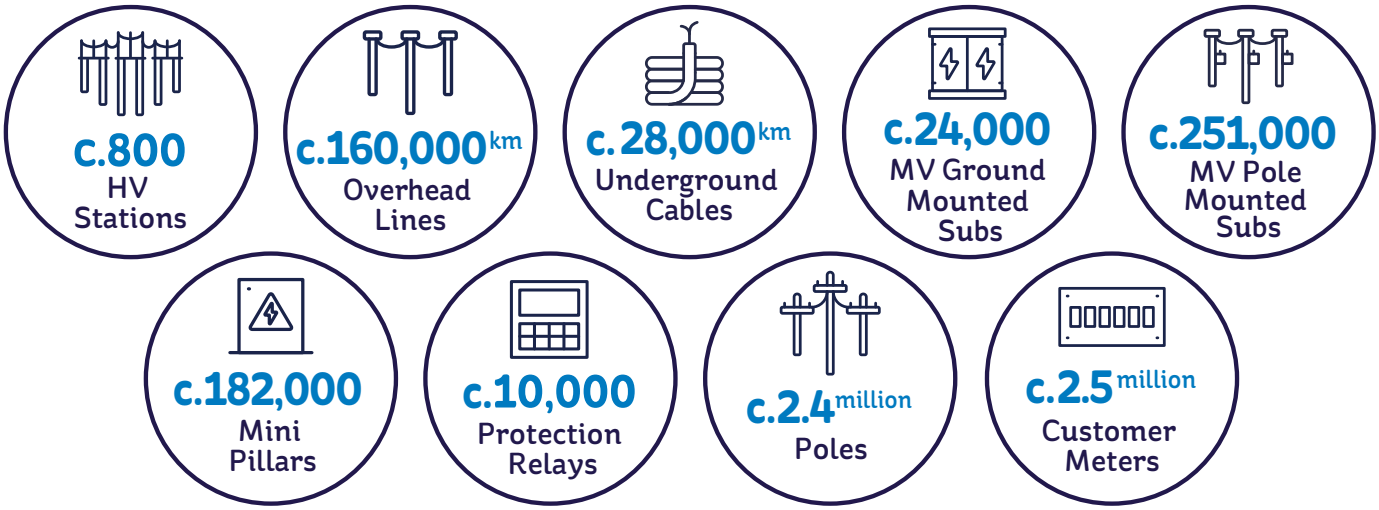
6.1 Introduction

Safe, reliable, and resilient electricity infrastructure is a cornerstone of Ireland's modern economy and a key requirement for economic growth, housing, and achieving Climate Action Plan targets. As customers adopt low-carbon technologies (LCTs) such as heat pumps, electric vehicles (EVs), and renewable generation, demands on the network will increase significantly and the quality, condition, and performance of the network will become increasingly important. We need to maintain robust and modern infrastructure to ensure that we can integrate new technologies without compromising on safety or reliability.

Based on projections in the National Planning Framework, the Irish population will grow by around 1 million people by 2040. Additional electricity network capacity will be needed to support new housing, infrastructure, and industrial growth, as well as the uptake of low-carbon technologies (LCTs). This will result in more connection applications of all sizes, as well as higher levels of network utilisation by existing customers. The electricity network must be capable of meeting higher levels of peak demand and more intensive network utilisation.

The electricity system comprises transmission and distribution networks, and includes all substations, overhead lines, and underground cables that are used to bring electricity to Ireland's 2.4 million domestic, commercial, and industrial customers. It includes approximately 160,000km of overhead network, 28,000km of underground cables, and around 800 HV substations (including both customer-owned substations and ESB Networks-owned substations).

Figure 16: The electricity system in numbers



As is the case with many distribution networks across Europe, much of our existing network infrastructure is over 50 years old. This presents risks relating to asset quality, condition, and performance, affecting day to day reliability and making it more vulnerable to the impact of climate change. More extreme weather events (including storms, flooding, and increased wind speeds) are causing damage to the overhead network, while rising temperatures and higher rainfall are contributing to longer growing seasons, faster vegetation growth, and water damage.

To maintain reliable and resilient infrastructure to meet the needs of customers and society, significant investment is needed in additional network capacity at all voltage levels (high, medium, and low voltage), as well as significant investment in asset maintenance and replacement, and measures to improve continuity of supply (including automated self-healing network technologies and more intensive timber-cutting programmes).

This section of our business plan outlines in detail the measures we plan to take to maintain a reliable and resilient network, and the investments needed to meet the needs of customers now and in the future.

In summary, this includes:

- Increasing the capacity of existing infrastructure and adding new distribution network capacity.
- Strategically replacing aging infrastructure to improve the resilience and reliability of the network and minimise the impact of climate change.
- Adopting a risk-based approach to asset maintenance and replacement programmes to enhance public safety and minimise customer disruptions.
- Implementing more extensive tree cutting and installing automated devices on the MV network to reduce the frequency and duration of power outages.
- Connecting renewable generation to support the target of 80% of electricity demand from renewables by 2030.
- Delivering a secure supply of electricity to meet the needs of our 2.4 million customers.
- Deploying new digital, data, and cyber technologies to enhance customer experience, improve network efficiency, and minimise risk.
- Investing in the processes, systems, and capabilities necessary to operate the distribution network in a way that optimises efficiency and maximises the use of renewable energy.

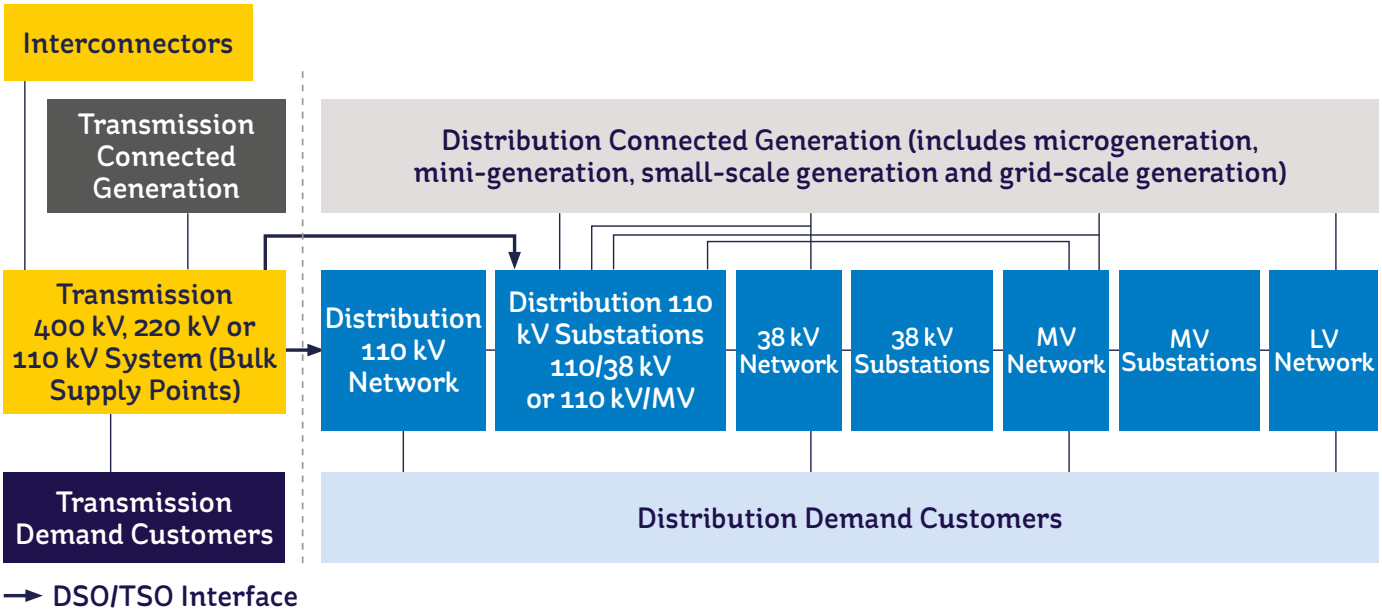
6.2 Distribution network capacity

6.2.1 Reasons to invest

Significant investment is required to ensure that the distribution network has sufficient capacity to connect renewables and meet unprecedented demand arising from population growth, new housing development, economic growth, and the electrification of heat, transport, and industry.

The distribution network includes 110 kV network and all voltage levels below this in the Dublin area, and 38 kV network and below outside of Dublin, as outlined in Figure 17 below.

Figure 17: Structure of the electricity transmission and distribution networks



Explainer: Network capacity and peak demand

Network capacity: When we refer to network capacity, we mean the ability of the network to increase the flow of electricity to serve increasing electricity needs of existing customers and for new customers connecting to the network. This is similar to the flow of water in water mains from water treatment plants. As demand grows, more pipes are needed; they may need to be replaced with wider diameter pipes for larger volumes, and new or expanded water treatment plants are required. Similarly for electricity, we will need more overhead lines (in many cases with greater carrying capacity), new underground cables, and new substations at different voltage levels to meet the needs of customers. The capacity on the network must be sufficient to meet peak system demand (see below) and address local constraints so that electricity can flow smoothly around the network.

Peak demand refers to the moment when the electricity network experiences the highest demand for power in a given period. Ireland recorded a new peak on Wednesday, 20th November 2024 when peak demand reached 5,639 MW.

New connection applications are growing across the board, from domestic to very large commercial customers. Under the Climate Action Plan, there is a target for Ireland to reach circa 1 million EVs, 680,000 heat pumps, and 22 GW of renewables connected to the electricity system by 2030. We also anticipate that around 50,000 new homes will be built each year, and significant power will be required to electrify seaports, inland waterways, airports, and public and private transport under the Climate Action Plan and Alternative Fuels Infrastructure Regulation. More power will be required to electrify industrial heat.

The additional network capacity required to meet this demand varies significantly across geographic locations, depending on existing infrastructure and historical demand. In some locations, additional network capacity is required at high voltage, in some locations at medium or low voltage, and in many locations at all voltage levels. Substantial and sustained investment in network capacity will be needed over the next three Price Reviews, starting in PR6, to ensure that the entire electricity distribution network is Net Zero-ready by 2040. During PR6, we intend to prioritise investment to address the following issues:

- ***HV stations:*** Currently 61 HV substations on the distribution system (comprising both 110 kV and 38 kV substations) are classified as load index 5 (LI5) under the load indices ranking metric. Load indices were developed by Ofgem, the UK energy regulator, to objectively measure the capacity utilisation of network assets and how close they are to maximum capacity. LI5 rating means that these substations have reached full capacity and mitigation measures are required. LI4 means that substations are fully utilised, and mitigation should be considered. Figure 18 below indicates the load index status of the existing DSO HV substations. In 2023, 95 HV substations were deemed fully utilised, with 61 substations ranked as LI5 and 34 substations ranked as LI4. ESB Networks has a significantly higher percentage of LI5 substations when compared to GB DNOs.

Figure 18: HV station load indices (2023 data)

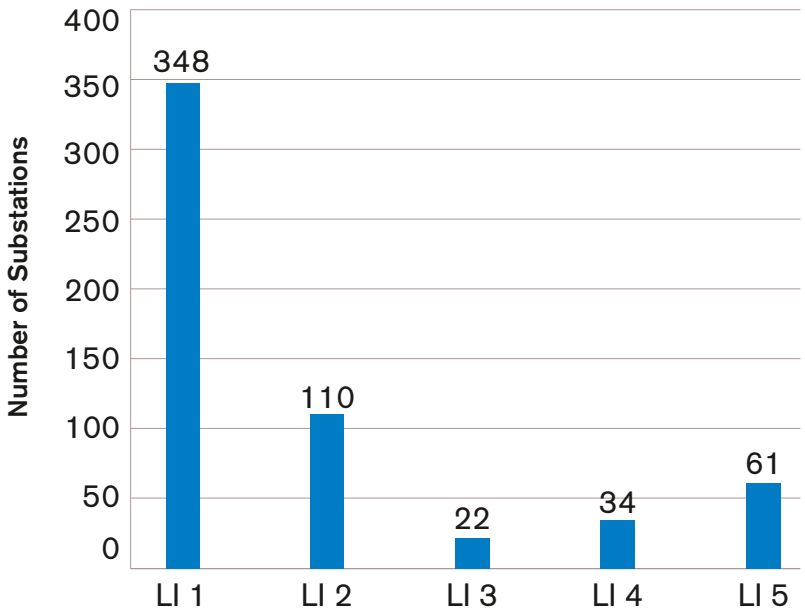
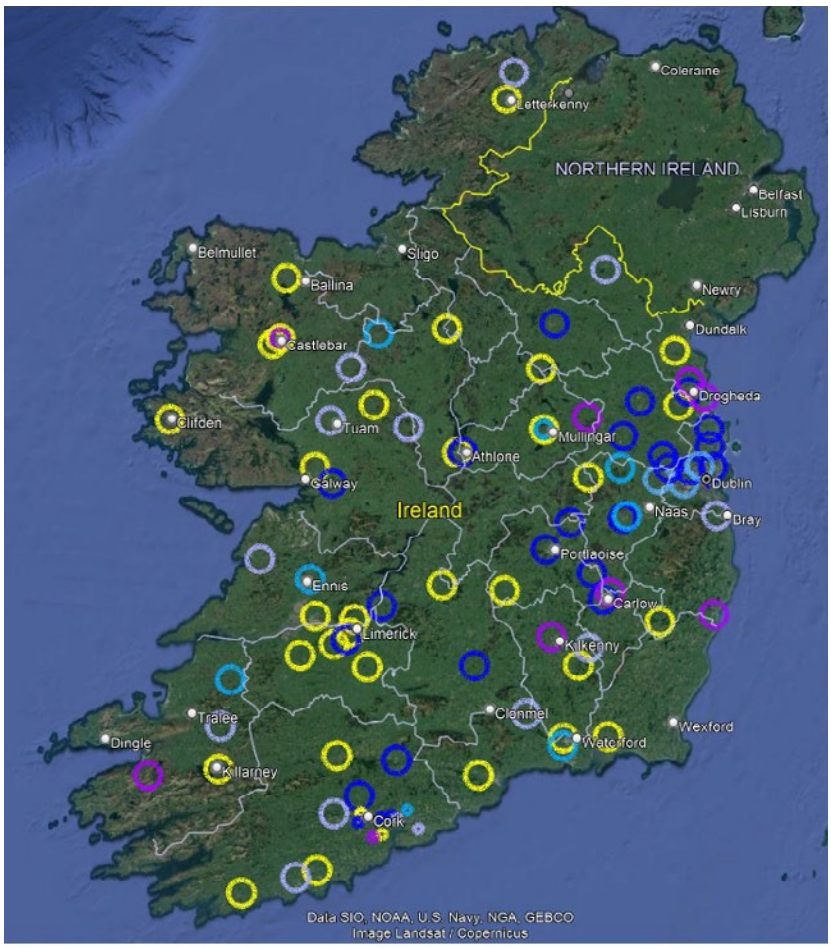


Figure 19: PR6 distribution high voltage substation projects



Legend

- Dark Blue - New 110 kV station
- Light Blue - Uprate 110 kV station
- Dark Purple - New 38 kV station
- Lilac - Uprate 38 kV station
- Yellow - Projects which will start in PR6 and finish 2030+

- ***Customer demand:*** There was considerable growth in new large-scale (>400 kVA) connection applications between 2021 and 2024 across a range of sectors, including housing, electrification of transport, public sector, and industrial and commercial customers. Many of these applications involved large point loads, such as high-speed EV public charging infrastructure, which requires significant capacity in areas with historically low levels of demand, such as motorway service stations. The number of large-scale connection applications from transport customers grew from 53 for the full year in 2022 to 108 for the first half of 2024. Similarly, mixed use developments, which include housing, grew from 21 in all of 2022 to 36 for the first half of 2024.

  This growth reflects more ambitious policy targets for housing and climate action which have been introduced since the start of PR5, and we expect this growth to continue during PR6 and beyond. Large-scale connection applications that are in excess of 400 kVA require a detailed network engineering planning study before an offer can be issued, and many require additional reinforcement works to add capacity before customers can be connected. In addition to a growing number of new connection applications, the scale of network capacity required by these customers has also increased substantially.

Table 9 below shows the diversified new demand capacity in MVA connected to the distribution system over the last five years. G1 and G2 represent new residential connections (G1: apartments and housing schemes; G2: single domestic connections). G3 represents new business (commercial, industrial, new technology) connections. It should be noted that the table below excludes increases in existing demand facilitated over that period. The connected diversified new demand over the last five years is approximately 1.4 GW.

Table 9: Diversified new demand capacity connected by year

Type of New Connection	2019	2020	2021	2022	2023
G1, G2, Contracted (MVA)	326	320	319	433	460
G1, G2 After Diversity Max Demand (MVA)	132	127	126	166	171
G3 <=4MVA Contracted Maximum Import Capacity (MIC), (MVA)	141	128	114	142	184
G3 <= 4MVA MIC Impact Factor (MVA)	106	96	86	107	138
G3 >4 MVA Contracted MIC (MVA)	6.5	10	21.6	12	97
G3 >4MVA MIC Impact Factor (MVA)	5	8	16	9	73
Total Diversified Demand Capacity Connected	**243**	**231**	**228**	**282**	**382**

During PR5, ESB Networks commissioned Charles Rivers Associates (CRA) to forecast* demand growth (both existing and new demand) up to 2040 based on current policies and targets. This considered a range of demand drivers including population growth, housing, electrification of heat and transport, industrial and economic development, impact of flexibility, smart charging, Microgeneration, and current government supports for various schemes to increase the pace of decarbonisation.

** Electricity Distribution Network Capacity Pathways Consultation Report Delivering the Electricity Network for Ireland's Clean Electric Future DOC-081223-HV*

Table 10 below outlines the level of demand growth potential during PR6, based on current policy objectives and regulations. While the scale of this is considerable, we don't yet know where exactly some of this new demand will materialise. It is likely that some of it will emerge in the form of large point loads, which can rapidly absorb available capacity in an area. These large loads are often difficult to predict and plan for. It is also difficult to plan for future policy changes which could impact on our projections over the course of PR6. Given these uncertainties, it is important that our investment framework is sufficiently agile and responsive to accommodate unforeseen changes.

Table 10: Potential capacity growth between 2025 and 2030 inclusive based on existing policies*

Driver	Indicator	MVA Demand Over 6 Years (2025-2030 inclusive)
Housing	30,000 housing units per year 40,000 housing units per year 50,000 housing units per year	~630 – 990 MVA ~840 – 1,320 MVA 1,050 – 1,650 MVA
Electrification of Homes	Retrofitting 400,000 units	~400 – 1,200 MVA
Economy and Industrial Heat	Last 12 months ~100 MVA	~600 MVA
Electrification of Public Transport	Bus depots, DART+, Metrolink (Dublin only)	~270 MVA
AFIR (Alternative Fuel Infrastructure Regulation)	Public recharging infrastructure – 945,000 EVs	~800 – 1,000 MVA
	Ports and airports	Under evaluation

** The home retrofits referred to in this table is the target number of heat pumps to be installed in retrofitted homes. The overall CAP24 target for retrofits is 500,000.*

Explainer: Diversity and after diversity maximum demand (ADMD)

In planning, to meet future network demand, ESB Networks considers a combination of historical utilisation and future assumptions to predict the additional capacity that will be needed. Rather than adding up the maximum possible electricity consumption of all customers connected, a diversity factor is applied which makes allowance for the fact that not all electrical devices or systems will be operating at their maximum capacity at the same time. This provides a more realistic measure of future demand and efficient use of the existing distribution network.

In Ireland, every domestic customer has a contract for at least 12 kVA maximum import capacity (MIC). Without a diversity factor, the network capacity required for 2 million customers would be 24 GW. In reality, peak demand on the network is between 5-6 GW, and includes all domestic and business connected customers (both distribution and transmission). The installed capacity between transmission and distribution system is around 8.5 GW.

An after diversity maximum demand (ADMD) standard is used to calculate the amount of network capacity to provide per customer. Before 2019, the ADMD capacity provided per household was 2.5 kVA. However, in 2019, this standard was increased to 5.5 kVA for houses and 3.5 kVA for apartments to make provision for increased load arising from the expected uptake of low-carbon technologies (LCT). LCT devices, including heat pumps and EVs, are likely to provide less diversity than traditional devices (e.g. an electric shower or a cooker) as they tend to be used continuously over long periods and at the same time as similar devices are being used by other people (e.g. heat pumps in winter). The revised ADMD standard is now used to plan all new domestic load on the network. For commercial and industrial loads, diversity is applied by multiplying the customers' maximum import capacity (MIC) by an impact factor based on a combination of past utilisation and future assumptions, depending on how long the customer has been connected to the network.

Note that, in Table 10 above, the lower MVA figures for housing are based on all new units being apartments, so an ADMD of 3.5 kVA is used. The higher figure assumes that all new units are houses, so an ADMD of 5.5 kVA is used.

6.2.2 Progress during PR5

Throughout PR5, ESB Networks has responded to meet the needs of customers in a very dynamic environment. We have delivered, and will continue to deliver, large HV projects that facilitate economic growth, provide new connections and improve security of supply for customers. HV station projects and 38 kV overhead line projects energised include Kilcoole 38 kV station, Adamstown 110 kV station, Grangecastle 110 kV station, Corduff 110 kV/MV station, Mullagharlin 110 kV station, Portlaoise 38 kV/MV and Rathkeale 38 kV/MV substations.

There was a significant increase in the number of large commercial and industrial customers seeking connection to the MV and HV network during PR5 that were not part of the PR5 submission. While many of these connections were accommodated within existing network capacity, significant HV capacity reinforcements were needed for others. Examples of projects that were not part of PR5 submission and will have progressed significantly by the end of PR5 are a new 110 kV station in South County Dublin for a hospital seeking an increase in its maximum import capacity (MIC)*, and the new Walterstown 110 kV station driven by the electrification of light rail. A large number of other projects, driven by large customer demands, are also progressing through capital approval and construction stages. We also uprated circa 1,650km of MV network from 10 kV to 20 kV, to significantly increase network capacity in these geographic areas.

The nature of HV project delivery means that it takes a number of years to progress projects from the initial concept stage through to the construction stage (the point at which significant costs are incurred). In the majority of the cases above, significant MV interim supplies were provided to customers to enable the energisation of their developments while HV works were progressing.

A key component of success in ensuring successful delivery in PR6 is to ensure that projects are progressed through the planning and approval stages in 2024 and 2025 in preparation for PR6.

6.2.3 Our plan for PR6

During PR6, we plan to deliver targeted network capacity reinforcements to enable renewable generators to connect to the network, and to meet growing demand for electricity across all sectors. We propose to focus our investment on specific areas of the network where there are heavily loaded assets and where significant growth is likely to occur in the short term. This will address areas of the network where capacity is already constrained or where constraints are likely to emerge in the near future.

Where demand increases outside of these areas, we will deliver greater value for customers by safely increasing network utilisation (i.e. absorbing demand growth by increasing loading on existing assets) and seeking smart, non-wires solutions to reduce peak demand where possible. This will require innovation and best in class asset management and delivery. It will also involve carrying a level of risk on the network; however, this is balanced by an investment programme that is achievable within PR6. Where a smart, non-wires solution is not achievable, we will seek to add new distribution network capacity to facilitate customer needs through the uncertainty mechanism.

** MIC stands for Maximum Import Capacity. It is the maximum volume of electricity in kVA that a customer is permitted to import.*

Our investment approach prioritises the reinforcement of 110 kV substations. This is because, outside of Dublin, 110 kV substations form the boundary between the transmission system and the distribution system, acting as bulk supply points (BSPs) for energy to flow from the transmission system to the distribution network. New BSPs are needed to meet growing customer demand on the distribution system, and these 110 kV reinforcement projects will play a vital role in meeting customer needs in areas that are heavily loaded.

Some stakeholders and customers with potentially very high capacity requirements have not yet established the scale of their electricity needs, or scheduling of their plans, including some of the TEN-T ports that are required to comply with the Alternative Fuel Infrastructure Regulation by 2030. In addition, national policies are evolving and could bring further demands on the network. If these additional demands materialise during PR6, we are proposing to bring forward investment decisions in localised areas using the uncertainty mechanism.

6.2.4 High voltage network capacity

The high voltage (HV) distribution network acts as the primary pathway for the delivery of power from the transmission networks (400 kV, 220 kV, and 110 kV) operated by the TSO to the medium voltage (MV) and low voltage (LV) distribution networks which serve the majority of ESB Networks' customers. During PR6, we plan to reinforce and uprate the HV distribution system to meet growing demand. We also plan to manage aging assets on the network so that we can connect and maintain secure supplies of electricity to our 2.4 million customers.

This work would include:

- Construction of new 110 kV substations
- Uprating of existing 110 kV substations
- Installation and uprating of arc suppression coils (ASC) in 110 kV and 38 kV substations
- Construction of DSO-operated 110 kV lines/cables
- Construction of new 38 kV substations
- Uprating of existing 38 kV substations
- Installation and uprating of 38 kV voltage regulators in 38 kV substations
- Construction of new 38 kV lines/cables
- Uprating of 38 kV lines and cables

HV capacity projects

ESB Networks is responsible for building and maintaining the transmission system and carrying out all functions relating to the electricity distribution system, including asset management, planning, construction, maintenance, and operation of the high, medium, and low voltage distribution network.

The DSO (ESB Networks) to TSO (EirGrid) interface boundary typically occurs at the 110 kV busbar in 110 kV substations nationally. Within the Dublin City area, the boundary occurs at the 220 kV interface, and the DSO operates a number of the 220 kV/110 kV transformers and 110 kV circuits within Dublin City. For the DSO to develop new 110 kV substations or to add capacity to existing substations, an agreement is required with EirGrid to ensure the transmission capacity required is available and to ensure the development of the overall electricity system is optimised. Given the requirement to deliver this new capacity at pace, these agreements will need to be finalised before the start of PR6 for ESB Networks to have an opportunity to deliver these projects within the five-year window. This will require close collaboration with EirGrid to deliver the new 110 kV distribution station capacity to supply distribution-connected customers.

Table 11 provides details of HV capacity projects that are proposed to be completed during PR6.

Table 11: Summary of projects proposed for PR6

Project Type	Number of Projects
38 kV Voltage Boosters	13
38 kV Overhead Lines (New and Uprate)	38
38 kV Substations (New and Uprate)	26
110 kV Substations (New)	27
110 kV Substations (Uprate)	11
220 kV Substations	4
38 kV and 110 kV UG Cables	5
38 kV ASC	1
38 kV Circuit Breaker	1
38kV to 110kV Conversion	1
Total Diversified Demand Capacity Connected	**127**

Note that approximately 82% of the planned investment in HV capacity development in PR6 will go towards projects which will be completed within the Price Review period, and the remainder will be invested in projects that commence in PR6 and will be completed in the early years of PR7.

Table 12 below outlines 43 additional projects we are planning to start during PR6 with a target for completion during the PR7 period (2031 to 2035). Activities during PR6 will include early project works such as TSO agreements, site acquisition, design, planning consents, and capital approval (CA), and will enable these projects to proceed rapidly into construction and energisation during PR7.

Table 12: Summary of projects that are proposed for delivery during PR7

Project Type	Number of Projects
38 kV Substations (New and Uprate)	7
110 kV Substations (New)	32
110 kV Cables	4
Total Diversified Demand Capacity Connected	**43**

All of the fully utilised (LI4 and LI5) 110 kV substations and a significant number of 38 kV stations will be reinforced within the current PR6 proposal. However, some LI4 and LI5 38 kV substations will not be reinforced until PR7 and PR8. A number of substations with existing load indices of LI1 to LI3 will become fully utilised during the PR6 period due to the demand growth. Several locations have been identified where demand growth and peak loading of the substation could be facilitated by a flexible solution, such as battery storage.

As outlined above, we intend to keep this element of our business plan under ongoing review. In the event that further investment is required after options relating to safe loading of assets and smart flexible solutions have been ruled out, we may reprioritise investment projects or seek to bring forward further investment through the agile investment framework and the uncertainty mechanism.

Capacity development plans

We recognise that information about our planned network capacity reinforcements is important in helping renewable generators and large demand customers to plan new projects. We will publish a distribution network development plan (DNDP) in 2025, setting out the distribution system planned investments for the next five to ten years. Linked to this, we will also publish capacity workbooks on our website by the end of 2024 setting out, with as much certainty as possible, the available capacity for new generation and demand connections per substation for the next ten years, based on ESB Networks' current investments. These capacity workbooks will be updated every year, and in 2025 they will incorporate our planned investments in PR6. The DNDP will be updated every two years thereafter.

Medium voltage network capacity

The medium voltage (MV) network is a critical element of the distribution network. As well as directly serving MV-connected demand and generation customers, it acts as a conduit from the high voltage transmission system to the LV network, ensuring that electricity can flow easily to homes, farms, and businesses. A major programme is ongoing to uprate the 10 kV network to 20 kV, which has the potential to double capacity on the MV network with minimal visual impact. By the end of PR5, it is projected that 55% of the 10 kV distribution network and 25% of MV busbars will be converted to 20 kV.

During PR6, we plan to convert a further 9,000km of 10 kV network to 20 kV. To optimise the benefit of the 20 kV conversion programme, we also propose to retrofit 18 existing substations to facilitate 20 kV conversion. This work will be largely delivered by our contractor partners, whose scope of work will also include the installation of automation technologies to address network continuity.

The early stages of the 20 kV conversion programme were mainly undertaken in rural areas to improve voltage quality on the overhead line network. The next phase of the programme will primarily focus on suburban and urban network with significant underground network. This requires significantly more time and increases the cost per kilometre of network converted.

Our MV capacity development plans for PR6 are based on the assumption that we will connect on average 50,000 new homes and 5,500 businesses per year across G1, G2, and G3 customers.

- **G1 customers** include residential apartments and housing estates. In the PR5 period, ESB Networks is on target to connected over 132,000 such units.
- **G2 customers** are residential one-off houses, and ESB Networks will deliver 38,000 of these units in PR5, overdelivering by 30%.
- **G3 customers** are business connections – they are often larger enterprises with significant energy needs.

Table 13: Summary of PR6 MV system improvement proposal

Project Type	Unit	Units Planned
20 kV Conversion of MV OH Lines	km	9000
Station Retro 20 kV Conversion	Projects	18
20 kV Conversion IFTs	Projects	59
MV System Improvements – Proactive	Projects	38
Reactive MV Underground System Improvement	Projects	N/A
Reactive MV Overhead System Improvement	Projects	N/A

Reactive MV system improvements are capacity reinforcements that may be required to facilitate new customer connections. These improvements are delivered reactively on a case by case basis, and can include deep reinforcement, including reconductoring, uprating cables and transformers, and voltage conversion or installation of voltage regulators. MV system improvements also cater for activities that are undertaken to maintain planning and security of supply standards.

LV network capacity

Despite being the most extensive element of the distribution system, the LV network, operating at a nominal voltage of 230 V (single-phase) and 400 V (three-phase), has undergone the least amount of planned development over previous Price Review periods. This LV network has expanded organically over many decades with the addition of one-off new domestic and commercial loads, particularly on the rural single-phase network. This reactive approach has not posed an issue to date, as domestic conventional loads have always been relatively small, or in the case of larger loads, operating for only a short duration (e.g. electric showers).

Traditionally, there has always been significant diversity between these loads in LV groups. However, low-carbon technology (LCT) loads are large (e.g. typically 7.5 kVA for EV charging at full capacity) and operate for extended periods of time (charging an EV battery from empty may require six to eight hours, two to three times a week, depending on the vehicle and the distance travelled). This reduces the diversity between loads in the area and increases the demand on LV network. Recognising this change in usage on the LV network, dedicated funds were allocated in PR5 to reinforce the LV network in a planned and proactive manner, using data to inform decision making and prioritise LV projects.

Proactive LV system improvement programmes involve the delivery of network capacity reinforcements, which are prioritised using the FIMSS methodology (see explainer below). The intention of this proactive capital investment is to ensure that capacity is available, and that voltage quality is within standard, for all customers in the LV customer group to be empowered to adopt LCT in line with our 'Build Once for 2040' approach. This involves:

- Replacement of existing transformers with larger ones to increase capacity.
- Splitting of very large groups and adding in new transformers to provide additional capacity.
- Converting some single-phase network to three-phase.
- Uprating overhead and underground conductors.
- Upgrading aerials and service cables.

Explainer: The FIMSS methodology

The FIMSS methodology stands for forecast, identify, monitor, smart toolkit, and strengthen the network. It is a structured approach used by ESB Networks to optimise planning and decision making for network capacity and development. Below is a brief overview of each component:

1. Forecast: This involves predicting future network demands and identifying potential areas of growth or increased load. Accurate forecasting helps in planning for necessary upgrades and expansions.
2. Identify: This step focuses on pinpointing specific areas within the network that may require attention or improvement. It involves analysing data to identify weak points or areas that need reinforcement.
3. Monitor: Continuous monitoring of the network is essential to ensure that it operates efficiently and to detect any issues early. This step involves using various tools and technologies to keep an eye on network performance.
4. Smart toolkit: This includes the use of advanced tools and technologies to manage and optimise the network. It involves implementing smart solutions that can enhance the network's efficiency and reliability.
5. Strengthen the network: Based on the insights gained from the previous steps, this phase involves taking concrete actions to reinforce and upgrade the network. This could include infrastructure improvements, capacity enhancements, and other measures to ensure the network can handle future demands.

This methodology helps ESB Networks to plan and deliver a more resilient and efficient network, ensuring that it can meet the evolving needs of our customers.

The level of LCT adoption during PR5 was lower than projected at the start of the Price Review period, and to date has had minimal impact on the network. Positive progress was made in terms of data gathering and analysis to ensure that we plan and deliver in line with the agreed FIMSS methodology. However, it is clear from the analysis carried out that there are potential network weaknesses (particularly in terms of voltage quality on the LV network) which will need to be addressed during PR6 as LCT adoption accelerates in line with the CAP24 targets. This will require a step change in the delivery of proactive LV network investment during PR6 and will rely on greater network visibility.

Changes to the Internal Market for Electricity Directive (IMED) are expected to be reflected in new legislation by January 2025, alongside the publication of the Smart Meter Data Access Code. Once these enabling provisions are available, smart meter data will provide enhanced network visibility regarding the location and nature of LCT uptake on our LV network. This will help us to make the right investments at the right time in the LV network to ensure value for money for customers.

In PR6, ESB Networks plans to bring forth the learnings, tools, processes, and standards initiated and developed in PR5 to empower between 176,000 and 236,000 existing customers to be low-carbon technology (LCT) ready for 2040. The new After Diversity Maximum Demand (ADMD) design standards will ensure that infrastructure put in place is compatible with 2040 targets, with 22,000 additional MV/LV transformers that will be added into the existing network increasing the number of LV network groups by 8% and adding an additional 743 MVA of LV network capacity.

Given the scale of work required to ensure that all LV connected homes and businesses are LCT ready by 2040, and the uncertainty around where and when demand will materialise, our strategy for maximising impact during PR6 is to optimise the use of resources by:

- Focusing proactive LV system improvements on areas of high LCT uptake in urban areas (G1 customers) to maximise the number of LCT ready homes that can be delivered in PR6 within the resources available.
- In cases where a new one-off customer requires a new connection or upgrade works in a rural area (G2 customer), we plan to undertake all necessary reinforcements to ensure that all customers in the same LV group are left fully LCT ready following the works. This 'Build Once for 2040' approach for rural customers is critical as our LV overhead network is over 75,000km in length.

6.2.5 Customer benefits

The proposed reinforcement works will provide urgently needed capacity at all voltage levels to facilitate economic growth, new housing connections, increased demand arising from the electrification of heat and transport, and will improve safety, network reliability and resilience.

Specifically, this programme of investment will deliver the following benefits:

- ***Additional capacity***: The proposed investment in HV and MV systems will reduce loading on existing substations and provide additional capacity at new substations. The proposed works will add the following capacity to the distribution network:
  1. 562 MW of firm transformer capacity at 110 kV in Dublin
  2. 1.1 GW of firm transformer capacity at 38 kV (nationwide)
  3. 1.5 GW of firm transformer capacity at medium voltage (nationwide)

The addition of new capacity will create large blocks of 'headroom' capacity at new substations. This, in turn, will facilitate quicker customer connection times as the complexity of connection method options are reduced. The additional headroom on the system will also enable more outages to take place, thus enabling important work on the network to proceed, such as planned maintenance or asset replacement. This will improve the safety, reliability, and resilience of the network.

- ***Dublin region:*** The CRU PR6 strategy paper specifically mentions the significant growth in demand in the Dublin region and the need to address these security of supply issues in PR6. Our plan for PR6 includes very significant investment across the Dublin region across both the transmission and distribution networks. The Dublin bulk supply points required to supply electricity from the transmission network to the distribution network are critically important to achieve the CRU objectives. We have set out investment plans for the HV, MV, and LV systems that cater for Dublin as part of a country-wide investment programme. Given the significant growth in connections to the network over recent years, there are some parts of the distribution network that have limited capacity and will require the projects identified in this plan to be implemented at pace.
- ***Supports electrification*** by providing increased capacity at medium voltage level.
- ***Reduces voltage drops*** along distribution lines. This is critical for maintaining voltage quality and ensuring that delivered power meets the required power quality standards.
- ***Delivers environmental benefits*** through reductions of network losses.
- ***Enhances energy security and decarbonisation*** through the connection of renewable generation.
- ***Enables economic growth*** by providing increased capacity at medium voltage supporting additional demand connections.
- ***Community empowerment:*** Increased capacity at medium voltage will facilitate community-led renewable projects at a lower cost. These projects can foster engagement and empowerment for local communities, giving these communities a stake in their energy future.

6.2.6 Alternatives considered

In assessing the system capacity reinforcements required for PR6, we considered scoping capacity reinforcements to address all LI4 and LI5 substations. Although this would reduce risk and further futureproof the network, it would put an additional cost burden on customers, and it would also be very challenging to deliver within the PR6 timeframe due to the scale of resources required to meet the already-challenging scope of work included in our proposed PR6 investment programme. We are therefore planning to focus investments on the most critical projects to maximise impact and prioritise national policy targets relating to housing, economic growth and electrification. At the end of PR6, we will still have a number of heavily loaded substations, even in the event of low-demand growth.

Outside of Dublin, 110 kV substations form the boundary between the transmission system and the distribution system and act as bulk supply points (BSPs) for energy to flow from the transmission to the distribution network. New BSPs are needed to meet capacity needs on the distribution system and will play a vital role in meeting customer demand. We did consider the option of including more 38 kV substations in our plans for PR6 as they also play an important role in providing capacity. However, one 110 kV station will deliver a better solution than multiple 38 kV substations. Adding capacity between the transmission and distribution systems is more urgent, as the delivery timescales for these projects are longer. This will also improve security of supply and meet the needs of more distribution customers as it enables load transfers from neighbouring distribution substations.

Taking into account delivery constraints and options to leverage smart flexible solutions, we believe that our decision to prioritise 110 kV HV substations and delay upgrades to some LI4 and LI5 38 kV substations strikes the right investment balance and will deliver better outcomes for customers.

6.3 Reliability and resilience

6.3.1 Reasons to invest

Our customers and stakeholders have identified network reliability and resilience as a priority in their input to this plan. Electricity plays a vital role in people's lives, and customers need to be able to rely on the electricity network to meet their current and future needs, particularly as they switch to new low-carbon technologies like heat pumps and EVs. Significant, ongoing investment in the network is necessary to maintain existing levels of service for customers.

For the vast majority of customers, ESB Networks provides secure, reliable supplies of electricity, with minimal disruption or unplanned outages. The primary way that network performance is measured is through the two metrics of **customer minutes lost (CML)** and **customer interruptions (CI)**. CMLs are calculated based on the average amount of time in minutes across the full year that a customer is without electricity due to an unplanned outage, when averaged across all 2.5 million customer meters. The CI metric uses a similar method to calculate the average number of interruptions experienced by customers. On average, customers experienced network reliability of 99.949%* of total time on average over the last five years. The 0.051% of time that the network was not available is made up of planned outages, storm-related outages, and unplanned (fault) related outages.

**The performance was 99.947% reliability, with 0.053% in 2023.*

Over the past five years, we have seen an increase in the number of unplanned outages affecting customers as outlined in the charts below. These are primarily caused by faults on the medium voltage (MV) overhead line (OHL) network.

Figure 20: Annual planned and unplanned CML

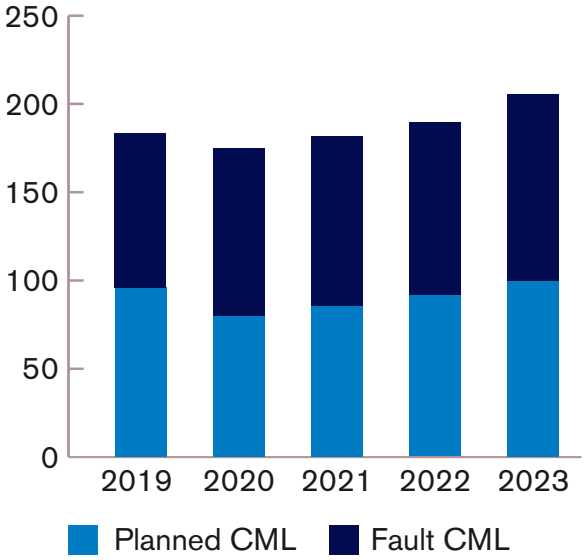
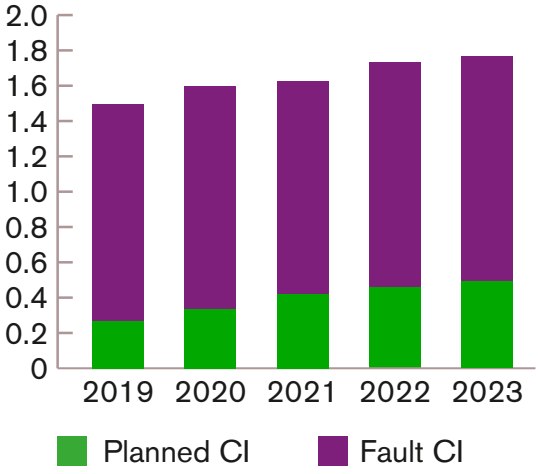


Figure 21: Annual planned and unplanned CI



An unplanned outage is an interruption in the power supply that occurs unexpectedly due to unforeseen issues on the network. These outages are not scheduled and are typically caused by events such as asset failures, severe weather, third-party interference/accidents, or faults like tree branches encroaching on overhead power lines. Unplanned outages can vary in duration depending on the cause and the time required for detection, repair and restoration. Unplanned outages can be further categorised as either transient or permanent.

- ***Transient faults*** are primarily caused by temporary events such as lightning, wind, tree branches, or wildlife. Once these faults occur, they cause a power outage, however the supply can be readily restored either by a technician replacing the circuit fuse or automatically by automatic reclosers and protection relays. Typically, more than 70% of all faults on an overhead network are transient in nature.
- ***Permanent faults*** require repair or manual intervention such as fixing damaged equipment, fallen lines, or significant vegetation-related issues.

A number of interconnected factors are contributing to the upward trend in unplanned outages, including:

- ***Dispersed rural population:*** Due to Ireland's widely dispersed population, the distribution network in Ireland has up to six times more overhead lines as a proportion of the total network compared with other European DSOs. Figure 22 below shows that some other European utilities have a ratio that is close 1:1.
- Due to the scale of our overhead network, the distribution network in rural areas is particularly susceptible to faults caused by wildlife, including bird strikes. Furthermore, invasive species are beginning to emerge as temperatures increase, with woodpeckers in particular causing extensive damage to network assets.

Figure 22: Customer interruptions (CI) and ratio of overhead network to underground cables international comparison

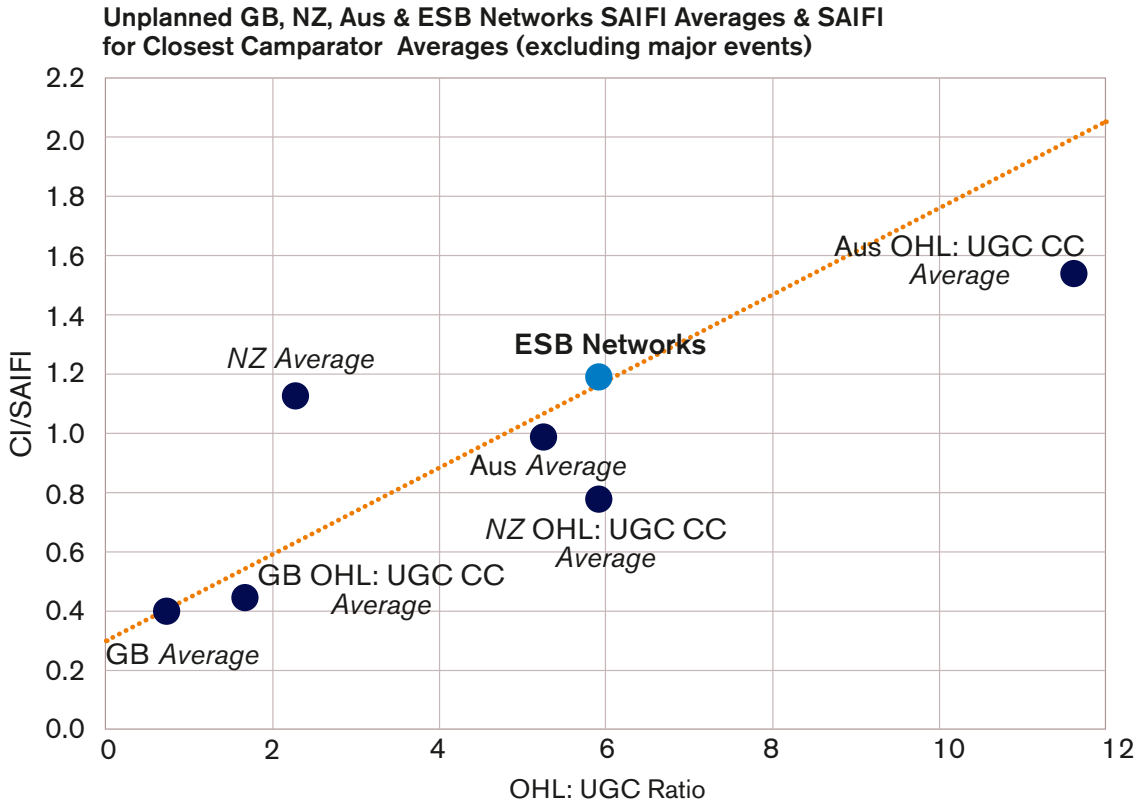
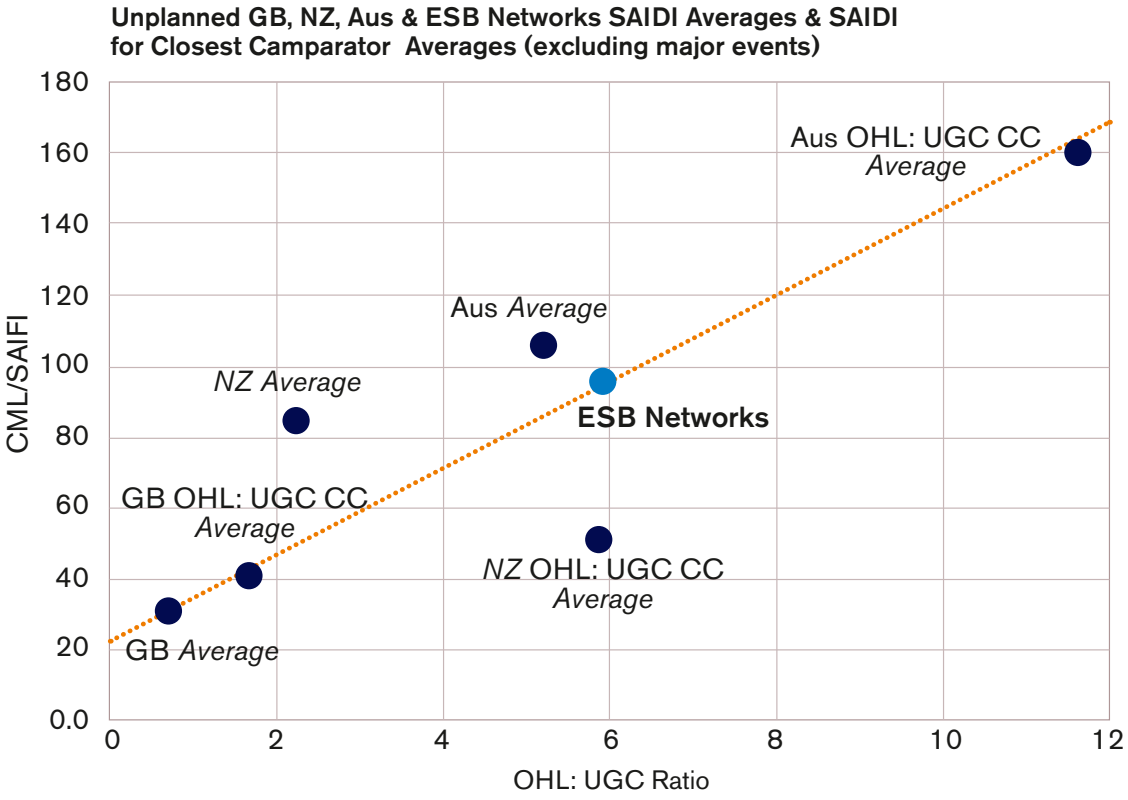
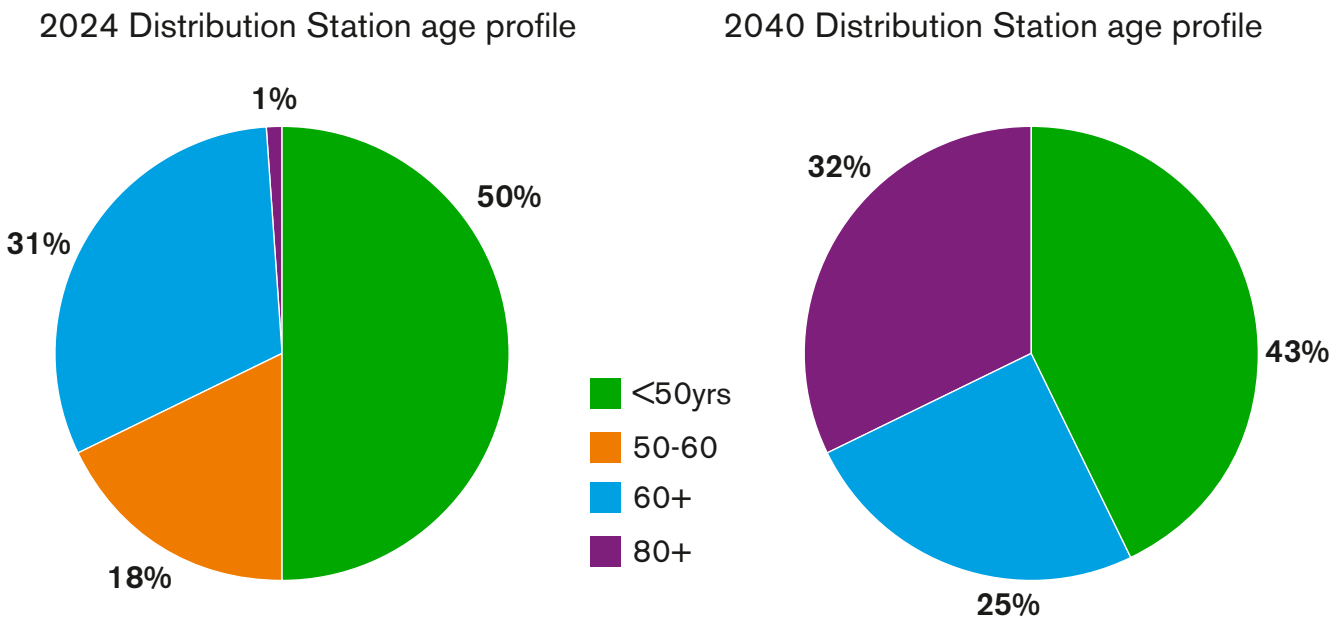


Figure 23: Customer minutes lost (CML) and ratio of overhead network to underground cables international comparison



- ***Asset age:*** Network assets typically have a technical life expectancy of between 30 and 60 years. This is based on the estimated length of time from when they are commissioned to a point in time when, on average, they will fall below a minimum technical or safety standard. During PR5, our asset replacement programme was based on an average replacement rate of 4% of network assets per year, meaning that some network assets could remain on the network until they were around 85 years old.
- While age in itself is not a reason for asset replacement, assets tend to deteriorate in condition significantly when approaching or exceeding the limit of their technical life. A significant proportion of the electricity network in Ireland was built between the 1950s and 1980s and is now between 40 and 70 years old. It is essential, as we reinforce and add capacity to the network to meet new demand, that we can continue to rely on our existing assets to meet the needs of customers.

Figure 24: Age profile of HV substations in 2024 and projected in 2040 based on current replacement rates (~32% > 80 years by 2040)



- The age profile of the network therefore represents a major challenge in the management of long-term network performance. A significant increase in asset maintenance, upgrade and replacement investment is needed during PR6 to address this. Failure to maintain the health of the network would result in excessive degradation which would be more dangerous, less efficient in the long term, and would adversely impact network performance and hence customer service both now and in the future. In the past, our approach has been to replace parts or refurbish older assets to extend their working lives, however this is becoming increasingly difficult as technology develops, new regulations are introduced (e.g., a ban on the use of SF6 gas for switchgear) and older components become harder to source.

Figure 25: Distribution of age profile for overhead line support structures on ESB Networks distribution network

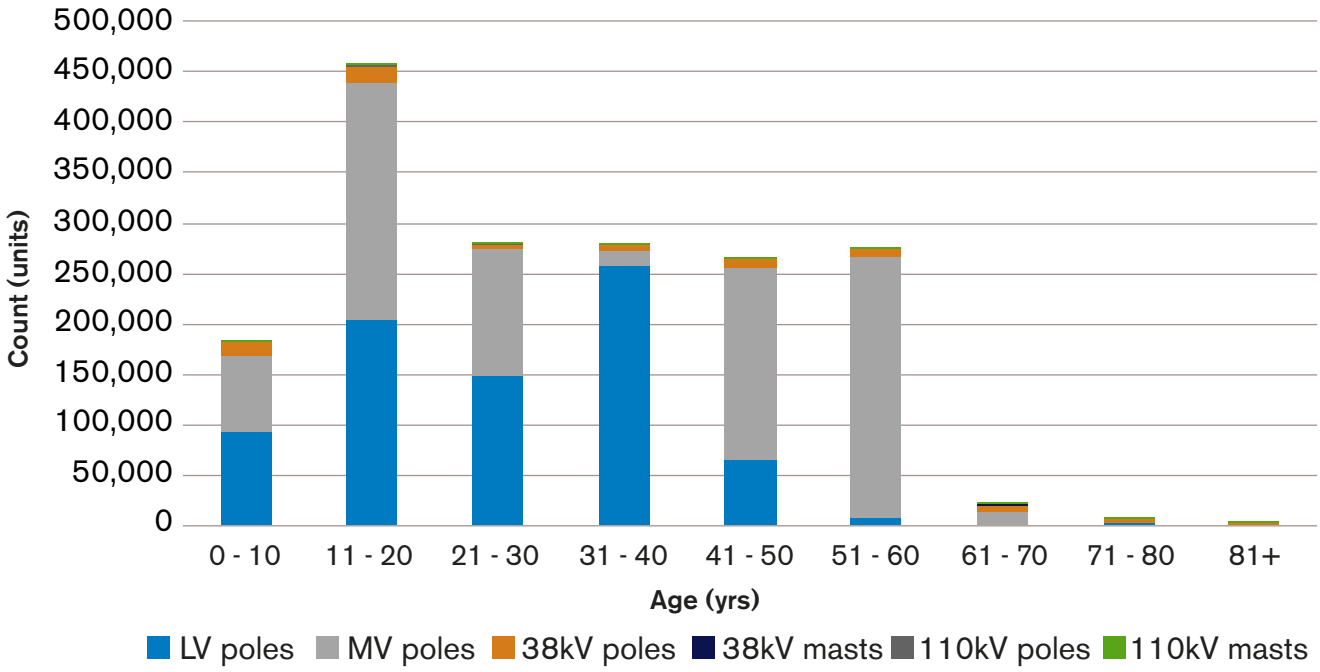


Figure 26: Distribution of age profile for underground cables on ESB Networks distribution network

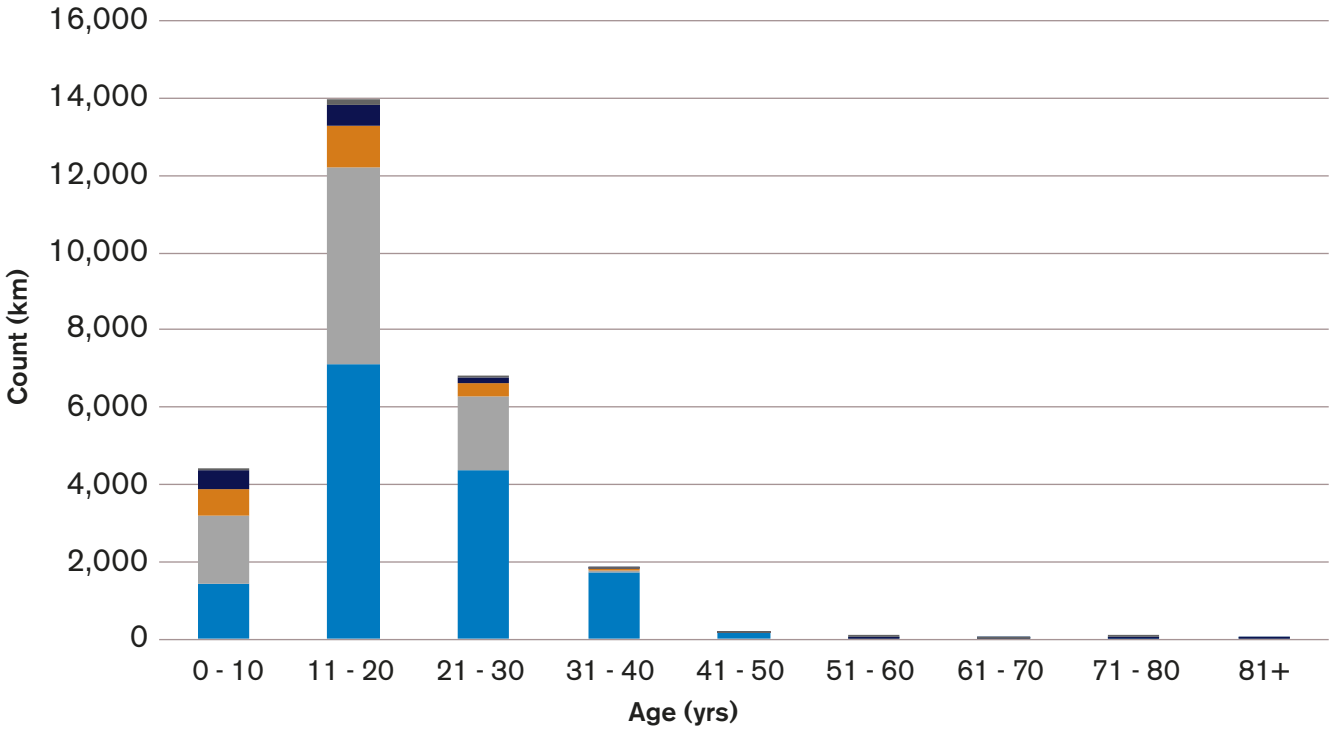


Figure 27: Distribution of age profile for MV transformers on ESB Networks distribution network

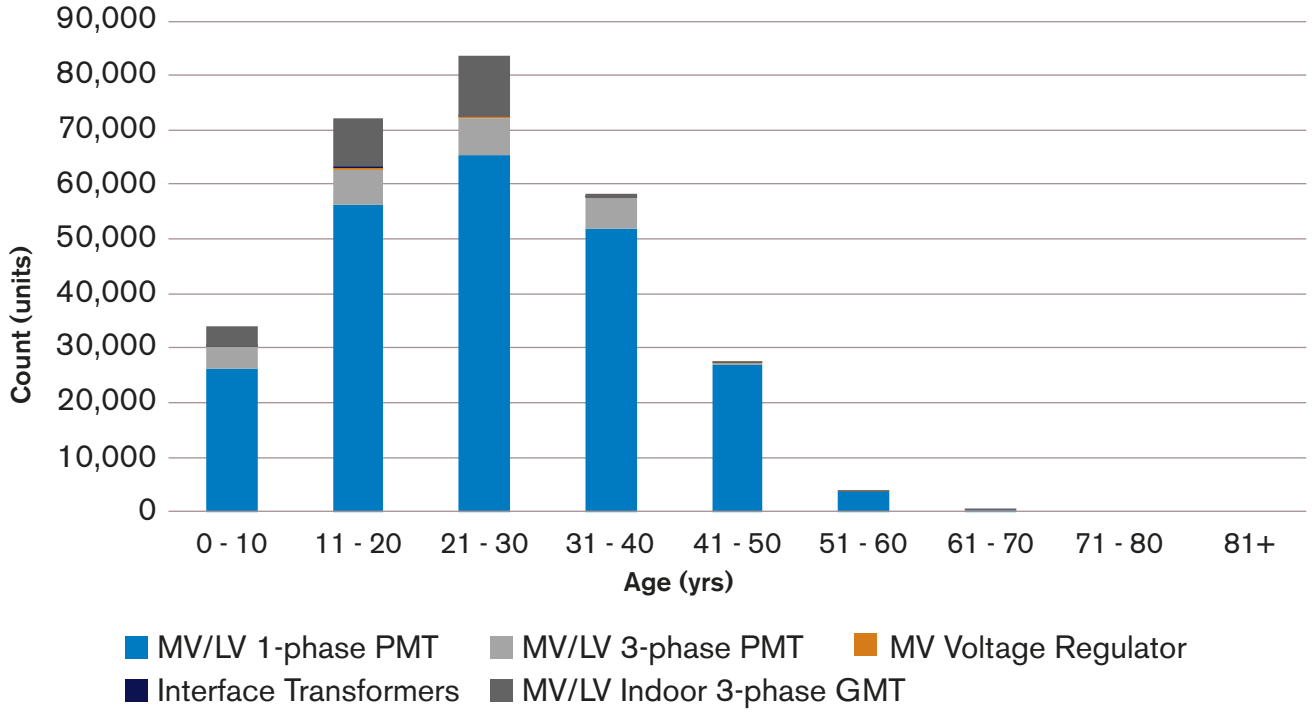
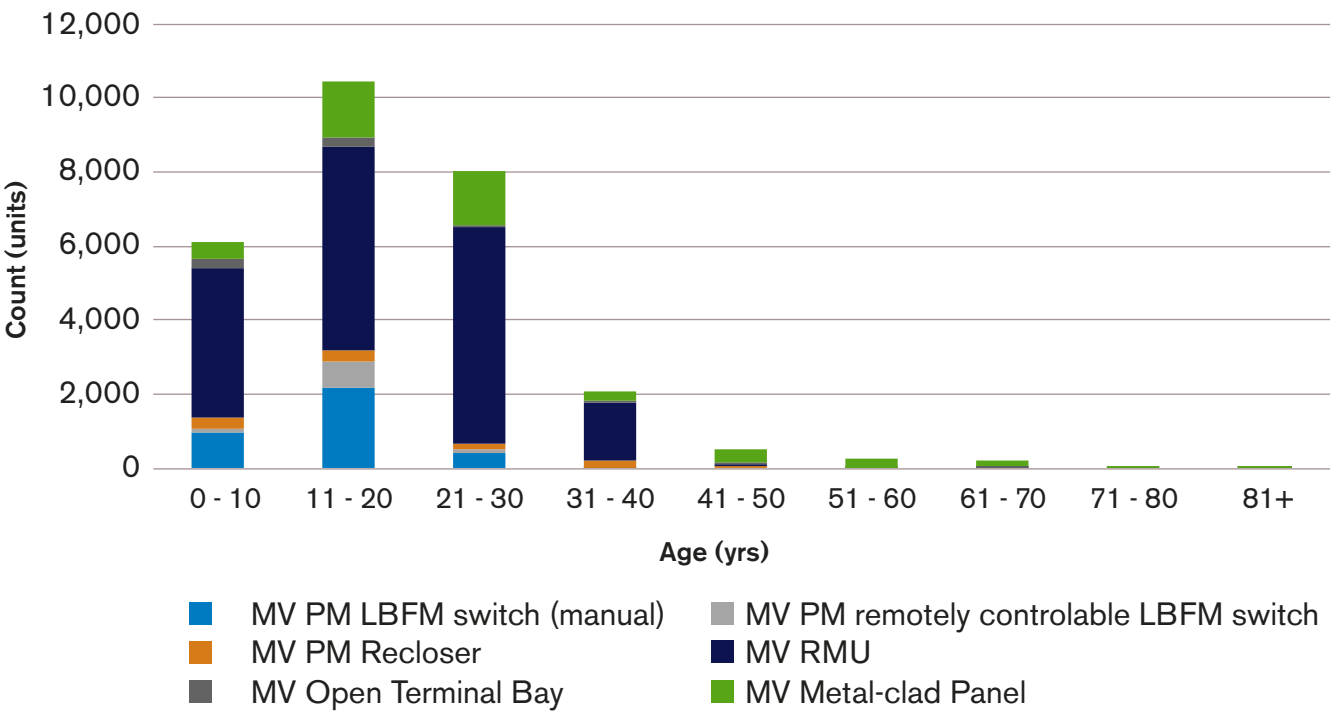
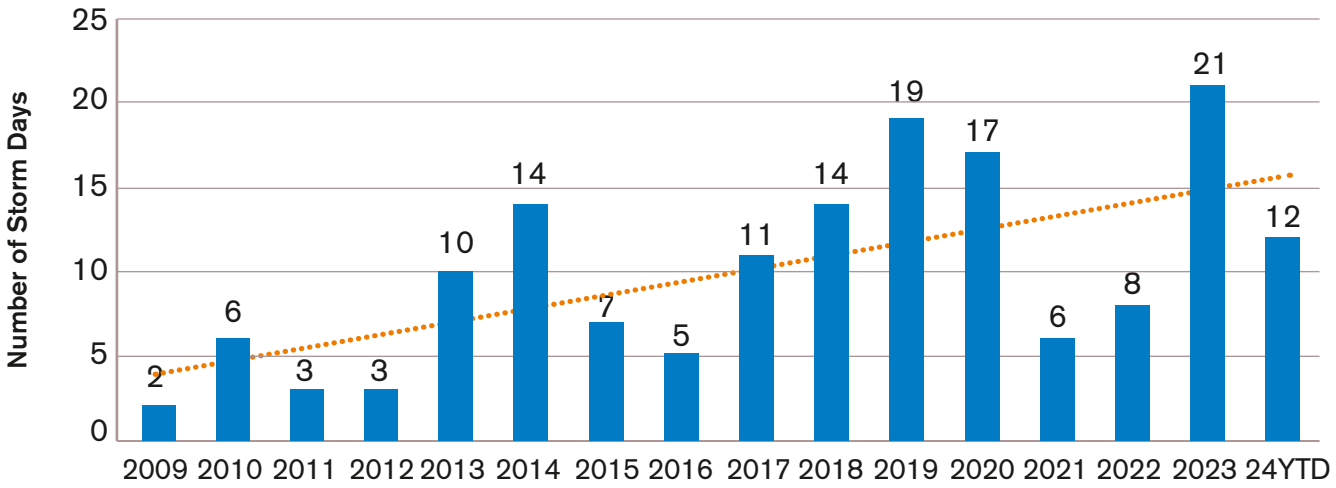


Figure 28: Distribution of age profile for switchgear on ESB Networks distribution network



- ***Climate change:*** Climate change poses a significant risk to the electricity network and to our customers. More frequent and extreme weather events, including higher wind speeds and more intense periods of rainfall, present risks to the overhead network and heighten the risk of flooding and erosion. Changing weather patterns have led to longer growing seasons, which increase vegetation growth and wildlife activity. While faults caused by vegetation are often transient in nature, when permanent earth faults occur, they can have a disproportionate impact on customers, particularly if a fault cannot be fixed remotely or if it takes time to locate.

Figure 29: ESB Networks declared storm days per annum



- The graph above illustrates the upward trend in storm days over the past 15 years. This increase in storm activity not only leads to direct storm-related outages, which are classified separately, but can also contribute to a rise in outages in the days before and days/weeks following a designated storm event. Contributing factors may include timber dislodged during storms that does not contact the network until several days later, as well as electrical infrastructure that experiences stress or damage from exposure to wind/lightning or multiple system faults, with resultant voltage and current surges.

- ***Planned outages:*** The frequency of planned outages has been rising annually since 2020 as more work is carried out each year on the network on a planned basis. Planned outages so far in 2024 are up 34% higher compared to the full-year 2020. While this is an indicator of increased work on the network, it results in an increased risk of faults impacting customers during planned outages. This is because, during these outages, where possible, customers are served by adjacent circuits or the electrical load is transferred to other substations, reducing contingency. The increased number of customers on a circuit, with reduced or no contingency measures during a planned outage, can further impact continuity figures in the event of a fault.

To address these factors and give confidence to customers that they can depend on the electricity network, our PR6 plan will focus on three interrelated areas of activity.

- ***Continuity of supply:*** To provide continuous, uninterrupted supplies of electricity to customers, we need to minimise the frequency and duration of customer interruptions caused by faults on the network. To this end, we plan to increase our timber-cutting programmes, install more automation schemes on our network, carry out targeted patrolling and corrective work to overhead network where customers are most impacted, and complete targeted asset replacement and maintenance programmes.
- ***Reliability:*** Reliability refers to the ability of the network to perform well under normal circumstances. This requires ongoing monitoring, maintenance, and asset replacement where necessary. To reduce the likelihood of equipment failing under normal circumstances, we will undertake targeted maintenance and replacement programmes, using asset health models and more advanced systems to enable an evidence-based approach to risk management.
- ***Climate adaptability and resilience:*** For the network to adapt to the long-term impacts of climate change (>40 years) and absorb or rapidly recover from disruptive events, we need to develop more sophisticated ways of predicting climate impact, implement more intensive timber-cutting programmes, and develop long-term plans for protecting coastal assets. As our asset base expands to meet increased capacity requirements during PR6, and as new challenges arise due to climate change, we are planning to implement a strategic approach to asset management to ensure that our investments are futureproofed and resilient.

6.3.2 Progress during PR5

During PR5, we put in place an extensive programme of work to reduce the number and duration of unplanned power outages and improve overall network performance. While the benefit has not yet translated into improvements in fault related customer minutes lost, we are confident that the right investment approach is being implemented to sustain and improve network performance. During the second half of PR5, we increased the installation of automation devices on the MV network as well as delivering increased vegetation management, asset maintenance, and replacement programmes. We also delivered work programmes focused on the worst-performing electrical circuits and worst-served customers (i.e., customers seeing the highest number and duration of network outages). While customer interruptions and customer minutes lost remain at higher than acceptable levels, this programme is showing promising results, and we anticipate that it will lead to tangible improvements for customers as further measures are implemented during PR6.

We have also developed a standardised asset health and condition-based approach to targeting assets that are most at risk of failure. This approach is CNAIM (common network asset indices methodology) aligned and approved by Ofgem in the UK . This allows us to objectively assess the health of assets and their risk of failure now and in the future.

In 2008, ESB Networks was the first utility company in Ireland to achieve PAS55 accreditation for asset management and subsequently achieved certification to the international standard ISO55001. ESB Networks has an effective asset management system in place, however, to finesse the balance between cost, performance, opportunity, and risk, we have embarked on a transformed approach to asset management.

We further reinforced this approach by developing a new value framework and investment decision-making support tool to improve cost benefit analyses. This approach to managing asset risk enables us to quantify the value of proposed network investments so that we can prioritise those that deliver most impact. Table 14 below outlines the value measures contained in the value framework. We have used the value framework and investment decision support tool in developing our plans for PR6.

Table 14: ESB Networks value framework

ESB Networks Value Measure
Safety
Asset Health/Load Indices
Environment: Carbon Losses, Climate Adaptability, Remediation Costs
Continuity of Supply
System Losses
Capacity: VOLL, Capacity Pathways, NPV
Legal/Regulatory/Statutory
Reputation/Stakeholder
Flexibility
ESG

During PR5, we also developed an integrated approach to asset management, which considers assets across their full life cycle from network development planning through to optimised delivery. This provides an end-to-end view of assets which will enhance outcomes for customers during PR6 and beyond.

In line with our PR5 commitments, we will continue to embed our asset-health and evidence-based approach to decision-making, optimising our investments and ensuring we are doing the right work to deliver a reliable and a resilient network. This approach recognises that a progressive and scaled approach is necessary to maintain asset health between now and 2040 and provides a clear line of sight to inform short- and long-term network investments. Delaying investments now will store up greater problems for PR7 and PR8 and will increase risks relating to safety and network reliability.

6.3.3 Our Plan for PR6

To enhance continuity of supply and improve the reliability and resilience of the network, we propose to implement further targeted continuity measures with robust asset management and climate adaptability programmes to improve overall network performance. We are confident that this will reduce unplanned outages, minimise the risk of equipment failure over time, and enable the network to adapt to more extreme weather events in the future. The key elements of our plan to deliver a reliable and resilient network are outlined below:

Reliability

Strategic asset management: Failure to adequately maintain network assets can lead to asset failure, increased risks to ESB Networks employees, contractors and members of the public, environmental impacts, and disruption to customers. It is critical that we proactively manage our assets in a way that prevents them getting to the point of failure. Our asset management approach is certified to ISO55001 standard and provides the framework to address higher-risk asset areas first, deliver a more reliable network for customers, and build resilience to meet customers' future needs while mitigating against the impacts of climate change.

During PR6, informed with more asset condition and climate data, we propose to undertake targeted asset replacement and maintenance programmes to improve network performance, enhance reliability and give customers the confidence they need to adopt low-carbon technologies. We plan to undertake network patrols and asset inspections, including condition-based assessments to inform, target, and prioritise the work needed in the immediate and longer term.

We plan to further embed the use of our asset health models, which were developed during PR5 and externally validated by EA Technology, the leading industry experts in this area, to identify our higher-risk assets.

Figure 30: Asset health model for 38 kV transformers (with and without intervention scenarios)

Future AHI Without Intervention						
	HI1	HI2	HI3	HI4	HI5	Sum
C1	3	1	0	4	0	**8**
C2	411	186	120	74	40	**831**
C3	0	0	0	0	0	**0**
C4	0	0	0	0	0	**0**
Sum	**414**	**187**	**120**	**78**	**40**	**839**

Future AHI With Intervention						
	HI1	HI2	HI3	HI4	HI5	Sum
C1	33	1	0	4	0	**38**
C2	411	186	120	74	10	**831**
C3	0	0	0	0	0	**0**
C4	0	0	0	0	0	**0**
Sum	**444**	**187**	**120**	**78**	**10**	**839**

Given the age profile of our asset base and the need to substantially increase the reliability and resilience of the network, we are planning to scale up investment in asset replacement across all asset classes. The key areas of investment during PR6 will include:

- ***Planned inspections and patrols:*** ESB Networks carries out inspections on the overhead network to identify and mitigate public safety hazards, assess asset condition for maintenance purposes, and ensure compliance with regulatory and legal standards. During PR6, we propose to enhance efficiency by combining inspections and will use standardised asset health models to objectively determine which are most at risk of failure and prioritise investments accordingly.
- ***HV station replacements and upgrade:*** Without intervention, through asset replacement and upgrade, 57% of HV substations will be over 60 years old in 2040, and roughly one third will be over 80 years old. As demand for electricity grows, it is important that these substations can continue to reliably serve customers and are not at risk of failure. During PR6, we are planning to undertake an extensive asset replacement and upgrade programme, targeting highest-risk substations first. Two old indoor substations at Inchicore and Finglas fall into this category as they are both reaching end-of-life but continue to serve a very large customer base. Station replacements and upgrades of this nature are challenging as they tend to be located in urban areas with restricted access.

  Our intention is to move away from piecemeal asset replacements and repairs and adopt a Build Once for 2040 approach involving full station replacements where appropriate. Where there is sufficient room, we intend to build on greenfield sites and use modular solutions to accelerate delivery.

Table 15: Age profile of our HV assets

Components	Assets >50 years old	PR6 Replacement Proposal (units & % of Asset Base)
110 kV Transformers	34 (11%)	7 (2.3%)
38 kV Transformers	50 (6%)	30 (3.6%)
38 kV Circuit Breakers	297 (11%)	70 (2.6%)
MV Circuit Breakers	645 (15%)	70 (1.6%)

- The age profile of our HV assets has a direct impact on our ability to increase capacity at medium voltage level (where many large demand customers are connected) as substations that are over 50 years old cannot readily support the 10 kV to 20 kV conversion programme which is underway at MV level. To enable the conversion of the remaining network, new 20 kV busbars are needed so that interface transformers (IFT), which serve as temporary transition points on the network prior to full conversion, can be retired.

- ***Wood pole replacement strategy:*** A combination of aging assets, accelerated decay (affecting a specific type of wood pole), woodpecker damage, and EU regulations limiting the use of creosote-treated poles is driving the need for an accelerated wood pole replacement programme. 665,000 MV/LV poles are at risk of failure by 2040. We are therefore planning to ramp-up our MV pole replacement rate from 4,000 to over 9,000 per annum and replace a further estimated 4,550 poles at LV level over the course of PR6. This will be a targeted and measured intervention to mitigate against safety, reliability, and financial risk, and will also serve to improve ground clearance.
- ***OHL conductor replacement:*** An ongoing programme of overhead line replacement is needed to mitigate risks and prevent failures that could lead to outages or safety issues, and to comply with current regulatory and safety standards. Upgrading and replacing old OHL network will result in improved network performance, better voltage regulation, reduced losses, and enhance capacity to handle increased demand.
- ***Fluid-filled cables:*** The targeted asset replacement programme for all fluid-filled cables (FFCs) that were installed from 1950 up to the 1980s will continue into PR6. We expect to progress 18 fluid-filled cable replacement projects in PR6, a small number of which may be completed in early PR7. In addition, there are four circuits being carried over from PR5. The continued replacement of FFCs during PR6 ensures that ESB Networks can sustain the rate at which we are working towards the targeted full replacement of all FFCs from the system by the end of PR7 (2035).

Continuity of supply

- ***Network automation***: We plan to deploy a range of smart devices on the MV overhead line network to automate processes, pinpoint fault locations, and enable fault responses to be activated or controlled centrally. These technologies will enable 'self-healing' of transient faults, better communications with central operations on fault locations, and faster restoration times to reduce outage durations.
- ***Vegetation management:*** To reduce unplanned customer outages caused by vegetation growth, it is essential that timber which has the potential to come in contact with the network is cut back in a planned and timely manner. Given the volume of timber, the extent of our overhead network and the rate of vegetation growth, we plan to massively scale up our timber-cutting programme. We will also maintain enhanced timber-cutting standards introduced during PR5 which have been effective in reducing customer interruptions. We project that timber operatives will need to significantly increase from the current level to meet our requirements and have set up a new timber contractor framework designed to encourage contractors to recruit more people and invest in training.
- ***Worst-served customer and worst-performing circuit:*** During PR6, we are planning to continue our targeted approach to improving continuity for worst-served customers and addressing the worst-performing circuits. On circuits where we have put in place targeted remediation works, we have seen an average improvement of 65% in continuity performance.

Case Study – Continuity of Supply

To minimise the impact and duration of unplanned outages, automated devices such as three-phase reclosers are installed on the network to provide automatic re-energisation following fault events and can be controlled remotely. As a result, the need for operator intervention, overhead line inspections, and associated costs/delays are reduced. Multiple three-phase reclosers can be configured to function together as a loop automation scheme. Loop automation schemes operate by automatically reconfiguring the OHL network during a fault to enable:

- Immediate restoration of supply to healthy sections of network
- Immediate sectionalising of the faulted section of network, thereby enabling operators and crews to locate and repair faults more rapidly

This reduces the number of customer interruptions and the duration of power outages. In cases where three-phase auto-reclosers have been installed, circuit performance has improved by >40%.

In 2022 and 2023, E20 Donabate ex Glasmore (Dublin North) was the worst-performing circuit. The table below illustrates the improvements arising from automation and other measures to reduce continuity.

Year	Customer Minutes Lost	Customer Interruptions
2021	9,640.39	9,050
2022	15,141.43	27,380
2023	9,004.43	10,270
2024 (YTD)	140.7	137

Climate adaptability and resilience

- ***Climate adaptability framework:*** ESB Networks plans to evolve our climate adaptability framework to ensure that the risks and impacts of climate change on the network are evaluated and addressed. Our approach will be aligned with EU and national policies and legislation. We will identify climate hazards, monitor trends, and put in place climate risk control measures to protect vulnerable assets across the asset life cycle. We will also ensure effective governance of climate risk and develop climate resilience metrics linking climate risk mitigation initiatives.
- ***Innovation:*** Innovation will be critical in delivering a safe, reliable, and resilient electricity work. During PR6, we will continue to trial new materials, including heavier insulated conductors along forestry corridors which are capable of suspending fallen timber. We also plan to enhance our use of digital, data and AI to capture network data, and feed it into risk profiles and maintenance plans. For example, we intend to use AI infrastructure modelling to aid timber management using LiDAR data to identify high-risk areas. In addition, we will use data regarding weather patterns, vegetation species, and customer interruptions to target and prioritise timber cutting to replace the standard cyclical cutting schedule we have used in the past.

6.3.4 Customer benefits

The investments we make in network reliability and resilience are designed to improve overall network performance, reduce the number and duration of unplanned customer interruptions, and ensure that the network can adapt to the long-term impacts of climate change. By implementing a comprehensive asset management and replacement programme, we will also reduce risks, leading to better safety outcomes. Our proposal to adopt a condition-based asset maintenance and replacement programme will help us to mitigate risks on the network while also increasing network performance.

Through these investments, we are seeking to deliver significant reductions in the frequency and duration of unplanned outages. The table below shows the reductions in customer interruptions (CIs) and customer minutes lost (CMLs) that we are seeking to achieve through our PR6 investment programme between 2025 to 2030.

Table 16: Reductions sought in customer interruptions (CIs) and customer minutes lost (CMLs)

	2026	2027	2028	2029	2030
CML	88.3	84.8	81.4	78.1	75
CI	106	101.7	97.7	93.8	90

We believe that these represent a balance between improvement targets for continuity and the other work programme requirements under PR6 as we scale up delivery across both transmission and distribution between 2026 and 2030.

6.3.5 Alternatives considered

In assessing our investment plans relating to network reliability and resilience, we considered delaying asset replacement and maintenance works to reduce expenditure during PR6. However, this will lead to major reliability and safety risks in subsequent Price Reviews, as the age and condition of assets would continue to deteriorate. Our proposed approach recognises that sustained investment is needed across each of the three Price Review periods to 2040 to maintain critical electrical infrastructure. An alternative proposal to condense the works into PR7 and PR8 was discounted due to the delivery risk involved. We believe that the programme included in this plan is a necessary and appropriate approach which minimises risk and delivers efficiently for customers.

6.4 Transmission

ESB Networks is the licensed onshore transmission asset owner (TAO) in Ireland. As the TAO, ESB Networks is responsible for building and maintaining the transmission network according to the capital and operational investment plans and policy decisions advised by EirGrid, the transmission system operator (TSO). Network assets are constructed by ESB Networks, and ESB Networks must maintain these assets in line with maintenance policies set by the TSO. The transmission system encompasses the high voltage network in Ireland, predominately assets that operate at 110 kV, 220 kV or 400 kV. The transmission network is critical to ensuring a safe, secure, and reliable supply of electricity to all electricity customers in Ireland in real-time.

While some very large customers, such as data centres, factories and utility-scale generators, connect to the electricity network at transmission level, most demand customers, and an increasing amount of wind and solar generators, connect to the network at lower voltage levels via the distribution system. Bulk supply points feed power from the transmission system to the distribution network to supply additional power for customers when it is needed.

Transmission capital projects are complex, and typically extend over several years depending on the nature and scale of the work. The required investment is significant and is projected to rise further over this decade to meet the climate action challenge as detailed in EirGrid's Shaping our Electricity Future publication. We commit to working with EirGrid, the CRU, the electricity industry, customers, stakeholders, and society, to transform our electricity infrastructure and deliver Ireland's clean electric future.

6.4.1 Transmission investment framework

The TAO and TSO have jointly developed and agreed an investment framework for PR6 that supports EU and national policy targets and addresses the strategic outcomes outlined in the CRU PR6 Strategy Paper. The framework includes eight investment portfolio categories, as outlined in Figure 31 and listed in Table 17 below.

Figure 31: PR6 transmission investment framework (Source: EirGrid)

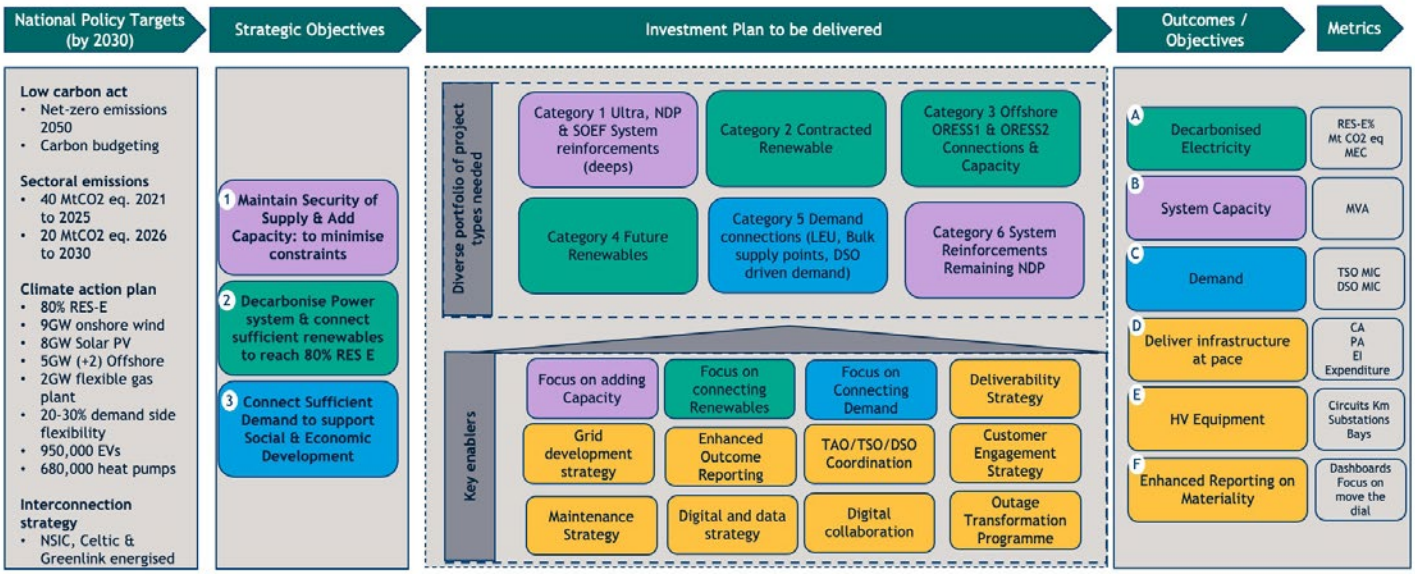


Table 17: Categories of transmission work and target outcomes

Category	Category Description	Target Outcome
Category 1	**Ultra & SOEF** – Maintain security of supply and add capacity to minimise constraints.	To carry 80% of Ireland's electricity from renewable sources by 2030, significant new network and a reinforcement of the existing network are required to transport the renewable power from where it's generated to population centres where it's consumed. The projects in this category were identified by TSO studies outlined in Shaping Our Electricity Future (SOEF) version 1.1
Category 2	**Contracted renewables** – Decarbonise power system and connect sufficient renewables to reach 80% RES E.	Projects to connect renewable energy providers who have signed contracts to export additional capacity.
Category 3	**Offshore connections** – Decarbonise power system and connect sufficient renewables to reach 80% RES E.	Projects to facilitate connection of offshore TSO-owned and managed assets to the TAO onshore grid.
Category 4	**Demand** – Connect sufficient capacity to meet demand.	Projects to connect the transmission system to the distribution system to provide capacity for DSO customer electrification needs.
Category 5	**System reinforcements** – Maintain security of supply and add capacity to minimise constraints.	Reinforcement projects to upgrade the local transmission network to match system capacity with demand requirements.
Category 6	**Under consideration/early pipeline (refurbishment programme) –** Maintain asset health, integrity, and performance.	Refurbishment projects to maintain asset health, integrity and performance of aging substation, overhead line, and cable assets.
Category 7	**Under consideration/early pipeline/reinforcement programme** – Maintain security of supply and add capacity to minimise constraints.	Reinforcement projects to further upgrade the transmission network to facilitate and transport renewable power.
Category 8	Under consideration/early pipeline (renewable EPC 2.3 & 2.4) – Decarbonise power system and connect sufficient renewables to reach 80% RES E.	Projects to connect renewable energy providers who have yet to secure a contract.

EirGrid, in its TSO submission for PR6 explains the categorisation of the projects in the context of the PR6 strategic outcomes and objectives. The main objective is to connect a sufficient level of additional renewable generators (in categories 2, 3 and 8) to achieve a total of 22 GW of renewable capacity on the systems operated by the network companies by 2030. This is broken down as follows:

Renewable Source	Target (GW)
Solar	8.0 GW
Onshore Wind	9.0 GW
Offshore Wind	5.0 GW

The TAO and TSO undertook an analysis of the projects within each category and identified 29 priority projects across categories 1, 3, and 5 that are of a scale and total value equal to approximately 50% of the total transmission system investment required in PR6. Acknowledging the challenges in accelerating investments in the PR6 transmission programme, including the priority projects, and the risks and uncertainties associated with their delivery, the agile investment framework outlined in Section 4.8 will be used to manage uncertainty.

6.4.2 PR6 transmission programme

ESB Networks and EirGrid have worked closely to develop a robust capital programme for Price Review 6 that meets ambitious climate and energy policy goals while managing the risk of uncertainties associated with energy transition investment and delivery. The PR6 transmission programme requires a step change in the delivery of transmission capacity to achieve the objectives in the CRU PR6 Strategy Paper. Investments of €5.9 bn are required, comprising delivery of approximately 231 projects within the five-year period and the development of a further 138 projects.

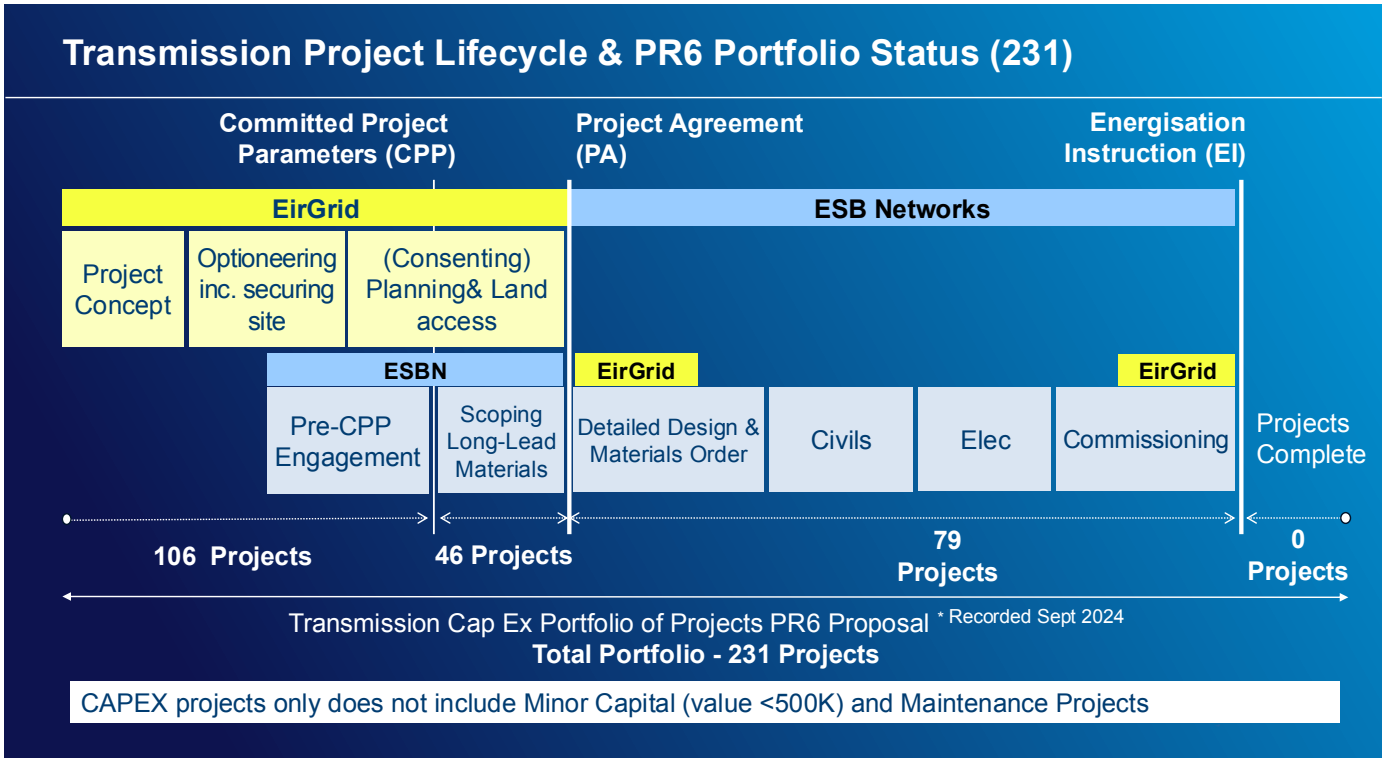
Table 18 below shows how the PR6 costs are distributed across different project types for the 231 projects that will be delivered in PR6.

Table 18: PR6 cost distribution across different project types

Project Type	% of total PR6 investment (€m)
New High Voltage Cables	25%
Refurbishment/Uprate of Overhead Lines	21%
Reinforcement/Upgrade of Substation	19%
New DSO Substations	14%
New Overhead Lines	10%
New Substations	9%
Contestable Substation Connections	2%
Total	**100%**

EirGrid and ESB Networks share responsibility for the development and delivery of transmission projects. ESB Networks starts work on construction and commissioning of projects once EirGrid has identified a technical solution and the necessary consent is secured. Below, we can see the volume of PR6 projects overlayed on the various project development and delivery steps. ESB Networks will continue to support EirGrid during the formative stages of the project life cycle as part of the CRU-approved pipeline and early engagement processes. This end-to-end collaboration across the full project life cycle was introduced in PR5 and represents a departure from the previous where ESB Networks had minimal involvement prior to project agreement. This new collaborative approach ensures that constructability and outage planning are considered much earlier in the project life cycle.

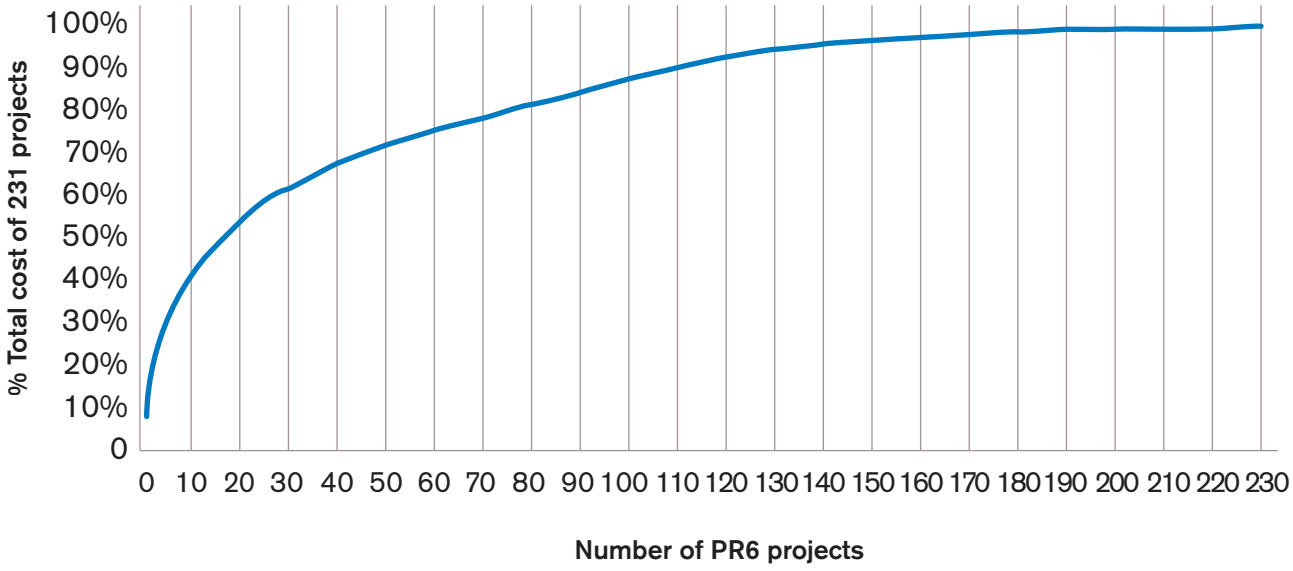
Figure 32: Graphic above representing life cycle phase 231 + 138 early pipeline projects



6.4.3 Characteristics of the PR6 transmission delivery programme

The PR6 transmission delivery programme is complex and requires a range of technical solutions to address the system needs identified by the TSO. The programme is characterised by a small number of high-value projects that make up a disproportionate share of the overall capital investment. Of the 231 projects to be delivered in the PR6 transmission programme, the ten largest projects contribute 40% of the total cost and the twenty largest make up just over half of the total costs. Figure 33 shows the distribution of costs across projects within the programme. The disproportionality of the investment profile across the portfolio presents risks and opportunities that must be managed and monitored.

Figure 33: Distribution of costs across the transmission delivery programme



During PR6, we propose to reinforce transmission network capacity by building new assets and upgrading existing assets in accordance with EirGrid's requirements. Reinforcements are needed across all transmission voltage levels and in different parts of the country. These investments will help to ensure security of supply, allow additional renewable generators to connect to the network, and enable new demand connections. Project types include new transmission network in the form of 400 kV, 220 kV and 110 kV substations, overhead lines and underground cables, and refurbishments or uprating of existing transmission assets.

The development, testing, and deployment of new technologies on the network are ongoing features of our transmission infrastructure delivery programme. The portfolio of transmission investment for PR6 includes the deployment of new and innovative technologies, including STATCOMs, series capacitors, and synchronous compensators. These technologies are essential for system security and stability in the context of increasing renewable penetration on the system.

The project portfolio includes 90km of 400 kV underground cable and 55km of 220 kV underground cable replacements within the environs of Dublin City. This will require careful planning and stakeholder engagement to manage and prepare for extensive disruption. There is also a programme of distribution cable projects planned for Dublin, including 33km of 110 kV and 38 kV underground cable which is discussed in Section 6.2.3.

6.4.4 Managing uncertainty in transmission delivery

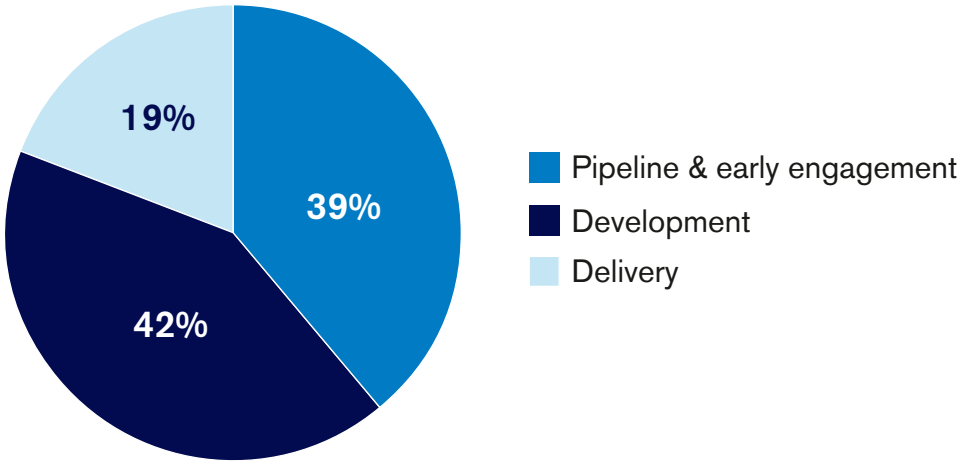
ESB Networks is committed to delivering the full programme of investment identified by the TSO in their PR6 transmission programme. However, acknowledging the inherent risks associated with project delivery of this scale, we are not proposing to include the entire €5.9 bn in our baseline investment scenario. The purpose of this is to shield customers from delivery uncertainty. If the entire €5.9 bn capital investment programme was included and approved by CRU, it would be fully charged to customer bills from the outset of PR6. This would not account for the uncertainty, complexity, and risk associated with the delivery of 231 transmission projects, and would put a significant cost burden on customers for projects that may not be delivered in PR6.

Our baseline investment scenario (see Section 4.6 above) of €3.4 bn for the delivery of transmission projects is based on a bottom-up assessment of project delivery risk and includes transmission project investments that are likely to be delivered with a higher degree of certainty. This takes into account project maturity, outage availability, outage optimisation potential, land access, and other factors that could disrupt delivery timeframes.

In the event that some or all of the remaining project investments progress with a lower risk profile, we will seek to draw down additional funds of up to €2.5 bn through the agile investment framework. This framework is designed to ensure that all viable projects can proceed as planned during PR6.

The projects included in the PR6 transmission delivery programme are at different stages in the project life cycle. Some projects at early development stages require work to finalise the scope, achieve planning permission and associated consents before entering construction. Other, more mature projects are in delivery stages and currently under construction. Project maturity is key to determining levels of investment certainty and has been used to determine baseline PR6 capex. Below, we can see the breakdown of total costs for the 231 PR6 projects across the various development stages.

Figure 34: Current project life cycle stages (% of total PR6 cost)



In recommending this approach, ESB Networks is fully committed to delivering the full programme of investment put forward by EirGrid during PR6. Our approach does not signify a lack of ambition, but rather a commitment to protect customers from uncertain expenditure risk. This is consistent with the approach used for PR5 and with the frameworks that are in place in other jurisdictions, such as Great Britain where it is overseen by Ofgem.

6.4.5 Accelerating transmission delivery

The PR6 transmission investment plan is characterised by a step change in infrastructure investment to achieve national policy targets. During PR5, ESB Networks has taken steps to adapt our organisational structure and delivery capacity in anticipation of a much larger programme of investment during PR6 and subsequent Price Review periods.

A broad range of initiatives are underway to ensure that the required internal resources and contracting partners are in place to deliver our PR6 programme at the required pace and scale (see Chapter 9 – Accelerating Delivery). A key enabler of this is the dynamic contractor strategy which was developed during PR5. A range of improvements has already been delivered, including changes to existing contractor frameworks across multiple skillsets and work types. ESB Networks recognises that delivering on our PR6 commitments will require strong partnerships with contractor delivery partners. During PR5, there was a large increase in the number of contractors who participated in training courses at the ESB Networks National Training Centre from 664 in 2021 to 2,087 in 2023, illustrating the scale of resource growth in this area over recent years. Managing supply-chain risk is a critical aspect of ESB Networks plans to deliver the PR6 programme, ensuring that assets and equipment are available where and when they are needed. Supply-chain related risks have increased.

The ESB Engineering and Major Projects (EMP) function provides specialist engineering and programme delivery services to ESB Networks to support transmission projects, particularly complex and high-value projects required on the HV transmission network. EMP takes a whole project life cycle approach to project management, with a focus on end-to-end development and early engagement. In anticipation of continued growth and additional services being requested by ESB Networks in PR5 and PR6, EMP has been scaling up resources and increasing major project delivery each year since 2018.

The Centre of Engineering (CoE) within EMP will see an expected 30% increase in engineering employees dedicated to providing services to ESB Networks in respect of transmission projects between now and 2026. Scaling delivery will be enabled by increased standardisation of 110 kV and 38 kV substation projects for both greenfield and brownfield applications. EMP has also increased its design capacity, with seven additional design service companies added to the existing engineering design outsourcing capability since 2022, which supplements the internal engineering capability.

ESB Networks has established a Transmission 2030 team which is a dedicated function responsible for transmission capital project development, programming, and optimisation. The team's mandate is to work closely with the TSO to develop a fully integrated transmission programme for 2030 with headcount increasing significantly since inception in 2023.

Key achievements for the team to date include:

- CRU approval for implementation of an early engagement process in 2022
- Engagement process for pipeline projects established with EirGrid in 2024
- Transmission maintenance programming responsibility was added to the 2030 team in June 2024

Managing supply-chain risk is a critical aspect of ESB Networks' plan to deliver the PR6 programme, ensuring that assets and equipment are available where and when they are needed. Supply-chain risks have increased substantially since the Covid-19 pandemic and the Russian invasion of Ukraine. Geopolitical risks remain a key factor in the development of our material procurement strategies for PR6. High demand for network-related materials remains a global issue as sustainable procurement grows in importance in delivering Net Zero targets. ESB Networks' procurement strategies are designed to mitigate supply chain risks, ensuring that the transmission programme assets can be built in line with the PR6 investment plan.

Delivering work on the transmission network requires outages which are planned and granted by the TSO, EirGrid. EirGrid and ESB Networks are working together to ensure that the outages required for the delivery of national policy targets can be granted over the remainder of PR5 and throughout PR6, and that the use of these outages can be optimised. Both organisations are working together as part of the joint outage transformation programme (JOTP), which is described in more detail later in the plan.

ESB Networks has deployed new strategies in respect of outage utilisation during the PR5 period and will continue to introduce new technologies, work practices, and methodologies to increase utilisation over time. Many improvements in outage utilisation have been achieved through early engagement during project development, a new overhead line assessment process, the use of greenfield developments, offsite substation builds and streamlined bulk commissioning procedures.

6.4.6 Transmission meeting the needs of distribution customers

As outlined in Section 6.2 – Distribution Network Capacity – above, the distribution system connects to the transmission system at substations known as bulk supply points (BSPs). Here, high voltage electricity from the transmission system is converted to lower voltages for distribution to customers across Ireland. The BSPs are the interface between the available capacity on the transmission system and the demand requirements at the distribution system level.

New BSPs are needed to meet capacity needs and to ensure security of supply on the distribution system as they will play a vital role in meeting growing customer electricity demand as we transition to a Net Zero electricity system. BSPs will also help to maintain power quality for customers in the context of different types of load connecting to the network (e.g., EV charging infrastructure, LCT, etc.)

Responsibility for the planning and delivery of BSPs is shared by the TSO and the TAO. As the TAO, ESB Networks' role involves identifying the need for new bulk supply point (BSP) substations or reinforcing existing interfaces. We have notified the TSO of the need for a number of new BSPs to be built during the PR6 period. These high-priority projects are required to ensure that forecast demand increases driven by the Government's Housing for All plan, the draft National Planning Framework, and the electrification of heat and transport can be met during PR6 and beyond.

The BSPs required include three 220 kV substations in the Dublin area and 27 x new 110 kV substations, in addition to uprates to an additional 11 x 110 kV substations in various locations around the network. All these projects are included in the PR6 transmission programme as agreed with EirGrid. ESB Networks is reliant on the TSO to progress these projects through the early development phases, ensuring that the necessary planning consents are obtained and that connection offers are issued. ESB Networks will continue to engage with the TSO in relation to these projects to ensure that adequate supplies of electricity are available to support population growth and climate targets.

6.4.7 TSO and TAO collaboration

As the onshore transmission asset owner, ESB Networks collaborates closely with the transmission system operator, EirGrid, to ensure that the transmission system is safe, secure, and reliable now and in the future. Continued engagement is of vital importance in the context of the PR6 delivery challenge, and both organisations are committed to working together to achieve a common set of strategic objectives for PR6.

In the lead up to PR6, the TAO and TSO identified a need to enhance the level of collaboration, coordination, and communication in order to jointly assess and address the emerging challenges, maximise alignment on proposals, and meet the requirements and expectations of CRU and other stakeholders, to deliver on the climate action targets.

PR6 collaboration leads in each organisation were appointed and tasked with optimising the engagements and touch points for the development of the TAO and TSO PR6 submissions. The key needs, opportunities and dependencies between TAO and TSO for the submissions were identified and a detailed schedule of interactions and milestones were planned and implemented. The approach was to create efficiencies through exchange of accurate and timely information, to reduce change management and avoid duplication and rework. A key element of our collaboration approach was to have a data-driven, bottom-up, information-led approach to the development of the PR6 submissions.

The collaboration approach was at all times informed by EirGrid's **Transform the Power System for Future Generations** strategy, ESB Networks' **Networks for Net Zero** strategy, and the CRU Strategy Paper for PR6 – all of which align with national policy objectives. This led to the joint development of the TAO/TSO PR6 investment plan framework.

These engagements have led to improved communication and mutual understanding, and resulted in an overall improvement in the quality and detail of programme-level information underpinning the PR6 submissions compared to PR5. It also enabled a common position on project risks and uncertainty, and mechanisms to address these in the context of the substantially increased scale of the PR6 programme. Key assumptions underpinning the submissions were also agreed through this collaborative approach.

EirGrid and ESB Networks will prepare a joint report following the TAO and TSO's PR6 business plan submissions to CRU, outlining in detail the process of engagement and collaboration by both organisations in preparation for our respective PR6 submissions, and how this supported our shared approach to meeting the PR6 strategic objectives and outcomes. In addition to outlining key TAO/TSO collaboration topics and engagements that have informed and aligned the PR6 submissions, the report will detail specific areas of ongoing collaboration such as the joint outage transformation programme and the digital collaboration project. It is proposed that the report will issue a post-PR6 submission date of October 31 and prior to January 1, 2025.

ESB Networks has set up new organisational structures to support our engagement with the TSO. In 2023, ESB Networks established a new Transmission 2030 team which is a dedicated function responsible for transmission capital project development, programming and optimisation, and maintenance programming. The team's mandate is to work closely with the TSO with the aim of developing a full integrated transmission programme for 2030.

Together, EirGrid and ESB Networks have developed a CRU-approved process for early engagement on transmission projects to ensure that key deliverability aspects are considered up front in the project life cycle. The objective here is to address project development questions at the earliest possible opportunity so that the required infrastructure can be delivered efficiently.

Given that joint governance of the transmission infrastructure programme and efficient sharing of data and information is critical to achieving our collective goals, ESB Networks has formed a new Transmission Strategy and Asset Owner team which is implementing structures and tools with EirGrid in support of joint objectives. These include the infrastructure delivery charter, the network delivery committee (NDC), the process systems information (PSI) charter, and the joint project management office (JPMO). This team also works to ensure optimum TAO and TSO alignment on delivery, performance measurement reporting, and incentive arrangements. The governance structures reflect the commitment of both EirGrid and ESB Networks to working together to deliver Ireland's climate and energy policy goals.

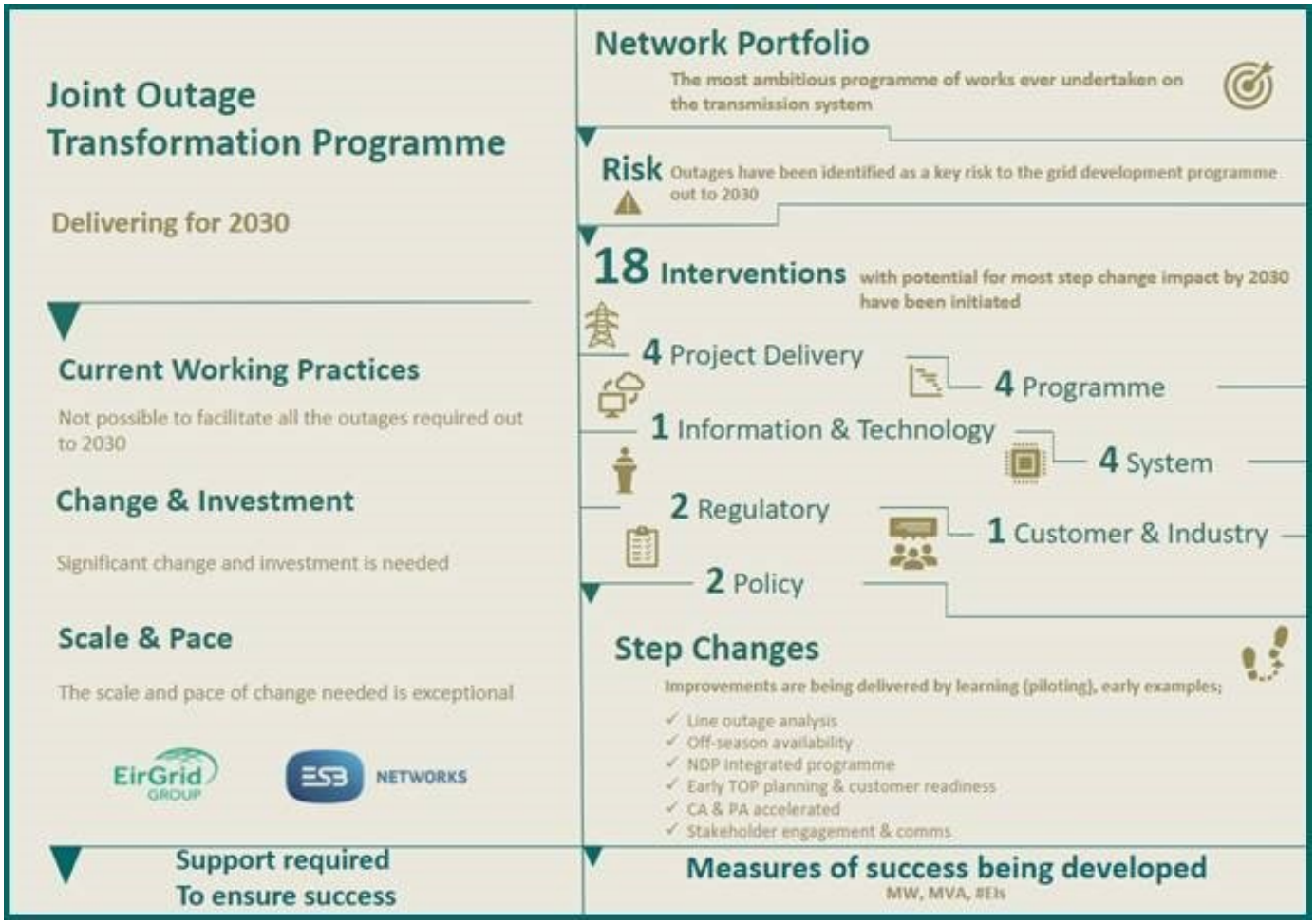
6.4.8 Joint outage transformation programme (JOTP)

Effective outage management is necessary for the efficient delivery of the PR6 transmission project programme. Transmission outages are needed so that parts of the transmission network can be isolated to allow work to take place. This could be for the purposes of maintaining equipment or connecting in new or upgraded transmission development projects or renewable connections. This is the equivalent of temporarily closing part of a motorway to facilitate road infrastructure upgrades, but still allowing traffic (or electricity) to flow using an alternative path. Managing these complex outage requirements is very challenging due to the exceptional volume of projects involved, the scale of projects, and existing constraints on the network.

ESB Networks and EirGrid have worked together over many years to deliver projects that are dependent on transmission outages. Over the past decade, approximately 110 transmission capital projects were delivered, which have been instrumental in connecting significant levels of renewables to the electricity network and meeting growing demand. In December 2023, EirGrid and ESB Networks approved the implementation of the joint outage transformation programme (JOTP), a multi-year programme to minimise outage requirements, increase outage availability, maximise outage utilisation, and improve the effectiveness of outages.

Below summarises the key elements of this programme, which includes eighteen interventions. Many of these are already being implemented, including the development of an integrated transmission programme, optimised project deliverability, and constructability methodologies. Stakeholder engagement is an important aspect of the programme given that approximately 20% of outage changes in the 2022/23 outage season were associated with third parties. A specific workstream has been established to promote awareness of outage performance with both customers and industry participants.

Figure 35: JOTP summary of approach and 18 interventions



The JOTP will span PR5 and PR6 and will focus on delivering significant improvements to enable the completion of more capital projects. Improvements in outage performance will also support more efficient operations, thereby minimising system constraints and dispatch down of renewables.

A number of JOTP interventions have already resulted in improvements in outage availability and utilisation. For example, the introduction of short outages during the off-season (December to February) is enabling more maintenance activities to take place. The acceleration of the transmission outage planning (TOP) publication process, the deployment of offline builds, and positive engagement with customers to optimise programmes are providing benefits. Other interventions relating to policy development, IT systems and tools, and regulatory processes will not deliver improvements until further into PR6. Systematic implementation of the JOTP interventions will deliver programme improvements over the period 2025 to 2030.

Increasing outage availability, the optimisation of existing outage durations, and completing more work each year will accelerate the delivery of much-needed system reinforcements and support the delivery of the CRU's PR6 objectives.

The JOTP is targeting a 25% improvement in project delivery for PR6 to deliver an increased volume of transmission infrastructure. This will be achieved by optimising all aspects of the project life cycle, increasing outage availability and optimising utilisation. While improvements under the JOTP will contribute to increased levels of project delivery, the constraints on the transmission network will remain.

6.4.9 Integrated transmission programme

Transmission capital projects are complex and can extend over several years, in some cases lasting over ten years before they are fully implemented. ESB Networks proactively engages with EirGrid at early stages of projects as part of the pipeline and early engagement processes to minimise potential delivery risks later in the project life cycle. This engagement helps to ensure that projects are scoped with delivery in mind and enables the pre-ordering of materials with long lead times. Early engagement and improved collaboration have led to an increase in the throughput of projects that are ready for construction.

The pace of transmission project delivery is dependent on a range of factors, including planning permission and consents, system outages, and supply chains. Managing these interdependencies and end-to-end project delivery requires a robust, integrated, and dynamic approach to project programming, change management and reporting. The **integrated transmission programme (ITP)** is a strategically focused implementable multi-year programme plan. It enables a full project life cycle feedback loop for lessons learned with a focus on project and programme level impacts. ESB Networks has worked closely with EirGrid to establish this integrated approach to the programming of the PR6 project portfolio.

The ITP will optimise the transmission programme to ensure delivery of the right project at the right time in the context of prevailing outage constraints, providing visibility and certainty of the transmission capital programme to 2030 and the pipeline of projects beyond 2030. During 2025, as the Price Review process progresses, we will continue to review and update the transmission and large distribution project delivery plans.

The ITP, through oversight of the implementation of transmission outage maximisation methodologies, ensures that an optimised, consistent, and robust deliverability methodology is applied to all phases of the project life cycle. This approach enables new methodologies to be coordinated, developed, and implemented to minimise programme durations. The ITP enhances transparency of project progress and assists with tracking and dynamic reporting of projects over time.

6.5 Proposed Investment

Table 19: Distribution network capacity

Description (€' bn)	PR5 Determination	PR6 (Baseline)	PR6 (Baseline + AIF)
HV Capacity Reinforcement	0.3	1.1	1.6
MV Capacity Reinforcement	0.2	0.6	0.6
LV Capacity Reinforcement	0.2	0.5	0.5
Total	**0.6**	**2.2**	**2.6**

Note: *Generation connections are included in decarbonised electricity:: Numbers are subject to rounding.*

Table 20: Reliability and resilience (Distribution)

Description (€' bn)	PR5 Determination	PR6 (Baseline)	PR6 (Baseline + AIF)
HV Stations	0.1	0.3	0.3
Overhead Lines	0.3	0.4	0.5
UG Cables (incl. fluid-filled cable replacement programme)	0.1	0.2	0.2
Asset Management, Metering, Protection, Fibre	0.1	0.2	0.2
Total	**0.6**	**1.0**	**1.2**

Note: *Continuity was a standalone allowance in PR5 but is accounted for within asset management in PR6*

Table 21: Transmission

Description (€' bn)	PR5 Determination	PR6 (Baseline)	PR6 (Baseline + AIF)
Stations		1.9	3.3
Overhead Lines		0.8	1.6
Cables		0.6	1.0
Others		0.03	0.03
Total	**1.4**	**3.4**	**5.9**

Note: *PR5 determination not broken down into this detail*

7 Decarbonised Electricity

7.1 Connecting renewables

Decarbonised electricity has been identified by customers as a priority area of investment in our PR6 business plan, with widespread support for investment across all cohorts including renewable generators, businesses and domestic customers. During PR6, we plan to build on progress during PR5 to streamline the connection process for renewable generators and accommodate demand growth arising from the electrification of heat, transport, and industry. This will require capacity reinforcements at all voltage levels (covered in Section 6.2) as well as continued support for generation customers. We also plan to deploy advanced digital technologies and implement smart solutions to manage the flow of energy and communications between millions of distributed energy resources on the distribution network and capitalise on the availability of renewables.

7.1.1 Reasons to invest

CAP24 sets a target for 80% of electricity demand to be met by renewable sources by 2030. This requires 22 GW of renewable energy to be in place by 2030, including 9 GW of onshore wind, 8 GW of solar capability and 5 GW of offshore wind.

Good progress was made in PR5, with a record year of 688 MW of utility-scale renewable generators connected to the electricity network in 2021. To date in PR5, 1.4 GW of utility-scale renewable generation has been energised. We expect this to reach 2.5 GW by the end of 2025.

The average annual connection rate for large-scale renewable generation during PR5 is 500 MW per annum. To meet the CAP24 targets, a connection rate of 1,600 MW per annum is required – more than three times the current rate. This will require coordinated and accelerated effort across all key industry stakeholders, including:

- Faster planning decisions for projects, supported by the recently enacted Planning and Development Act.
- Greater alignment between national, regional, and local authority renewable generation targets, as enshrined in the draft National Planning Framework.
- Acceleration of connection offers to meet the requirements of the Renewable Energy Directive (REDIII).
- Additional measures and innovations by ESB Networks to mitigate issues associated with disruptions in the international material supply chain.
- Access to outages on the system and associated planning and scheduling of complex system reinforcement to maximise ESB Networks' ability to continue connecting renewable generation customers at the earliest opportunity.
- Societal support for renewable generator projects to facilitate site and land access so that the overhead lines and cables necessary for new renewable connections can be installed. ESB Networks will continue to sensitively engage with landowners to ensure good collaboration throughout the engineering installation works.

7.1.2 Progress in PR5

To date in PR5, 1.4 GW of utility-scale renewable generation was connected, and a further 1.1 GW is expected to connect before the end of PR5. There are currently 485 individual utility-scale renewable generators connected to the transmission and distribution networks, delivering over 6.1 GW of renewable energy. Of these, 82% (401 of the 485 generators) are connected to the distribution system, providing 43% of the installed renewable capacity (2.6 GW of the 6.1 GW).

In addition, more than 100,000 Microgeneration, Mini-Generation and Small Scale Generation customers, providing approximately 600 MW of rooftop solar capacity, are also connected to the distribution system.

Renewable applications are governed under the enduring connection policy ruleset. By the end of PR5, we expect to have received 3 GW of generation connection applications, and to have contracted 2 GW. However, a number of external factors are likely to limit the number of projects that will proceed to energisation during PR5 to around 1 GW.

To accelerate the connection of utility-scale generation during PR5, we implemented the following measures during PR5:

- ***Smart HV and MV distribution planning standards review:*** Following a review of the distribution system security and planning standards in 2021, ESB Networks introduced the option of non-firm access (NFA) for utility-scale generators who were prepared to accept a connection on condition that they would disconnect if the normal configuration of the network was interrupted (for example, by a planned or fault-related outage).
- ***Renewable hubs:*** During PR5, the CRU approved a joint proposal from EirGrid and ESB Networks to develop five renewable hub pilots. These will be developed in locations where there is a known pipeline of renewable projects and where capacity is available. The intention is to make it easier, safer and faster to connect renewables, and particularly benefits smaller generators such as community energy projects, by reducing upfront costs associated with network capacity reinforcement. The goal is to build once with a view to minimising the need for future uprates.
- ***Flexible access to the distribution system for renewable generation:*** ESB Networks introduced a pilot to facilitate early access to the distribution network on a flexible basis for generation projects. Wind, solar, and community energy projects are participating in the pilot. Of their total output of c40 MW, c5.65 MW is contracted on a flexible basis with the first flexible access project energised in October 2024.
- ***Connection process review:*** During PR5, a review and redesign of the entire connection process for utility-scale distributed generators took place. This improved alignment and collaboration across key business units, streamlined work, and provided a range of benefits to customers, including improved communications, greater cost certainty, and fewer modifications post offer.

- ***Enhanced transparency:*** To assist generators in making key decisions about their projects, ESB Networks has introduced customer meetings and clinics at key points in the project life cycle. This gives customers the opportunity to make informed decisions, and the option of amending or withdrawing their applications as they receive more information about the potential cost of connection. To assist with site selection, we also developed an available capacity map that shows the capacity available on all three-phase LV, MV and HV DSO substations. A new online minimum cost calculator was also introduced which provides customers with an estimate of the minimum cost for the dedicated connection works for a generator >200 kW connecting to the distribution system.
- ***Commissioners:*** Commissioners are essential for the successful deployment and integration of renewable generation, ensuring that projects are completed efficiently, safely, and in compliance with all relevant standards and regulations. During PR5, ESB Networks recruited additional commissioners to ensure that the connection and integration of renewable generation to the distribution network could progress at pace. No renewable customer project was delayed waiting on commissioning resources.
- ***Telecommunications:*** During PR5, ESB Networks undertook extensive upgrades to telecoms systems to enhance connectivity with renewable generators. This ensures reliable and real-time communication between generators and electricity network operators, and allows network operators to monitor and control the flow of electricity so that the network remains stable and efficient. This is important for managing the variability and intermittency of renewable energy sources.
- ***Mini, Micro and Small Scale Generation:*** In addition to utility-scale renewable projects, ESB Networks support Mini, Micro and Small Scale Generators to connect to the network at low voltage levels. During PR5, the number of Microgeneration applications processed by ESB Networks rose rapidly, from around 7,100 in 2021 to 33,000 in 2023. We expect that the total number of applications will exceed 40,000 this year. To date, c600 MW of rooftop solar has been installed across more than 100,000 individual installations. This has been enabled by ESB Networks through the use of a simple inform and fit process, supported by significant development and modernisation of our IT systems. We have also introduced new streamlined applications processes for Mini and Small Scale Generation. Over 1,100 Mini-Generation customers (>50 kW) and over 170 Small Scale Generators (up to 200 kW) with a total capacity of 52 MW have connected via this process, with application numbers continuing to increase.

- ***Transmission delivery:*** ESB Networks play a pivotal role in connecting and integrating renewable generators to the transmission network. Working closely with EirGrid, we ensure that transmission generator connections are scheduled, constructed, and commissioned to meet the specific requirements of each customer's project. Currently, the vast majority of transmission connected generation customers elect to develop their connections contestably, meaning that they undertake some elements of the works required to connect to the network themselves. Contestable connections require significant additional work by ESB Networks to complete, including:
  - Brown field substation connection works in the existing ESB Networks substation to accommodate the new connection.
  - Implementation of SCADA systems for the new customer substation to provide signalling and remote-control systems for the transmission and distribution control centres.
  - Installation of revenue meters to ensure customers get paid appropriately for their generation.
  - Commissioning of all elements of the project to ensure the customers' connection is fit for purpose while ensuring that the connection is safe from a public and system perspective.

To date, ESB Networks has successfully connected almost 3.5 GW of renewable generator customers to the transmission network. This represents approximately 57% of the total 6.1 GW of connected renewable energy on the network, demonstrating the significance and scale of work completed to date.

The volume and scale of transmission renewable generator customers are expected to increase significantly in PR6. ESB Networks will continue to prioritise and enable these connections, as they are essential for meeting the targets set out in the Climate Action Plan and maintaining energy security.

- ***Renewable enabling technologies:*** To enable more renewable energy connections to the network, additional system inertia and interconnection are needed to maintain system stability. This can be achieved through advanced energy storage solutions such as battery energy storage systems (BESS), synchronous compensators, and interconnectors. These technologies will play a critical role in maintaining grid stability and reliability as we integrate higher levels of renewable energy. By investing in and deploying these enabling technologies, ESB Networks is ensuring that the grid can accommodate the increasing share of renewable energy, thereby supporting Ireland's ambitious climate action targets.

To date in PR5, ESB Networks has connected 608 MW of battery energy storage schemes to the transmission and distribution schemes with a further 185 MW anticipated before end of the PR5 review period. In addition, final commissioning is well advanced on a 500 MW subsea interconnector between Ireland and Wales.

7.1.3 Our plan for PR6

Utility-scale distributed generation

We anticipate that 4.4 GW of utility-scale renewable projects will connect to the distribution system during PR6, 1.6 GW of which was already contracted in PR5. This equates to approximately 236 projects, made up of approximately 59 x 38 kV connections and 177 x connections at MV level. Accommodating an additional 2.8 GW of distribution connected renewables will require capacity reinforcements at 25 stations as well as the construction of five renewable hubs. The projected timing of renewable projects during PR6 is outlined in Table 22 below.

Table 22: PR6 estimated annual delivery of utility-scale renewable generation

PR6 Deliverable	2026	2027	2028	2029	2030	Total
38 kV Connections	12	12	12	12	11	**59**
MV Connections	35	35	35	35	37	**177**
Network Capacity Reinforcements	5	5	5	5	5	**25**
Renewable Hub	-	-	1	2	2	**5**

We anticipate applications for Mini, Micro and Small Scale Generation will increase by about 30% annually as a result of technological improvements, enhanced government support, and growing capacity and expertise across the industry. To support this rapid increase in connections and adapt to changing patterns of network usage, we will regularly review developments and respond as appropriate to ensure that the needs of customers and the network are being met. We plan to develop systems to capture and track data to enable accurate reporting against the Climate Action Plan target of over 2.5 GW of non-utility solar by 2030.

To support the faster deployment of renewable projects during PR6, we propose to:

- Engage with the CRU, EirGrid and wider industry stakeholders in the development of a new electricity generation connection policy.
- Deliver faster grid connection offers for renewable projects through extensive customer engagement and move to processing two ECP batches per year.
- Deliver the capacity and reinforcements needed at distribution and transmission level as part of the overall delivery programme for PR6.
- Deliver the approved renewable energy hub pilots in line with our Build Once for 2040 approach and assess the impact of increasing capacity at existing substations, new renewable hub substations and connecting community projects to these hubs.
- Explore further options for anticipatory investment to enable future renewable customers to connect quickly and safely to the electricity network.
- Provide technical support and guidance to customers that choose to build network connections contestably.

- Continue to innovate technical engineering solutions such as the prefabricated modular MV EGIP generator substation developed in PR5 to help accelerate connections for PR6 and beyond.
- Explore and implement innovative solutions to address capacity requirements, including:
  - The development of a diversity factor for renewable generation connected to the same TSO/DSO node. Instead of considering the full output of a generator, a reduced value would be considered to account for the efficiency of the technology, the variability of its output, and its interaction with other technologies.
  - Progress changes to current generation planning standards to release up to 1.5 GW of existing transformer capacity.
  - Extend the initial non-firm access offering to 110/38 kV transformers, therefore enabling more 38 kV and MV customers to avail of this option.
  - Continue to support Mini, Micro and Small Scale Generation to connect to the LV network through streamlined processes that can be managed at scale.

Renewable Hub Locations

During PR5, the CRU approved a joint proposal from ESB Networks and EirGrid to deliver five renewablehub pilots. This will require capacity reinforcements in the following stations:

- Butlerstown 110 kV station
- Ennis 110 kV station
- Mullingar 110 kV station
- Trien 110 kV station
- Kilteel 110 kV station

7.1.4 Customer benefits

ESB Networks will facilitate the connection of significant levels of renewable generation to the distribution system during PR6. We are estimating that this will comprise approximately 236 utility-scale renewable projects which would bring the total amount of distribution connected renewables to 7 GW by 2030. This will require network capacity reinforcements and the completion of the five renewable hubs which the CRU approved in PR5. We will seek to connect all generators who come forward with projects during PR6 or whenever network capacity is available to do so. ESB Networks will also continue to facilitate the rapid growth of Mini, Micro and Small Scale Generation, ramping up the existing connection process to manage 30% year-on-year growth. We will also connect projects brought forward by EirGrid for connection to the transmission network.

7.1.5 Alternatives considered

Under our licence obligation, ESB Networks has a duty to provide customers with a connection. The Government has set targets for renewable electricity in the Climate Action Plan. Therefore, it is imperative that ESB Networks continues to invest in the necessary capacity reinforcements to connect customers, and that we do whatever we can to assist and encourage customers to bring forward renewable projects.

7.2 Distribution system of the future

7.2.1 Reasons to invest

As distribution networks become more complex with the integration of renewable energy, electric vehicles, heat pumps, storage, and other distributed energy resources, DSOs must take on a more active role in managing energy and data flows to ensure that customers have access to electricity where and when they need it and to capitalise on the use of renewable generation when it is available. During PR6, ESB Networks will continue to develop the processes, systems and operational platforms to enable this transition, so that we can actively manage local network constraints, support the integration of renewable energy, and establish the market arrangements and products to enable customers to engage in and benefit from network flexibility.

The EU Clean Energy Package requires DSOs across member states to take on a transforming role. This includes the responsibility for enabling non-wires alternatives to physical infrastructure development, namely the following:

- The development of flexible products and services necessary for the efficient, reliable, and secure operation of the distribution system.
- The provision of the necessary regulatory framework to allow and provide incentives to distribution system operators to procure flexibility services.
- The procurement of products and services necessary for the efficient, reliable, and secure operation of the distribution system, and the establishment of technical specifications.
- Ensuring the effective participation of all qualified market participants, including energy from renewable sources, demand response, energy storage facilities, and market participants engaged in aggregation.

In Ireland, CAP24 sets out flexibility requirements and targets to achieve 20 to 30% demand side flexibility by 2030. The CRU's National Energy Demand Strategy (NEDS) sets out three focus areas to deliver on this target: smart services, demand flexibility/response, and new demand connections.

To deliver on these objectives, the following measures are required:

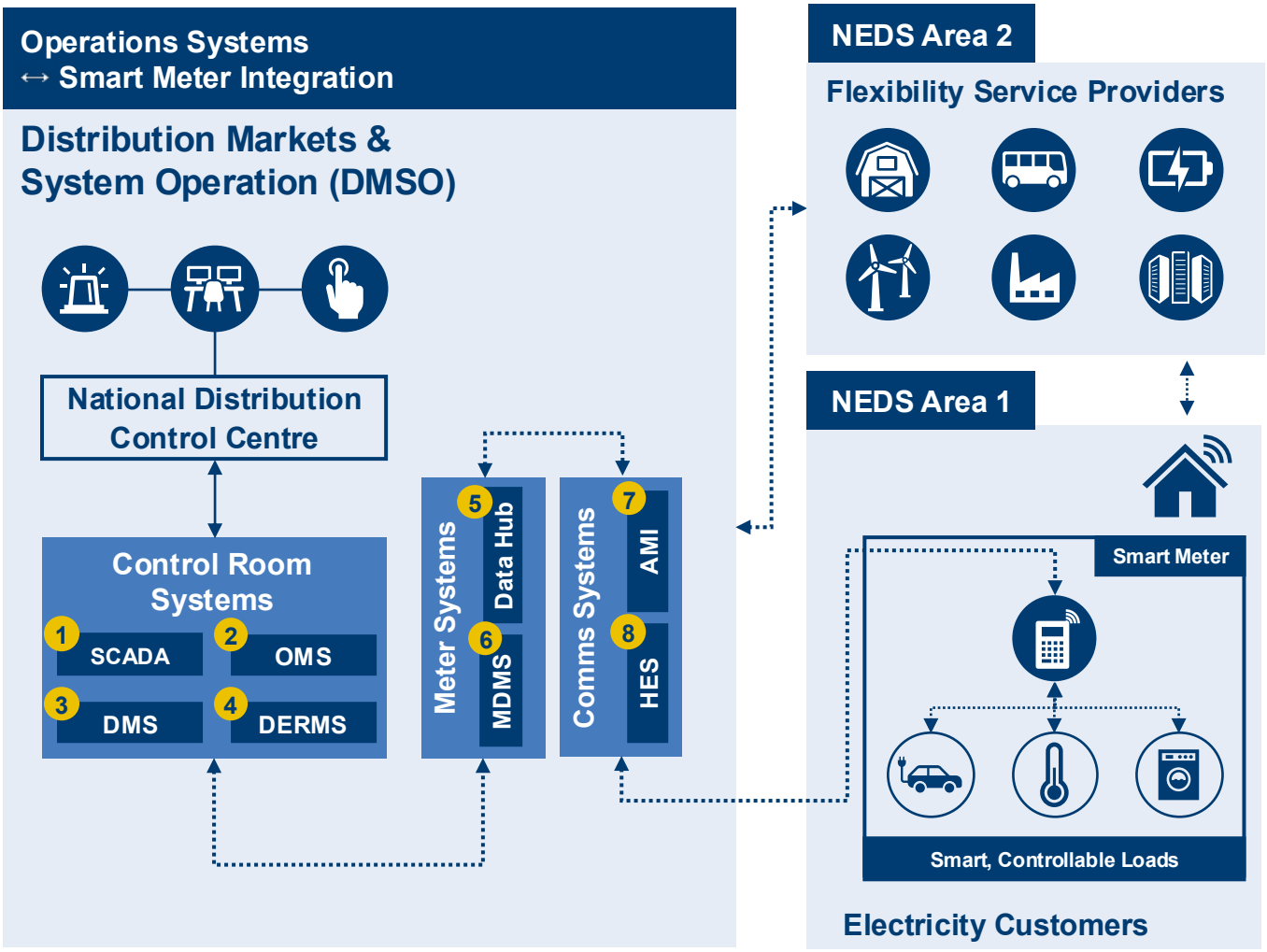
1. Flexibility products and services, including medium- and long-duration storage facilities.
2. A flexibility market to enable large energy users to participate.
3. The empowerment of domestic customers through smart metering, education, and smart-enabled technologies and services.

Smart, flexible networks present new opportunities for network operators to avoid or delay investment in physical network infrastructure by actively managing the system to reduce peak demand, overcome network constraints, and improve network efficiency. ESB Networks intends to capitalise on this opportunity during PR6 to supplement our planned investments in physical infrastructure in order to speed up connections and minimise the overall scale of investment required.

7.2.2 Distribution Markets and System Operation (DMSO)

To ensure a coherent response to legislative, regulatory and policy developments, ESB Networks established the Distribution Markets and System Operation (DMSO) function in January 2024. The DMSO is designed to encourage collaboration, innovation, and alignment across various teams within ESB Networks to ensure an integrated design across distribution markets (retail and flexibility) and system operation.

Figure 36: Smart meter integration is foundational for the distribution system of the future



NEDS Area 1:
Smart Services, encouraging greater flexibility amongst domestic customers and smaller businesses; includes Time of Use, dynamic tariffs and microgeneration

NEDS Area 2:
Demand Flexibility and Response, market focusing on demand response from flexibility service providers / aggregators

Sample new smart meter data use cases

Real-time data provision by enabling customers to collect data directly from the meter

Enabling customer participation in future flexibility products and services

Facilitation of eligible party access to data & management of customer permissions

Core DMSO Systems

1. **SCADA:** Supervisory Control and Data Acquisition, to control and monitor field devices
2. **OMS:** Outage Management System, to raise outage-driven alerts and manage restoration
3. **DMS:** Distribution Management System, to enable power flow and feeder load management
4. **DERMS:** Distributed Energy Resource Management System, to optimise and manage DERs
5. **Data Hub:** Smart Meter Data Hub, to store, process and secure smart meter data
6. **MDMS:** Meter Data Management System, to manage and process smart meter data received
7. **AMI:** Advanced Metering Infrastructure, enabling two-way comms with customers
8. **HES:** Head-End System, to collect measurement data and meter events

Specifically, the role of the DMSO is to:

- Efficiently, securely, and effectively manage the distribution system, while enabling a significant increase in connections of distributed energy assets including renewable generation and low-carbon technologies (LCTs).
- Empower and incentivise a shift in how customers use electricity.

7.2.3 Progress in PR5

During PR5, ESB Networks made progress in establishing the foundations for active management of the electricity distribution network across three main areas:

- ***Smart meters:*** We are on track to roll out 2.1 million single-phase smart meters to customers across Ireland by the end of 2025. In tandem with this, we developed new capabilities and functions, including the smart metering operations centre (SMOC).
- ***Flexibility markets:*** The National Networks, Local Connections (NN,LC) programme piloted the structures for monitoring, forecasting, and managing energy flexibility at a local level. This has laid the foundations for introducing non-wires alternatives and creating local flexibility markets. It has also undertaken extensive research to identify high-potential sources of flexibility, with new products and services created to support and incentivise these sources coming to market.
- ***Operations:*** ESB Networks invested in core operations infrastructure, cyber security and systems during PR5 so that we can continue to fulfil our DSO licence obligation to operate, ensuring the maintenance and development of a safe, secure, reliable, economical and efficient electricity distribution system.

Innovation Case Study: National Networks, Local Connections Programme

The ESB Networks National Network, Local Connections programme was established to transform how electricity is generated, stored, and consumed in Ireland, supporting a cleaner, more sustainable electric future. To achieve this ambition, the programme has focused on three main areas:

Introduction of local flexibility markets: The programme introduced Ireland's first local flexibility markets via Pilot 1. This pilot procured industrial and commercial flexible service providers to provide contracted volumes of flexibility according to provided schedules. Several tenders have since been rolled out to build market liquidity and test various market rules and payment structures.

- ***Beat the Peak Commercial:*** Aimed at commercial customers providing flexible demand during peak hours for security of supply.
- ***Pilot 3B and locational summer flexibility:*** Addressed constraints and flexibility needs at specific points on the network to support planned maintenance programmes. This targeted approach did not yield the required level of flexible demand.
- ***Beat the Peak Business:*** We are currently contracting assets for another flexibility product aimed at commercial customers.

Enhanced network monitoring: LV network visibility refers to the ability to monitor and understand what is happening on the low voltage (LV) network and it is critical in enabling homes and businesses to participate in flexibility at scale. Significant progress has been made in low voltage network monitoring, modelling and mapping, and the programme is on track to deliver 50% LV network visibility by the end of PR5.

ESB Networks has implemented a **conservation voltage reduction (CVR)** pilot which involves reducing the supply voltage by a small percentage to enable a reduction in energy demand and optimisation of voltage management to support the integration of renewable energy sources.

Flexible demand products/initiatives: New products and initiatives have been developed for commercial, community, and domestic customers to support participation in flexibility.

- ***Flexcharging:*** A live research study to test the reliability of EVs as a source of flexible demand is ongoing, involving 174 participants. It aims to shift EV charging times based on local peaks, potentially overlapping with system peaks.
- ***Ireland electricity community toolkit:*** A minimum viable product of the Ireland Electricity Community Toolkit has been published on the ESB Networks' website. This product includes a renewable energy forecast, a near real-time review of 'how flexible your county is,' showing the uptake of flexible technologies and products at county level and displays demand and generation levels. New features are currently being added on the recommendations of the SEAI sustainable energy communities.
- ***Vulnerable customers review:*** A review of potential measures to support customers at risk of being left behind in the energy transition is underway with a view to developing a suitable market product and exploring potential routes to market.
- ***National outreach plan:*** ESB Networks drove a major outreach programme to drive awareness and understanding of demand side flexibility and give customers tangible opportunities to participate. Embedded in this approach is a societal behavioural measurement framework to assess what activities are supporting customer engagement.
- ***The Is This a Good Time?*** Demand side flexibility product was introduced to support Ireland's security of supply efforts. The pilot concluded in March 2023 with 18,500 participants, delivering 17 energy saving events and reporting 45,000 actions. This resulted in overall savings of 137 MWh, equivalent to powering 11,900 homes for a day. The product, which is now live, has approximately 24,500 customers and each event now sees savings of 16.3 MWh, enough to power 1,400 homes for a day.

7.2.4 Our plan for PR6

Our PR6 plans are designed to meet the requirements set out in the Clean Energy for all Europeans Package, the Climate Action Plan, and the National Energy Demand Strategy (NEDS). We plan to focus on the following three strands of activity:

- ***Smart plus and retail transformation:*** Our PR6 investments will build on smart meter roll out and the smart meter operations centre and data access office to maximise smart meter capabilities and data use cases (in line with the Smart Meter Data Access Code). The smart meter operations centre (SMOC) is a centralised facility within ESB Networks that plays a crucial role in managing and supporting the smart metering infrastructure. The smart meter data access office is a part of ESB Networks' broader strategy to manage and utilise data from smart meters effectively. This office plays a crucial role in ensuring that the data collected from smart meters is accessible and used in compliance with legal and regulatory requirements, such as GDPR. The smart meter data access office works closely with the smart meter operations centre (SMOC) to maximise the capabilities and use cases of smart meter data.

Key Initiatives	Purpose
Technical and System Enhancements	Establish the foundation for future market requirements, while remaining current on technology platforms which are relied upon for mission-critical operations.
Retail Market 2030	Develop products and services that enable the delivery of NEDS Area 1 smart services, enabling demand flexibility in line with EU directives, including energy sharing, enduring Microgeneration, separate suppliers for import/export, multiple suppliers behind a single connection point, etc.
Data Access Office	Establish a ringfenced function to enhance data access services, including permissions management and ensuring customers control their data. Through legislation or customer position, this data can be used to provide the best value from smart meter data.
Meter Asset Maintenance, AMI and Communications Upgrades	Deliver cyclical meter upgrades, transitioning to next-generation smart meters and enhanced communications infrastructure.

- ***Operations transformation:*** Our PR6 investments will build on developments in operations made during PR5 with a view to implementing enhanced OT/IT to support active network management.

Key Initiatives	Purpose
Flexibility Operations	Integrating flexibility operations in the national distribution control centre (NDCC) to manage the system near real-time.
OT System Upgrades	Advanced distribution management and security capabilities.
Visibility and Mapping	Continuation of GIS validation of the LV network to improve visibility. Advancement of installation programme for LV monitors. Commencement of MV installation programme.
Future DSO-TSO Operating Model	Enhanced protocols, including scheduling and dispatch of distribution-connected resources.

- ***Flexibility market transformation:*** During PR6, we plan to refine and develop our product offerings by piloting and growing flexibility markets, progressively scaling and empowering customers through investments in new front-end and back-end platforms/technologies.

Key Initiatives	Purpose
Product Research and Development	Research and trialling/sandboxing of high-potential sources of flexibility.
Flexibility Market Development	Delivering on NEDS Area 2 and explicit flexibility of NEDS Area 1; building market liquidity and maturity through procurement of technology services, as well as business and LEU and residential demand flexibility.
Flexible Connections	Delivering on NEDS Area 3 and Clean Energy Package requirements; developing systems and processes and commercial arrangements to enable non-firm flexible generator and demand connections.
Flexibility Market Systems	Introducing new front-end and back-end platforms/technologies to systemise the management of flexibility.
Customer of the Future	Building awareness of flexibility, equipping customers with the right information and tools to enable them to engage with their local energy system (and participate in flexibility initiatives and demand reduction events).

7.2.5 Accelerating delivery in line with the National Energy Demand Strategy (NEDS)

- Support delivery of electric vehicle and smart appliance-related flexibility of 4,510 MWh per day by 2030.
- Support delivery of Microgeneration and energy sharing-related flexibility of 400 MWh per day by 2030.
- Support delivery of smart metering and tariff-related flexibility of 270 MWh per day by 2030.
- Support delivery of medium-duration demand-related flexibility of 2,000 MWh per day.
- Support delivery of industrial and commercial heat-related flexibility of 1,890 MWh per day.
- Support delivery of electric road transport-related flexibility of 870 MWh per day.
- Commence 12 year cyclical replacement programme for smart meters, providing the necessary data and services to empower customers.
- New flexibility market systems go live.
- Behind-the-meter distributed energy resource pilot of scale established.
- The development and offering of new flexibility products and services to customers.
- Minimum of 3,500 LV monitors and 2,500 MV monitors installed.
- Improved cybersecurity measures, in line with the latest legislation and regulations (the EU NIS2 and Critical Entities Resilience directives).
- Significant capability upgrades on core operations control centre systems, including Oracle NMS version 2.6 and modernisation of SCADA system.
- Implementation of the future DSO-TSO operating model, underpinned by enhanced protocols.

TSO-DSO collaboration

As increasing amounts of distributed energy resources (DERs) such as heat pumps, renewable generation, storage devices and EVs connect to the distribution system, ESB Networks, as DSO, must take on a more active role in managing the flow of electricity around the distribution network to meet the needs of customers. The relationship between DSO and TSO (EirGrid) is of vital importance and both organisations have placed great emphasis on collaboration throughout PR5 and will continue to develop this during PR6 as we work together to achieve a common set of strategic objectives.

TSO-DSO multi-year plans

The joint system operator programme (JSOP) was established by the TSO and DSO in 2021 to ensure that the system operators are working together in a collaborative and effective way to jointly address electricity system needs and deliver whole system solutions. The CRU PR5 Regulatory Framework, Incentives and Reporting decision paper (CRU/20/154), published in December 2020, introduced a regulatory incentive on joint DSO/TSO coordination. Since 2021, there has been a requirement for both EirGrid and ESB Networks to submit a joint multi-year plan for the DSO/TSO joint incentive.

The collaboration between EirGrid as TSO and offshore TAO, and ESB Networks as onshore TAO and DSO Ireland is an essential part of the transition to a clean energy future and to ensuring the long-term resilience of electricity supply. The latest multi-year plan details the key tasks and milestones that both companies will work towards between 2025 and 2029 under the following pillars: whole-of-system approach, facilitating new technology and system service, reducing dispatch down, and secure future power systems. The multi-year plan is revised annually and includes detailed actions to be completed for the next three calendar years and a high-level plan for years four and five thereafter. The milestones and activities within the plan have been shaped by the stakeholder feedback that was received following the PR5 DSO/TSO Call for Input Consultation paper published on June 28, 2024.

Both EirGrid and ESB Networks are committed to delivering on the ambitions of the multi-year plan in the lead up to, and throughout, PR6. Many of the tasks and activities proposed within this programme are world leading. The approaches proposed, in terms of the level of coordination between the TSO and DSO in addressing the needs of our customers, consumers, and society will break new ground internationally. We are adopting these approaches as we believe they are necessary to achieve the overall government and regulatory policy and objectives set out for 2025, 2030 and beyond. However, we do so in the knowledge that in many instances there will be limited precedent or blueprints for us to follow. As such, there will be a degree of underlying risk which we must manage throughout the life of the programme, and there will likely be cases where the outcome of a task is different from that of the originally expected outcome. The approaches being developed include coordination of services arrangements on a constrained system, coordinated management of pioneering levels of variable non-synchronous renewable generation, and whole system approaches to ensuring we provide capacity and security to support the uptake of low-carbon technologies in homes and businesses. The proposed approach within the plan is an iterative one, allowing us to learn what works and what needs to be adapted. We will adapt the multi-year plan in response to changing customer needs, changes in technology maturity, stakeholder input, and pilot learnings.

7.2.6 Alternatives considered

In PR5, DMSO used the agile investment framework (AIF) to adopt a more flexible investment approach. We started with small pilot projects and developed basic solutions before making big investments. This method allowed us to test new ideas, gather feedback, and improve products without spending too much too soon. It helped the industry make better decisions that align with customer needs and market trends, leading to more efficient and cost-effective solutions.

In PR6, ESB Networks will take a more active role in managing energy and data flows to meet new European and national energy policies. As we aim for more sustainable energy and new technologies emerge, our IT systems need to evolve to support renewable energy, electric vehicles, heat pumps, energy storage, and smart meters. DMSO's PR6 plan is a comprehensive strategy to transform Ireland's energy system, making it flexible, resilient, and capable of meeting future demands. By investing in smart technologies, enhancing network reliability, and developing flexibility markets, DMSO aims to support Ireland's transition to a sustainable, low-carbon energy future.

To support this, we will develop agreed roadmaps that provide regulatory certainty, recognising the integrated nature of our IT solutions ecosystem, which is relied upon by many stakeholders in the electricity industry. Even with these plans, we need to stay flexible and invest in adaptable IT solutions to handle the changing energy landscape. In our PR6 investment plans, we carefully considered large IT and OT solutions expenditures. We propose a mix of baseline PR6 investments and agile investment framework (AIF) to balance meeting ambitious climate and energy policy goals while managing uncertainties and timing related to energy transition investments.

Operations technology (OT) landscape upgrade

ESB Networks' current operational technology includes OMS (outage management system), SCADA (supervisory control and data acquisition) and AMI (advanced meter infrastructure) systems. We need to add new components like advanced distribution management system (DMS) capabilities and distributed energy resource management system (DERMS) capabilities. These upgrades will bring new capabilities such as managing unbalanced loads, estimating system states, handling congestion, and optimising load flow. We also need new protocols and interfaces which will require significant investment. In assessing our investment plans, we considered delaying some of these OT upgrades, however they are foundational for achieving flexibility at scale, meeting climate action targets, and improving network resilience and reliability. As such, we need to start these OT system upgrades immediately, though we have included some timing uncertainties – under AIF, for example – in relation to CyberSecurity and NIS2 directive requirements.

Visibility and mapping

We are exploring automation to make mapping the low voltage (LV) network faster and more efficient. We have talked to other European distribution system operators (DSOs) to learn from their experiences and are consulting with third-party organisations for help with our mapping strategy. We plan to see if data aggregation and machine learning (AI) can give us the visibility needed to manage the LV network actively. In our PR6 plans, we have included baseline proposals for installing LV/MV monitoring devices. If we need more LV/MV monitors, we can seek them under the agile investment framework.

Product and business design

It is important to support and encourage new and innovative product developments. The National Energy Demand Strategy (NEDS) highlights several high-potential sources of flexibility, such as energy storage, demand side units, demand response in balancing markets, long-duration energy storage (like pumped hydro-storage, iron-air, thermal energy storage, and hydrogen) and bespoke congestion management and carbon reduction solutions. Throughout PR6, we will remain agile and responsive in order to develop and grow flexibility market liquidity in line with CRU requirements. This uncertainty is best managed under the agile investment framework.

Flexibility and retail market roadmap

Our IT systems need to transform at pace to support renewable energy, electric vehicles, heat pumps, energy storage, and smart meters. In collaboration with industry stakeholders, we plan to develop and publish agreed roadmaps to ensure our integrated systems work well together and meet regulations, benefiting everyone involved in the electricity industry. Even with these plans, we will need to stay flexible and invest in adaptable IT solutions to handle the changing energy landscape. To balance managing IT solutions, investment uncertainty, and minimise impacts on customer bills, we've included significant IT solutions investment as part of the agile investment framework (AIF) in our PR6 DSMO submission.

7.2.7 Customer benefits

Smart+ and retail transformation:

Key customer benefits include:

- Maintaining smart meter assets for customers – initiating a phased asset replacement and upgrade programme will reduce future replacement burdens, decrease obsolescence risks, enable optimised resource management, and extend asset life cycles.
- Increasing choice for customers by creating routes to market for new suppliers, increasing competition, developing separate supplier agreements and multi-contracts, and enabling energy sharing.
- Increasing implicit demand flexibility by providing better data and insights to customers, including a networks online account where customers can independently access their data.
- Facilitating Microgeneration meter reads and data for customer export payment fulfilment.

Operations transformation:
Key customer benefits include:

- Improving safe and reliable distribution system operations for customers.
- Moving to ESB Networks' privately owned LTE network will decrease risk of cybersecurity attacks, ensuring security of the network for customers.

Flexibility market transformation:
Key customer benefits include:

- Creating new revenue streams for customers.
- Creating routes to markets for emerging/nascent technologies.
- Affording opportunities for customers to play their part in tackling climate change, engaging with their local energy system through participation in flexibility initiatives and demand reduction events.

7.3 Proposed investment

Connecting renewables

Description (€' bn)	PR5 Determination	PR6 (Baseline)	PR6 (Baseline + AIF)
Generator Connections	0.2	0.3	0.4
Total	**0.2**	**0.3**	**0.4**

Distribution system of the future

Description (€' bn)	PR5 Determination	PR6 (Baseline)	PR6 (Baseline + AIF)
Operations Transformation		0.2	0.3
Smart+ and Retail Transformation		0.6	0.8
Flexibility Market Transformation		0.1	0.1
Total	**1.2**	**1.0**	**1.2**

Note: *PR5 determination not broken down into this detail. Numbers are subject to rounding.*

8 Empowering Customers

8.1 Customer experience

8.1.1 Reason to invest

The next decade will see significant changes in the way that customers use electricity and interact with the electricity network. Increased adoption of low-carbon technologies (LCTs), including heat pumps, electric vehicles, smart meters, rooftop solar and in-home storage, will allow customers to take more control over their use, costs and participate in new flexibility markets.

As LCT uptake accelerates during PR5, customers are becoming increasingly reliant on having access to a reliable and resilient electricity network and expect that it will be easy to interact with the network to optimise energy savings and benefits. At the same time, customer queries are becoming more complex, requiring highly skilled and knowledgeable customer service advisors on hand to answer queries.

8.1.2 Progress during PR5

During PR5, we have made significant progress in improving the customer experience. We have enhanced core customer journeys by digitising the connections process, enhancing outage communication and keeping customers up to date via digital notifications, implementing an online account where customers can easily access personalised services and understand their energy use. We have also launched flexibility products including Is This a Good Time? and Beat the Peak Business to encourage and reward customers for participating in flexibility markets. We have also leveraged digital and data to provide new online capacity screening tools for renewables and electrification customers. We have received external recognition for our customer transformation programme and for the customer-centric approach we have adopted to drive customer excellence. We have received five Customer Experience Impact awards, one customer Digital Transformation award and two Website awards from 2022 to 2024.

8.1.3 Our plan for PR6

Our plan for PR6 builds on existing programmes to transform the customer experience and deliver a more dynamic and interactive customer service which puts customers at the heart of our business. In summary, this will involve:

Advancing and progressing the PR5 customer excellence programme, which is focused on:

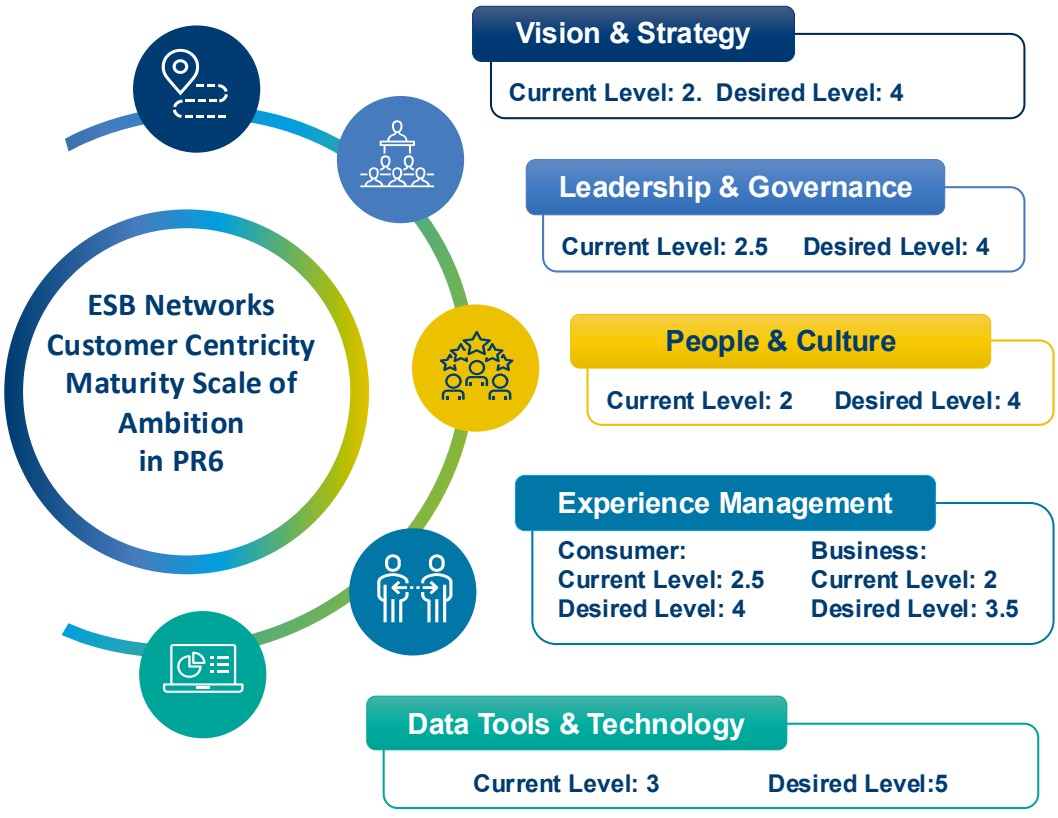
- Connected, streamlined customer experiences across all journeys.
- Best-in-class service across digital self-serve and enhanced agent support.
- Improved support and service for B2B customer segment.
- One customer view (CRM) platform.
- Articulating the need for the step-change in network transformation to reach our climate targets, the benefits for customers, and the collective role we all play to achieve Net Zero via a public communications campaign to run throughout PR6.
- Empowering customers and communities to participate in flexibility markets, pilots etc.
- Embedding a customer-first culture, informed by an advanced ‘voice of the customer’ programme.

Embedding customer centricity

ESB Networks is one of Ireland's largest service providers with 2.4 million customers connected to the electricity network. We have a very strong customer service culture dating back to our foundation, which is particularly visible to the public through our award-winning customer contact centre and through the work of our network technicians in the aftermath of storms. To ensure that we can continue to meet the needs of customers as they evolve, we developed a customer excellence programme during PR5 to enhance customer experience and increase customer satisfaction. Through widespread engagement with teams across ESB Networks, we have developed a customer promise, principles/behaviours and values to inform our customer engagement and communications and shape our training plans to drive a customer-centric culture.

Building on this progress, we plan to use an industry-leading customer centricity maturity framework to achieve higher levels of customer centricity, drive increased customer satisfaction and experience, while also improving how we deliver our services. The framework assesses current state maturity versus best practice, identifying what is needed to achieve desired maturity over time. It also serves as a measurement tool to track performance and assess the impact of measures to improve customer centricity. We will monitor our performance throughout PR6 with the aim of achieving an overall maturity score of four (out of five) by the end of the Price Review period.

Figure 37: Customer centricity maturity framework



Under the People & Culture pillar, we will continue to implement our customer excellence implementation plan with a focus on employee engagement and training organisation-wide, defined by our customer principles and promise.

Improving customer experience

As customer needs and expectations change, we are improving our services to provide customers with choice in how and when they interact with us. During PR6, we plan to further refine our services, ensuring that our customer services are inclusive and accessible to all, and that every interaction is easy, convenient, and suits the customer's choice of communication channel.

Key initiatives to improve customer experience include:

Key Initiatives	Purpose
Digitalise core customer touchpoints **Expand online services and self-serve tools** **Use of AI and data to deepen customer insights and drive continuous improvement**	Provide timely information and streamlined services. Allow customers to interact with us at times that suit them and through their preferred channel.
Provide dedicated electrification support through the customer contact centre	Provide expert and accurate information to guide customers adopting LTC.
Enable single customer view using master source of real-time and historic customer data	Improve ability to track customer interactions, analyse trends, and identify emerging issues to improve customer experience.
Accessibility and inclusion	Provide an inclusive and enhanced customer experience. Ensure that ESB Networks complies with all legislation and regulation relating to accessibility and the Official Languages Act.

Strengthening business-to-business service and support

We have listened to our business customers and sought their feedback on how we can improve our service performance. The core initiatives planned for PR6 to enhance support for business segments are outlined below:

Figure 38: Core initiatives planned for PR6 to enhance support for business

Business Customer Priorities	Customer Initiatives
1. Customer Engagement & Partnership	• **Early-Stage Customer Engagement & Education at the pre-application stage (Before they get into the System)** • Formalise the pre-application process with the customer with 1:1 Engagements / Customer Clinics • Understand the customer strategies and plans • Manage customer expectations • **In-Journey Customer Engagement during each stage of the Customer Journey (When they are in the system)** • Customer Communication at key milestones and at handover points across the Customer Journey • Some of this should be automated, e.g. System Generated emails / letters • Some of this should involve an individual being a Point of Contact (POC) for the customer
2. Customer & ESB Networks Alignment	• Clear understanding of customer project goals, timelines, investment plans • Communicate network capacity and together align on project plan/ timelines • Educate customers on their energy journey • Educate customers on the flexibility market
3. Customer Experience	• Simplify the Customer Journey(s) & Internal Processes and embed nationally to deliver a consistent service • Clear Handovers at each stage in the Customer Journey • Enable the customer to track their application, receive status updates (increase self-serve – empower the customer) • Business online account • Website: Customer Centric Redesign of the Website - easy search engine based on key words, FAQs & 'How to' Videos • Enhanced customer support tools
4. Flexibility Customers	• New partnership with customers who are interested in participating in the Flexibility Market • Procurement of Flexibility to support grid stability and optimise energy usage • Capacity & Flexibility interplay to address capacity issues , e.g. Pilot Project in Fermoy

Supporting vulnerable customers

Supporting the needs of customers most vulnerable to the loss of electricity supply is a priority. Vulnerable customers include those who need vital electrical medical equipment on a daily basis and those particularly vulnerable to disconnection during winter months. With the electrification of heat and transport, identifying the right actions to support vulnerable customers will become increasingly important as their dependence on electricity increases.

Definition: vulnerable customer

A vulnerable customer refers to a domestic customer who is critically dependent on electrically powered equipment, which includes, but is not limited to, life-protecting devices, assistive technologies to support independent living, and medical equipment. The term also refers to a customer who is particularly vulnerable to disconnection during winter months for reasons of advanced age or physical, sensory, intellectual or mental health.

Recognising that different customer segments face unique challenges on the journey to Net Zero, we understand that adopting low-carbon technologies like electric vehicles (EVs) and solar panels may not be immediately feasible for everyone. Therefore, we plan to work collaboratively to develop integrated services that focus on supporting those at risk of being excluded from the energy transition, ensuring an inclusive approach to achieving a sustainable future.

Our key actions include:

- Providing dedicated resources and customer support in the customer contact centre to provide a more comprehensive service to support vulnerable customers.
- Developing two-way communications with vulnerable customers during power outages.
- Driving awareness of services for vulnerable customer via marketing campaigns and through suppliers.
- Working collaboratively with vulnerable customer associations to develop joined-up services for vulnerable customers during power outages.
- Identifying and piloting innovative solutions based on customer research and input from vulnerable customers and community groups or charitable organisations representing people living in poverty.

Understanding customers' needs

ESB Networks undertakes regular customer research to provide independent insights into customers' current and future needs and assess customer satisfaction. During PR6, we propose to update existing research models and methodologies to reflect new services (such as Microgeneration, Mini-Generation) and services such as tree-cutting and line diversions which are currently not being tracked.

Information and communications campaigns

To inspire customers around the benefits of the energy transition and inform them about key elements of our work, we intend to continue running public information and communications campaigns relating to our services and work programmes. This will include campaigns on new online tools and services, flexibility products, smart meter exchanges, safety, recruitment, investment and community-related initiatives. In PR6, we propose to promote and inform customers about the transformation of the energy network, the investment required and the associated benefits. We plan to bring our brand strategy to life through our brand purpose, which is: Delivering the electricity network for Ireland's clean electric future, energising the nation, and empowering our customers to join us on that journey.

8.1.4 Customer benefits

As we implement the customer centricity framework model, we aim to improve our customer-centric maturity from level 2 to level 4 on a five-point scale, based on implementing the initiatives described above.

Specific outputs and benefits of our proposed programme include:

- Improving our CSAT score over the PR6 period, maintaining a 90% score for the customer contact centre.
- Improving our standard quotation timelines.
- Reaching 80% proactive digital notifications for outages by the end of PR6.
- Optimising, streamlining, and digitising all core customer journeys, including new services to customers by the end of PR6 to ensure more convenient, seamless, and simple interactions with ESB Networks.
- Implementing complaint resolution reporting and reducing complaints by 50% to 2,500 by the end of PR6 supported by a Centralised Escalation team in the contact centre.

8.2 New business

8.2.1 Reason to invest

A significant, ongoing and publicly facing element of our work involves responding to customer-driven work, including new connection applications, requests for line diversions and, increasingly, applications to connect Microgeneration, Mini-Generation and Small Scale Generation to the network. These activities drive a considerable volume of work on an ongoing basis. They involve all of the work required to enable connections to the electricity network for domestic homes, housing schemes, apartment blocks, farms, business, and industry. They also involve managing connection processes for non-utility-scale generation and undertaking cable and line diversions requested by customers to facilitate construction works or mitigate hazards.

Customers seeking a new connection to the electricity network pay a standard connection charge. These charges are reviewed and approved annually by the CRU and are detailed in our Statement of Charges , which is published on our website and updated annually. The amount a customer pays depends on the type of connection they require, such as a single domestic house, housing estate, apartment, or business of various sizes, with charges linked to the size of the connection. Connection charges contribute to the overall cost of providing the connection but do not cover the full costs. The proposed level of investment for new business included in our plan will be offset by the connection charges paid by customers.

The draft National Development Framework projects that 50,000 new homes will be required to meet the needs of our growing population from now until 2040. This, along with the increasing adoption of low-carbon technologies including electric vehicles, heat pumps and solar panels, is likely to drive significant new business activity for ESB Networks throughout PR6.

8.2.2 Progress during PR5

Since the start of PR5, we have connected over 136,000 homes, farms and businesses, and are forecasting that this will increase to close to 200,000 by the end of 2025. This represents an overall increase of approximately 50% on the previous Price Review period, which saw a total of 131,000 connections over the five years. All new domestic customers connections are designed to meet the revised design standard which ensures that they are ready for low-carbon technology (LCT) adoption.

New domestic connections include scheme-based connections (G1) such as apartments and housing developments and non-scheme connections (G2) which relate to single domestic connections, including farms. During PR5, G1 customers made up circa 67% of new connections, with approximately 85% of these located in the main urban centres of Dublin, Cork, and Drogheda. Non-scheme connections made up circa 20% of new connections, and non-domestic customers (G3) made up around 13% of new connections. These comprise metered and unmetered connections and vary considerably in scale and complexity.

During PR5, ESB Networks carried out extensive work to streamline and simplify the connection process for Microgeneration installations, including rooftop solar installations. This allowed us to efficiently handle over 112,000 applications. We also introduced new streamlined applications processes for Mini and Small Scale Generation. Over 1,340 Mini-Generation customers (<50 kW) and over 215 Small Scale Generators (up to 200 kW) with a total capacity of 62 MW have connected via this process, with application numbers continuing to increase.

8.2.3 Our plan for PR6

During PR6, we are planning to deliver increased numbers of new connections for domestic (G1 and G2) and business (G3) customers as well as new LV connected generation customers (i.e., Microgeneration, Mini-Generation and Small Scale Generation). We also expect more line diversions and other customer-driven works.

New connections

Our plans for PR6 are based on the assumption that we will connect 50,000 new homes and 5,500 businesses per year across G1, G2 and G3 customers. We are also assuming around 2,000 connections per year relating to reconnections and 'granny flats'.

Table 23 below shows projected new business connections during PR6.

Table 23: Projected new business connections during PR6

Customer Category	2026	2027	2028	2029	2030	Total
G1 (domestic apartments and housing schemes)	37,500	41,000	41,500	42,500	42,500	205,000
G2 (domestic one-off)	11,000	11,000	11,000	11,000	11,000	55,000
G3 (business)	5,500	5,500	5,500	5,500	5,500	27,500
Total	**54,000**	**57,500**	**58,000**	**59,000**	**59,000**	**287,500**

We expect that the focus on urban centres seen during PR5 will continue and that unit costs for G1 customers will stay largely static due to increased economies of scale. The costs relating to G2 customer connections are projected to increase as customers seek to connect eheat and transport, and dairy farms continue to expand their operations and require increased capacity. Our ability to sustain high levels of connections to the distribution network will depend on delivering the HV and MV reinforcement projects set out in Section 6.2 of our plan.

Line diversions

In addition to new connections, we have made provision in our plan for customer-driven line diversions. Demand for line diversions is driven by a range of factors, including economic growth, construction activity, and the identification of hazards on the network. Given the scale of ongoing construction activity across the economy, we expect this to be an area of growth in PR6.

New generator connections

We anticipate applications for Mini, Micro and Small Scale Generation will increase by approximately 30% annually due to technological improvements, enhanced government support, and growing capacity and expertise across the industry – we have made provisions for this in our plan.

New connection services

ESB Networks' Customer Charter sets out our guarantees and commitment to timelines across the range of services that we provide to demand and generation customers. For new demand connections, we commit to two timelines:

- ***Time to Quote:*** We provide customer quotations for new demand connections within 90 days for larger developments and within 15 days for single domestic connections (seven days if no site visit is needed). Quotation charges are calculated in line with ESB Networks DAC Basis of Charges for Connection to the Distribution System and the annual Statement of Charges documents.

- ***Time to Final Connection:*** Once connection paperwork, certification, and supplier registration are confirmed, typical connection times are 10 days for a single domestic connection and 15 days for mixed developments. For large mixed developments, connection times align with the developer's construction schedule, often completed in phases. We are investing in both the electrical infrastructure and people to cater for the forecast increase in the volume and complexity of new connections.
- We plan to invest in infrastructure, digital technology and people to cater for the forecasted increase in new connections, building on the development of enhanced digital tools during PR5 to scale up our ability to respond to customer needs and improve connection services. Our digital investment will focus on the following key initiatives:

Key Initiatives	Purpose
Deliver digital end-to-end processes on the customer online account	Provide a convenient and simplified experience to pre-screen, apply and track the connection journey. Reduce the time from application to connection.
Expand desktop quotations	Speed up timelines and improve efficiency of the Design team.
Enhance connection team resources	Provide customer engagement through a single point of contact. Enhance local delivery teams for pre-planning discussions and rapid resolution of queries.
Enhance design and planning process	Maximise business connection throughput and cost transparency.
Establish encrypted, secure collaboration space	Provide real-time sharing of high value technical information with our generators and large customers.

8.2.4 Customer benefits

Our new business programme is central to the delivery of the Government's Housing targets and will support the delivery of 50,000 new homes per year. It will ensure that customers benefit from a safe, secure, and affordable electricity connection, and support the transition to Net Zero through the implementation of new connection standards that will ensure that these homes are ready for LCT uptake. New connections are also critical for supporting economic and industrial growth and fostering employment through the timely connection of business customers to the network.

Having adequate capacity to undertake line diversions is also important in facilitating increased levels of housing and infrastructure construction and removing network hazards to maintain public safety.

Simplified processes for connecting non-utility scale renewable generation will play a key role in meeting the government's renewable energy targets and will enable customers to easily install and connect rooftop solar for self-generation and export.

Initiatives to streamline the new connection process will enhance customer experience, increase convenience, and save time for customers.

8.3 Electrification

8.3.1 Reason to invest

ESB Networks is committed to supporting customers to switch to low-carbon electric technologies like heat pumps and EVs so that they can benefit from a clean energy future that is healthier, more sustainable, and ultimately more affordable. Under the CAP24 targets, 940,000 EVs and 680,000 heat pumps will be connected to the distribution network by 2030. CAP24 also sets targets for a 10% reduction in emissions from industry. Separately, AFIR requires approximately 1 GW of public EV charging to be connected within the same timeframe. Supporting these policies and targets will require the connection of millions of new devices to the electricity distribution network and will drive the need for significant investment.

8.3.2 Progress during PR5

During PR5, we implemented a range of measures to support electrification customers, particularly in the transport sector where we are working closely with the ZEVI, the TII and EV charge point operators to support the implementation of the alternative fuels infrastructure requirements (AFIR). We also established the LV Planning team to proactively plan the LV network so that all homes, farms and businesses connected to the LV network are fully LCT ready by 2040. As the specific needs of electrification customers have emerged, we have developed new technical standards and guidelines to support new connections, and have developed innovative solutions including modular substations and connection screening tools to assist customers in planning and implementing electrification projects.

8.3.3 Our plan for PR6

During PR6, we plan to continue to support electrification customers across the transport, heating and industrial sectors by:

- Providing the capacity for all newly built homes connected to the LV network to adopt low-carbon technologies such as heat pumps, EVs and solar panels, in line with our updated LV design standard.
- Reinforcing infrastructure in high-growth areas to support LCT uptake.
- Developing enhanced tools to help charge point operators, local authorities, and other major electrification stakeholders make informed decisions about the location of new heating and transport infrastructure.
- Engaging with customers and stakeholders at an early stage to understand future capacity requirements to inform network development plans.
- Developing innovative solutions to meet the needs of electrification customers as efficiently as possible, either through new physical capacity or using smart, flexible non-wires (see Section 6.2 and Section 7.2).
- Supporting key electrification stakeholders through clear information and guidance, technical support, and through ongoing improvements to our systems and processes.
- Engaging and collaborating closely with stakeholders to ensure a whole-of-system approach to optimally deliver national heat, transport and energy infrastructure.
- Establishing an LCT certification register and database to assist customers in adopting technologies that are compliant with network rules.
- Researching, trialling and where possible implementing innovative approaches to support electrification customers.

Public lighting energy efficiency project

- 21 local authorities are taking part in the national public lighting energy efficiency project to upgrade their public lights to LED. The project will upgrade approximately 205,000 public lights through an investment of €150m. These lights currently consume 123 million kWh of energy annually. Once complete, the project will avoid emitting 20,000 tonnes of CO2 each year and save 68m kWh in energy. ESB Networks will continue to work with the local authorities on this important project as part of our overall delivery programme.

8.3.4 Customer benefits

Our proposed plan to support the electrification of heat, transport and industry will enhance customer experience through clear information, guidance and insights, as well as providing new capacity to meet growing customer demand. Early engagement with customers will allow us to better anticipate and plan for meeting their needs.

8.4 Proposed investments

Description (€' bn)	PR5 Determination	PR6 (Baseline)	PR6 (Baseline + AIF)
New Business	0.8	1.2	1.2
Customer Experience	0.02	0.05	0.05
Total	**0.8**	**1.3**	**1.3**

Note: *the capacity investment to support electrification is included under distribution network capacity reinforcement*

9 Accelerating Delivery

9.1 Introduction

Between 2026 and 2030, we plan to deliver a capital investment programme that is more than double our current work programme to meet national housing, infrastructure, growth, and climate targets. We have identified in excess of 500 capital projects in PR6 which are necessary to deliver additional network capacity, connect new customers, maintain the integrity and safety of network assets, install smart technologies and automation, and deliver a range of other customer-focused outcomes. Approximately one third of these will be transmission projects delivered by ESB Networks in collaboration with EirGrid, the transmission system operator, and two thirds will be distribution projects.

To enable this ramp-up in activity, ESB Networks has scaled up our capacity to deliver and is optimising the use of scarce resources as we prepare for a much greater scale of activity in PR6.

9.2 Progress during PR5

During PR5, the Covid-19 pandemic and geopolitical instability disrupted supply chain capacity at EU and global level and led to increased commodity prices. At the same time, competition for talent intensified across jurisdictions and industries and attrition resulting from an aging workforce demographic resulted in loss of capability from the industry. In response to these developments and in preparation for a much larger capital investment programme during PR6, we have developed a new delivery approach to accelerate the pace and scale of delivery. During PR5, we have been stress testing and refining our approach to ensure that by the start of PR6 it is firmly embedded and working effectively. Specific initiatives delivered under PR5 include:

Resourcing: We continue to build our internal resourcing capability and have recruited over 1,200 new employees since the start of PR5 to grow our delivery capability as well as managing succession associated with retirements. We have an annual apprentice recruitment campaign and have increased the number of first year electrical apprentices from 60 in 2021 to 108 in 2024.

Contracting partners: We are working with our contracting partners to build capacity aligned to requirements to reach our 2030 targets. We have doubled our electrical contractor capacity through market-based procurement since 2022. We have worked with the Irish Government to put in place essential skills permits to allow access to a wider pool of resource capacity outside of the EU.

Skills development: We are expanding our capacity to train and onboard both internal and external workers. We have enabled a large increase in training course participant for our framework contractors over the past three years, with over 2,000 contractor employees attending training in the NTC in 2023. We intend to expand our training school capacity and have applied for planning permission to do this.

Supply chain: We have reviewed our supply chain requirements in the context of critical material and ramp-up areas, and worked with our supply chain partners to accelerate the ramp-up of key materials such as overhead line poles, ground-mounted and pole-mounted transformers.

Accelerating digital and data: We have developed and are continuing to refine the digital tools and capability to enable data-driven, effective and efficient ways of working. This includes:

- ***HV substation preparation:*** We have **standardised** our high voltage distribution substation designs at 110 kV and 38 kV level. We are actively engaging in **site acquisition** processes for our new build high voltage station portfolio, with forecast acquisitions to take place in 2024 and 2025. We have already **advance ordered** long lead time materials for this portfolio of projects for equipment such as large capacity high voltage transformers which will be delivered in the PR6 period.
- ***Collaboration:*** We are engaging with key stakeholders such as local authorities to give early visibility of our programme of work and network development requirements to identify suitable locations for new developments, aligning our plans with regional development and in preparation for planning submissions.
- ***New business functions:*** We have reorganised a number of key business units to maximise delivery potential and growth. New business functions have been created, including the National Programme Delivery team, the Transmission 2030 team and the expansion of the Contracting Partners Group to enable the onboarding of greater levels of industry support.

As a result of these initiatives, ESB Networks has made significant progress in supporting renewable energy connections, with over 1 GW of solar photovoltaic generation capacity reached and connected to the electricity network in 2024. We also connected 5,792 MW of utility-scale renewable generation by the end of 2023, which is now supported by over 1 GW of utility-scale energy storage. We accelerated the roll out of Micro, Mini and Small Scale Generation, with over 100,000 rooftop solar installations now in place, providing approximately 600 MW generation capacity. In response to the demanding system winter peak challenge, we connected over 800 MW of new and crucial emergency generation to the system since September 2023 to maintain national security of system supply.

In line with the strategic pillar of empowering our customers, ESB Networks successfully installed 1.85 million smart meters in homes, farms and businesses across Ireland. The national smart metering project is on track to complete the installation of over 2 million smart meters by early 2025.

An example of where the contractor rollout programme has provided success is with the replacement of low voltage (LV) underground assets, in particular mini-pillar and Magnefix replacement programmes. Success in this area has seen ESB Networks exceed the delivery targets of this key public safety programme.

9.3 Our plan for PR6

During PR6, we will continue to implement, refine and expand measures to increase workforce resilience, streamline construction and optimise the use of constrained resources, focusing on the following areas:

9.3.1 Total workforce strategy

We plan to maximise our total workforce by supplementing internal capability with outsourced talent through contracting partnerships. We propose to carefully balance internal and external resources and skillsets in a manner that the competencies and capabilities of ESB Networks and our contracting partners are mutually complementary. We will also continue to develop effective people managers to maximise the productivity and engagement of our workforce and ensure efficient delivery. This model will enable us to flex capacity in response to growing needs, scale resources, and respond effectively to delivery challenges.

9.3.2 Contracting alliances

We will continue to build strong strategic relationships with our contracting partners who will make a very significant contribution to our delivery programme and our ability to scale our capital programme. We will do so using market-based competitively tendered frameworks to ensure efficiency. Through ongoing contractor engagement, we recognise that early engagement and visibility (both short and long term) of our work programmes are essential for cost efficiency and to develop the pipeline of required skills, capabilities, and capacity. We propose to continue to expand technical recruitment campaigns and contracting frameworks and are currently on track to put in place approximately €5 bn of contracting frameworks by the end of 2024.

9.3.3 Supply chain resilience

We are working closely with our suppliers to align production capacity with our needs in order to overcome supply chain challenges. We are also taking a proactive approach to material life cycle management. This includes standardising and rationalising materials to enable easier sourcing, increasing stores of strategic spares, and recycling and refurbishing aging assets to extend asset life. We have identified key materials and areas of growth and are assessing our suppliers' capacity to meet the demand. We are optimising our stock holding levels based on a combination of current and future use, taking material criticality, supplier capacity and lead times into account. Standardisation of material, increasing framework capacity where required, advance procurement of equipment and materials with long lead times, early engagement with our suppliers to provide visibility of the programme and associated material requirement are all components of our supply chain strategy which we are applying to address these challenges. For example, we have entered into frameworks for advanced orders of materials including production slots for 20 110 kV and 5 x 220 kV HV transformers, as well as €200m of SF6 switchgear.

9.3.4 Turnkey model

A turnkey delivery model is a project delivery method where a contractor or firm assumes full responsibility for managing the entire project life cycle, from initial concept and design through to construction and final delivery. By adopting a turnkey delivery model of outsourcing, we can substantially increase our ability to deliver projects quickly and effectively. Multi-project tendering could also make this process more efficient, particularly when used on a standardised basis, as it can reduce effort relating to particular parts of project development (e.g., standardised design reduces design effort when used across a portfolio). This method of delivery is particularly well suited to greenfield new-build assets, which are a fundamental component of how we plan to grow capacity at transmission and high voltage levels in the network. This will allow us to access a larger market sector, while at the same time building capacity through our contracting frameworks to deliver on the wider PR6 programme.

9.3.5 New ways of working

We understand that simply increasing resourcing capacity will not deliver the step change in delivery needed to realise our 2030 ambition. We are therefore developing new approaches and work methods, which will be embedded in advance of PR6. This will include new approaches to standardisation, work integration, batching and modern methods of construction such as prefabrication. A core approach is the application of the Build Once for 2040 concept to deliver enhancements and ensure that planned upgrades are performed in an efficient manner, aligned to future network requirements over a longer time horizon.

Our new ways of working include:

- ***Standardisation:*** Standardisation of both design and materials will enable us to productionise infrastructure delivery, enabling faster infrastructure deployment at higher volumes. This will reduce overall design effort and supply chain risk and support measures such as advanced procurement and contracting which, coupled with an overall portfolio approach, will de-risk individual projects.
- ***New build approach.*** While uprates of existing assets will remain a feature of our work programme, deployment of HV substation network capacity at scale and pace can be best achieved through a new build approach. We plan to construct new assets at key nodes on the network to provide substantial volumes of additional electrical capacity. This is particularly effective when coupled with a standardised approach and a turnkey delivery model. By working in this way, we will substantially reduce the constraints associated with brownfield development, such as onerous multi-season system outages and labour-intensive bespoke design requirements.
- ***Work integration.*** By consolidating work activities into a small number of core programmes, we plan to optimise resource utilisation and efficient delivery of work. We are developing this work integration approach for application to our medium and low voltage overhead line network programmes. Customer supply will be enhanced as system outage requirements to enable work on the network are reduced. This is supported by digital tools and extensive data models to enable integrated technical scope and work delivery.

- ***Modern methods of construction***. Prefabrication of assets such as modularised high voltage substations speed up delivery of construction projects. Units are factory built to standard design and will be deployed across a portfolio of projects, enabling rapid deployment at scale and opening opportunities for batching of procurement and manufacturing. Both onsite and offsite activities can therefore be maximised.
- ***Anticipatory investment.*** We propose to apply a Build Once for 2040 approach where it makes sense to do so to eliminate the need for repeated, costly, and resource-intensive interventions on the network, and minimise customer disruptions over a longer time horizon. This will involve designing projects now to meet the anticipated needs of customers in 2040 and ensuring that maintenance works are considered over a longer timeframe.
- ***Accelerate digital and data.*** We are leveraging digital and data to enhance organisational effectiveness in order to scale up to deliver a much larger work programme. This involves integrating business processes, facilitating faster decision-making by providing data at the point of need and enhancing our ability to adapt to changing circumstances.

Embedded generation module

ESB Networks developed an MV embedded generation interface protection (EGIP) modular substation to assist renewable generators to connect to the network. This standardised, prefabricated substation module can be deployed readymade to site, allowing for faster renewable connections for embedded renewable generation connections of between 1 and 20 MVA. By streamlining the connections process for embedded generation, this innovation supports the decarbonisation of electricity by making it easier and faster for new renewable generation to come on stream.

EV charging hub module

ESB Networks also developed a modular substation for use by EV charge point operators (CPOs) to support the roll out of public EV charging. CPOs were finding it difficult to secure lease agreements from forecourt owners to install public EV charging on their sites due to the space required to install a MV block built substation. Following a public consultation, ESB Networks developed and piloted a standardised, prefabricated substation module with several CPO customers that can be deployed readymade to site. The first successful pilot was energised in Killarney, Co. Kerry in 2023. ESB Networks has since connected a further 22 charging hub sites using the charging hub module. The module has a much smaller footprint than a block-built substation, is easier to install and allows for faster connection to the system.

(a) EV Charging Hub module at Blanchardstown

(b) Showcase MV EGIP Module at NTC Portlaoise

10 Foundational Capabilities

The step change required to deliver a programme of the scale and ambition of PR6 will require ongoing changes and refinements in the way we deliver work and the enabling structures we have in place. This section of the business plan outlines our approach to enabling this transformation through people, processes and technology. It also sets out our approach to embedding sustainability in everything we do.

10.1 Workforce strategy

10.1.1 Reason to invest

ESB Networks has a highly skilled and engaged workforce that is deeply rooted in service to our 2.4 million customers. We have a proud and consistent record of delivery and are driven by a strong sense of purpose to address social, economic and environmental objectives that are critical to Ireland's future.

Over the course of PR5, we have increased the size of our workforce to almost 3,900 people. This comprises our frontline network technicians, instantly recognisable in the iconic yellow fleet, as well as customer service personnel embedded across every part of our business, including our award winning customer contact centre in Cork. At our core is a deep technical and engineering capability which has helped to shape the electricity industry in Ireland since the 1920s, with a growing number of experts in newer areas such as digital and AI.

In addition to directly employed ESB Networks employees, we have expanded our total workforce through contractor partnerships to ensure we have the requisite expertise and capability to deliver on Ireland's policy goals relating to housing, economic growth and climate change.

To successfully deliver a programme of the scale of PR6, it is essential to cultivate a resilient, skilled, and adaptable workforce capable of meeting the challenges of a rapidly changing industry. This involves managing the availability, retention and development of talent throughout the entire employee lifecycle – from recruitment to retirement. We are committed to providing a positive people experience, where everyone feels valued and included.

The PR6 workforce strategy sets out a comprehensive strategy to enhance workforce capabilities, promote inclusive growth, and ensure delivery of PR6.

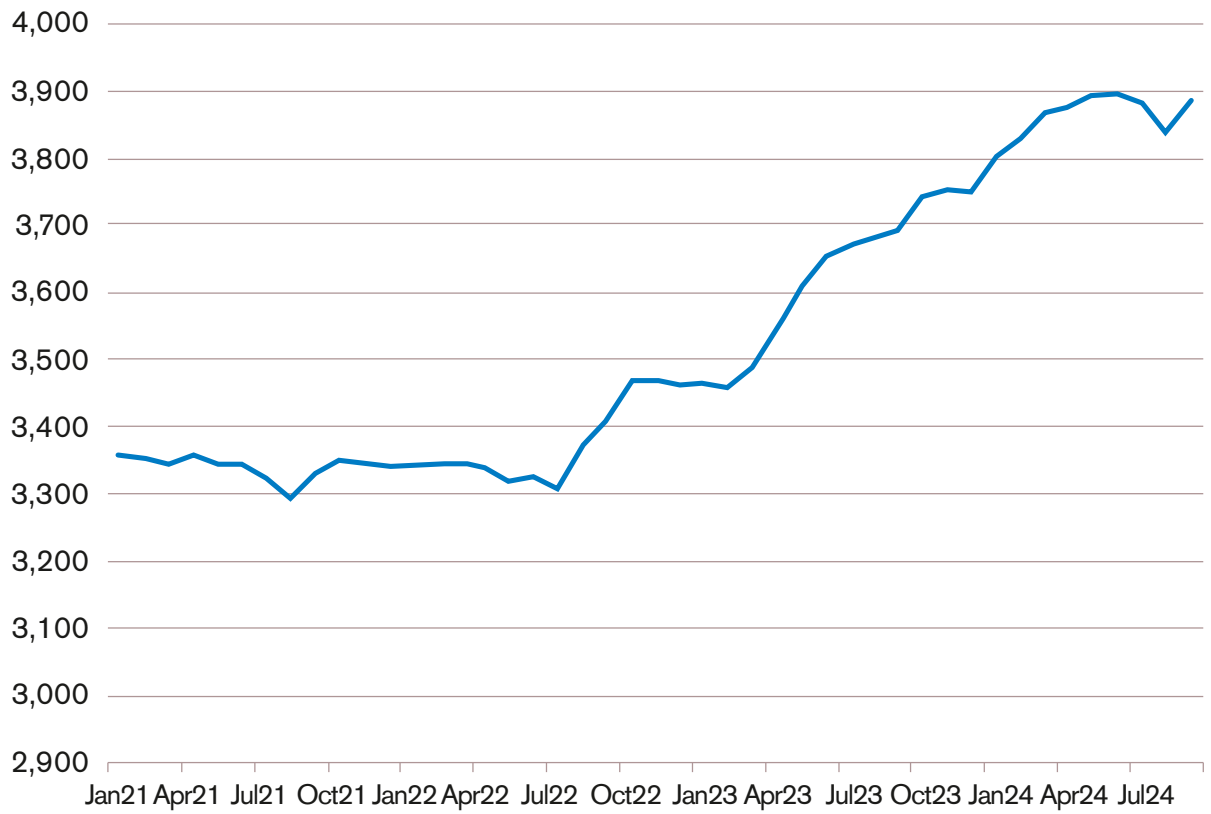
10.1.2 Progress during PR5

During PR5, we have successfully undertaken a range of workforce initiatives to build capacity and capability within the organisation to enable a significant ramp-up in the remaining years of PR5 and into PR6. Recruitment has been at an unprecedented level and we have more than doubled the delivery of technical training in order to meet the growing demand for skills. Highlights include:

- We recruited over 1,200 new people since January 2021, against a backdrop of high levels of retirements, resulting in an overall increase of 16% in internal workforce (Figure 39).
- We increased the number of new apprentices on the ESB Networks' electrical apprenticeship programme to 96 in 2022 and 108 in 2024, bringing the total number of retained electrical apprentices in the programme to 377, as of September 2024.

- Significantly increased training days delivered by the networks training centre to more than double the level delivered in 2021.
- Increased the number of crews available to work with ESB Networks through our partner contracting organisations.
- We have a progressive employee relations model, which combines direct engagement between the company and the employees through line managers, extensive internal communications channels, and regular employee updates and townhalls. We also ensure trade union engagement with local representatives and we benefit from a robust set of internal processes and procedures for effectively managing issues and grievances as they arise.
- Utilised an organisation design review to optimise our organisation structure for delivery of PR5.
- Robust succession planning processes to prepare for high level of retirements, ensuring knowledge transfer and business continuity..

Figure 39: ESB Networks' employee numbers over PR5



10.1.3 Our plan for PR6

In preparation for PR6, we are building our total workforce through direct recruitment and contractor frameworks and investing in our people to ensure that we have the requisite skills to operate, develop, and maintain the electricity network as we transition to a Net Zero future. Our resource plan is aligned with and will anticipate future needs throughout PR6. Key initiatives will include:

- Sustained recruitment throughout PR6 to build the capacity of our core workforce, with a strong focus on technical capability.
- Building on successful recruitment campaigns in recent years to attract up to 100 qualified electricians annually to retrain as network technicians to grow frontline delivery capacity.
- Continuing to recruit into our apprenticeship programme at >100 per year.
- Further scaling our workforce with a specific focus on network technicians, project management, engineering, and contractor management.
- Continued succession planning and knowledge transfer during ongoing high levels of retirement.
- Working with our strategic partner contracting organisations to support them in scaling to address the increased work programme requirements.
- Continued investment in technical development through our electrical apprenticeship programme, our graduate engineer development programme, and continuous development through the networks training centre.
- Continued adoption of digitalisation, standardisation and new ways of working to enable increased delivery capability.
- Fostering diversity and inclusion by implementing initiatives that support the recruitment, retention, and development of underrepresented groups..

10.1.4 Key workforce considerations

The key challenges we anticipate while growing and developing our workforce to deliver PR6 are:

Key Challenges	Description	Proposed Mitigation Plan
Availability of Key Capabilities	Increased demand for key capabilities (e.g., electrical craft, engineering) and specialised skills. Competition with other utilities for in-demand skillsets.	Targeted recruitment campaigns to attract talent with the required technical skills. Promote ESB Networks' purpose and central role in climate action. Foster early career talent through apprenticeships and graduate programmes, and provide a clear, rewarding career path and growth opportunities. Robust succession planning, hiring ahead and knowledge transfer in critical roles as we enter a period of high forecasted retirements. Work with contracting partners to grow contracting workforce.
Retention of Key Talent	High competition for skilled talent requires enhanced retention strategies.	Ensure ESB Networks is an employer of choice with competitive compensation packages, career advancement opportunities, comprehensive benefits (Our People Promise), flexible working where applicable, work-life balance, attractive corporate culture, employee engagement and employer branding.
Training and Development	The need for continuous upskilling due to increasing demand and technological changes. Leadership development to manage new processes and drive innovation.	The networks training centre will continue to drive technical excellence and will scale up to deliver more training to meet demand of both employees and contractors. Training will be aligned to meet demand for critical skills to deliver PR6 (e.g., operations). Develop a strong leadership pipeline capable of driving the transition. Offer continuous professional development opportunities to enhance skills and knowledge in line with industry trends.
Aligning Workforce Capabilities with Future Demands	Managing workforce capability gaps in rapidly evolving landscape of new technology and business functions.	Data-driven workforce planning and capability analysis utilising predictive modelling to forecast workforce needs and inform strategic hiring and training decisions.
Business Transformation	Increased delivery required under PR6 means we must embrace new ways of working, innovation, and cultural transformation.	Continued adoption of new ways of working developed as part of the accelerate digital and data programme, including increased use of digital tool and data-driven decision making, leading to greater efficiencies in work delivery. Build on our strengths and work together to create an inclusive, values-based culture.

10.2 Sustainability

ESB Networks recognises the impact our activities have on communities and the environment. We are committed to embedding sustainability at the core of everything we do, while focusing specifically on the three UN Sustainable Development Goals (7, 9 and 13) where we can make the most tangible and lasting difference.

During PR6, ESB Networks plans to continue to support key sustainability measures and requirements relating to biodiversity, carbon reduction, and energy efficiency within our own landholdings, fleet and buildings. We will also report on our sustainability progress under the Corporate Sustainability Reporting Directive (CSRD).

The key focus of this PR6 Investment is on:

10.2.1 Buildings and fleet

Implement carbon reduction and energy efficiency measures across all current and future building upgrade works to reduce our building CO2 emissions by at least 51% by 2030.

- Improve the energy efficiency for our buildings and transport fleet by 50% by 2030.
- Bring all buildings up to a rating of at least BER B and 40% of buildings at a BER A standard by 2030.
- Continue to transition our fleet of approximately 2,000 vehicles away from fossil fuels to reach the target of 100% decarbonised fleet by 2040.

10.2.2 Carbon assessments and risk

- Integrate carbon emission assessments as part of all infrastructure capital investments as required under CAP19. Calculate and value GHG emissions as part of this economic appraisal of major capital investment projects that we undertake, where these emissions are material, using a shadow price of carbon.
- Incorporate climate-related processes and risks into ESB Networks' overall risk management framework and risk reporting.
- Adopt purpose-led sustainable procurement strategies and practices that deliver value for money and socially responsible outcomes for customers. Sustainable procurement seeks to have the most positive environmental, social, and economic impacts possible on a whole life cycle basis.

10.2.3 Sustainable procurement

- Adopt purpose-led sustainable procurement strategies and practices to deliver value for money and socially responsible outcomes for our customers and the internal networks business to ensure the materials and products we buy have the most positive environmental, social, and economic impacts possible on a whole life cycle basis.
- Investigate and adopt new low emissions technologies to replace SF6 equipment as soon as they are proven to be viable.

10.2.4 Biodiversity

- In line with the Nature Positive policy direction for public authorities, implement our biodiversity strategy to bring a regenerative environmental benefit to the local communities where we operate.
- Deliver biodiversity net gain for projects at sites within ESB Networks' ownership and ensure no net loss of biodiversity at a national level when carrying out operational and maintenance activities.
- Foster proactive engagement with other utilities, public bodies, stakeholders and the communities in which we operate to identify synergies for the delivery of biodiversity action at a range of scales across the country.
- Work to improve biodiversity and enhance the local natural ecosystems in which we work while making use of dormant or redundant assets and minimising habitat disturbance.
- Support national policy and positive action for nature through a suite of measures.
- Report on our biodiversity measures and progress under the Corporate Sustainability Reporting Directive (CSRD).

10.2.5 Diversity, equity, inclusion and belonging (DEIB)

- We are committed to an inclusive working culture and increased diversity in all its forms. The benefits and positive impacts of increased diversity in our workforce are obvious in terms of decision making, innovation and overall performance, and we continue to prioritise this across all areas of our business in PR6. Increased diversity in traditionally non-diverse roles has been very positive for ESB Networks. Building on this, we actively seek to recruit people from more diverse backgrounds, ensuring greater diversity across technical roles and progressing this through to management levels. ESB Networks is committed to being an LGBTQ+ inclusive workplace. Using the Corporate BeMe@ESB initiative as our guidance, we are creating a culture where each person can bring their whole self to work, fully contribute and feel valued, respected and equal in the workplace.
- Continue to enhance diversity in our workforce to improve decision making, innovation, and overall performance.

10.3 Safety

Safety will remain front and centre of our work, and as we ramp-up delivery during PR6, we plan to undertake significant measures to protect the health, wellbeing, and safety of our employees, contractors and the communities we serve. Safety considerations are a key input to our designs and how we operate and manage the electricity network.

Our commitment to achieving an incident and accident-free workplace is reflected in our implementation of a 'just culture' framework, which promotes an atmosphere of trust and encourages open and honest reporting of incidents and errors, while also holding people to account. By implementing a just culture, ESB Networks aims to foster a positive safety culture, enhance employee engagement, and ultimately improve overall safety performance.

Our investment plans for PR6 include:

- Public safety strategy, including public safety awareness campaigns to inform members of the public of the dangers of coming into contact with our infrastructure.
- A risk-based approach to asset maintenance and replacement to reduce risks associated with aging assets.
- Patrolling and monitoring aspects of our networks which the public may come in contact with, such as poles, overhead conductors, mini-pillars, and substations.
- Embedding safety into our work processes and procedures and those of our contractor partners.
- Undertaking risk-based plans and programmes to improve road safety outcomes, including enhanced use of the vehicle management systems.
- Developing new e-tools and technology both for training and safely managing the work.
- Building on our safety culture by implementing a 'just culture' framework which further encourages open and honest reporting of safety-related information while clearly defining the boundaries between acceptable and unacceptable behaviour.
- Completing a process of safety culture transformation through the safe and sound programme.

10.4 Innovation

10.4.1 Reasons to invest

Innovation is fundamental to meeting the needs of our customers now and in the future as we prepare for a transformed energy landscape where customers depend on electricity to power almost every element of their lives. During PR5, ESB Networks identified, trialled, and implemented a range of innovative solutions in line with our Networks for Net Zero strategy, with the objective of meeting the evolving needs of customers, communities and stakeholders. In the context of accelerating climate targets, a rapidly evolving energy landscape, and the emergence of new technologies and solutions, innovation remains central to our plans for PR6. In addition to innovations that directly improve ESB Networks' functional areas of responsibility, we plan to consider our wider role in society and collaborate with external stakeholders on innovations that can deliver whole-of-system benefits.

10.4.2 Progress during PR5

Innovation

Innovation played a key role in supporting strategic outcomes and customer-focused solutions during PR5, with over 50 innovation projects materially progressed since 2021 across our three areas of focus: climate action, network resilience, and future customer. These projects were developed and delivered in accordance with our innovation governance framework as set out in ESB Networks' Innovation Strategy.

Significant emphasis was placed on solutions to support the electrification of transport during PR5 in anticipation of the implementation of the Alternative Fuels Infrastructure regulation in 2024. The new solutions included a pre-screening process for demand connection applications made by electric vehicle charge point operators, integrated electric vehicle charging and public lighting solutions for local authorities, new transformer designs and pilots, and an online capacity heatmap to assist customers in making informed decisions around site selection for developments. Monitoring trials were also undertaken to assess the impact of LCT uptake (including EVs and heat pumps) on the LV network. New digital modelling trials were also undertaken to identify and target network reinforcements.

Projects to accelerate decarbonisation have modelling and impact assessment of Microgeneration, a pilot of export limiting schemes for Mini-Generation and Small Scale Generation, and the development of a new modular substation to facilitate renewable generator connections. Innovation solutions to decarbonise island communities were also identified and evaluated.

There was a strong focus on innovations to enhance network efficiency, including projects relating to enhanced substation and transformer design and operation, the use of digital twins to anticipate timber-cutting needs, and the use of UAVs (drones) for network mapping and vegetation management. A highly innovative 'sidewalk transformer' was also developed to support capacity reinforcements in densely populated urban areas, which is currently being trialled.

The Innovation team also worked closely with the DMSO to identify and develop new flexible network solutions and are currently developing a timed connections pilot with a view to accelerating connections for customers who are willing to limit their electricity consumption to specific times.

Many of these innovations have resulted in the adoption of new technologies and solutions and will enable greater work volumes from 2025 to 2030.

10.4.3 Our plan for PR6

During PR5, we commissioned research into best-practice innovation approaches among UK DNOs. We are using the insights from this to inform the development of a revised innovation strategy in preparation for PR6. A key focus will be on ensuring that our innovation approach is sufficiently agile, outward looking, and strategically aligned to meet our Net Zero by 2040 target and that innovation can be progressed at pace.

During PR6, we intend to continue to encourage and support innovation across all parts of ESB Networks and enhance external collaboration to achieve key national policy outcomes relating to climate change, just transition and electrification. Our innovation programme will be underpinned by the following principles:

- **Collaboration and engagement** to enhance whole-of-system outcomes.
- Building an **innovation culture** to drive innovation across ESB Networks.
- Ensuring alignment with strategic outcomes.
- **Applying appropriate governance** to protect customers and optimise outcomes.
- **Sharing insights** to ensure that learning from innovation is not wasted.
- Maintaining independence.

Key focus areas

Given the inherently changing nature of innovation, we cannot predict with certainty what innovation projects we will undertake throughout the life of PR6. However, we have identified core areas of focus and potential projects, taking into consideration our Networks for Net Zero Strategy, industry developments and trends, national policy objectives, and the CRU outcomes and objectives for PR6. In summary, these projects span the following areas:

- ***Electrification:*** Building on innovation projects developed during PR5, we plan to explore ways to optimise EV charging facilities and their impact on the network, including the use of smart EV charging tools to optimise network efficiency, vehicle-to-grid solutions, and charging solutions for heavy goods vehicles. We also propose to explore innovations to accelerate and enable eheat solutions and optimise its potential as a source of flexibility for the network.
- ***Network capacity including flexibility:*** Several projects looking at the potential to expand network capacity or delay the need for capacity reinforcements through smart and flexible solutions are proposed. Projects that are already underway during PR5 include a feasibility study looking to upgrade the 38 kV network to 110 kV and a timed connections pilot. We intend to continue working closely with the DMSO to identify and develop innovations to support flexibility and active system management.
- ***Network resilience, reliability and safety:*** ESB Networks plan to initiate projects to improve continuity, enhance network resilience, and mitigate climate risk. These will include wildlife protection measures, LV planning solutions, cyber security, flood risk mitigation, and fault identification and repair measures. We plan to leverage data and digital technologies to analyse trends and identify potential areas of innovation focus.

- ***Decarbonised electricity:*** To facilitate accelerated electricity decarbonisation and long-term energy storage, ESB Networks plans to assess the impact of hydrogen electrolysers on the network as these technologies come on stream during PR6. We intend to build on work undertaken in PR5 to find technologies to replace carbon-intensive fuels used in the operation of the network, including fleet vehicles and mobile generators, as well as in island communities.
- ***Environmental sustainability***: In line with our commitment to place sustainability at the core of our operations, we propose to explore and develop innovative projects in the areas of circularity, biodiversity, and regeneration.
- ***Digital, data and AI:*** We plan to identify new solutions and use cases for digital and data, particularly in the areas of open data, AI, and augmented reality (AR)/virtual reality (VR). We plan to work closely with the digital and IT teams to identify opportunities to explore innovations with the potential to deliver transformation.
- ***Empowering and protecting customers:*** We will explore innovative solutions to empower and support customers through streamlined processes, self-serve tools and enhanced data to support decision making. We also plan to collaborate with external partners to support energy communities, medically vulnerable customers, and those who are at risk of being left behind in the energy transition.
- ***Urban community project:*** We are proposing to develop a flagship project that will take a whole-of-system approach to analysing and addressing the challenges of electrification in large urban centres. This would involve extensive external collaboration and incorporate specific measures to support medically vulnerable and energy poor customers.

In addition to projects that are led out of our Central Innovation team, innovation will be embedded throughout ESB Networks, with each business unit focusing on innovations that directly support the efficient delivery of their functional responsibilities.

10.4.4 Outputs and customer benefits

Our innovation programme will enable ESB Networks to continue to drive a culture of innovation, gather insights on new technologies at early states of technological maturity, and identify innovation opportunities from around the globe. Through our PR6 innovation programme, we plan to lead and substantially progress approximately 15 small scale projects, five medium scale projects and two flagship projects over the course of PR6. We also plan to support business units across ESB Networks to initiate and drive their own innovation projects (approximately 25 projects over five years). Through external collaborations, we will focus on whole-of-system solutions and share learning and insights with our ecosystem of innovation stakeholders.

The wide scope of our innovation programme will help to provide insights and solutions that can help to deliver a range of customer benefits, including:

- Projects aimed at standardising and modularising assets will lead to **faster deployment of infrastructure** and support national policy targets relating to housing, climate change, and economic development, while supporting **decarbonisation**.
- Projects that leverage digital, data and AI will help to **enhance transparency, improve process efficiency** and enable the delivery of self-serve tools to **aid business planning** and **empower customers**.
- Projects focusing on medically vulnerable and customers at risk of being left behind by the energy transition will help to inform policy makers and contribute to a **just transition**.
- Projects seeking to optimise the use of existing network infrastructure through flexibility will help provide **faster access to capacity** and **empower customers**.
- Projects that leverage new technologies to manage EV charging will support the **electrification of transport**.
- Projects that inform and enhance network planning will help to ensure **safe, reliable, resilient electricity networks** and **enhance continuity**.
- Projects focused on whole-of-system improvements will help to support Ireland's broader **social and economic goals**.
- Projects that engage customers and communities in the energy transition will help to build awareness and support for the energy transition.
- Projects that assess the impact of new technologies on the network (e.g., battery storage, hydrogen electrolysers, or other low-carbon technologies) will help to **inform regulation and policy**.
- Projects to accelerate electrification will empower customers and support Ireland's carbon **reduction targets**.
- Activities to improve **innovative culture** and **identify emerging technologies** will bring new ideas into ESB Networks and support **continuous improvements** for the benefit of customers.

10.5 Accelerate digital and data

In the rapidly evolving energy landscape, digitalisation is crucial to enabling the changes needed to bring about a secure, reliable Net Zero electricity system for customers. Good quality, structured and digitised data will play a fundamental role in improving customer experience, increasing network efficiency and performance, reducing unplanned outages, and enhancing productivity.

During PR6, we will continue to leverage the capabilities of our existing IT systems to accelerate digital and data and deliver customer benefits across our business through our Powering Ahead programme. Our investment plan for IT, OT, and digitalisation will support virtually all of the PR6 strategic outcomes and objectives, and will form a foundational capability that can be leveraged across multiple use cases now and in the future as the industry evolves.

Research has shown that every distribution network utility is undergoing significant transformation in these areas as a means of meeting ambitious climate change targets:

- *"Digitalisation of the energy system is at the heart of our transition to build a smart and efficient energy system"* – National Grid's DSO Strategy, digitalisation and data
- *"Global investment in the energy transition hit a record $1.8tn in 2023, climbing 17% from a year earlier"* – Bloomberg New Energy Finance Energy Transition Investment Trends 2024
- The energy sector requires *"A fundamental digital transformation across the sector, from generation to transmission and distribution to end-use"*: Ofgem's 2023 Future Systems and Network Regulation

10.5.1 Reasons to invest

Foundational IT systems and infrastructure

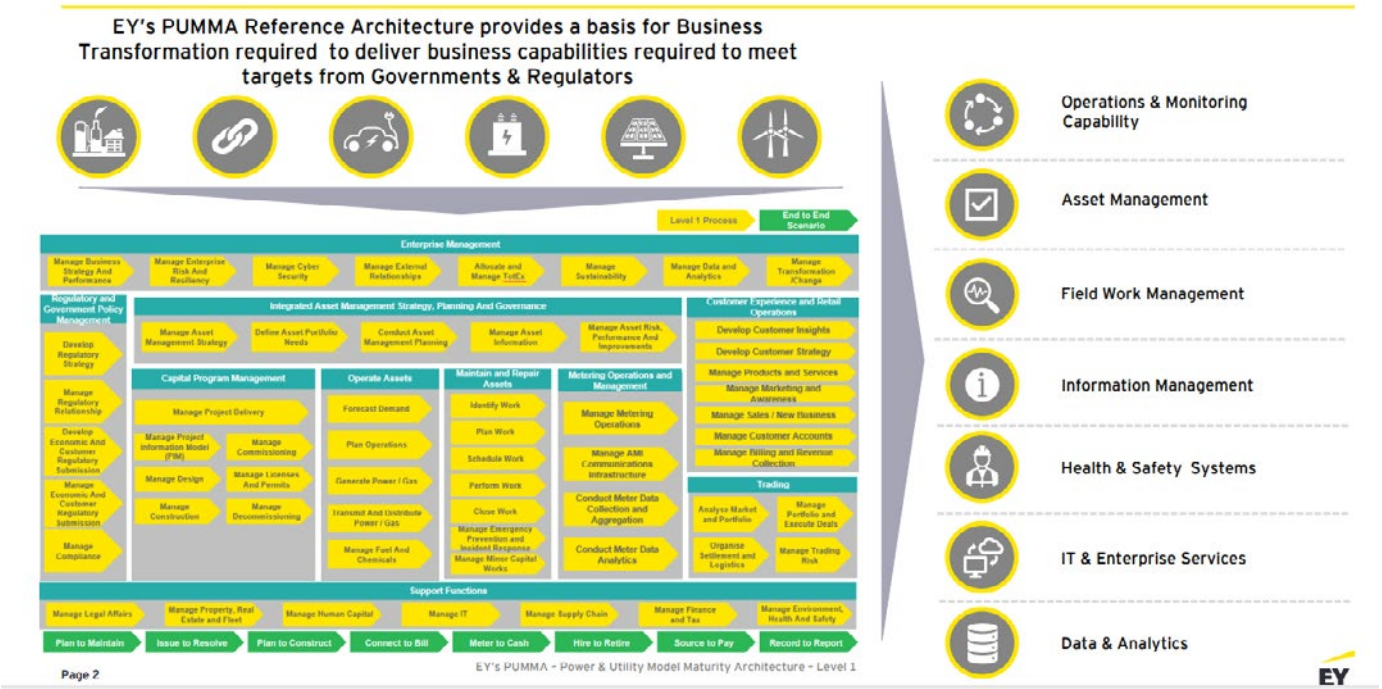
Electricity utilities businesses are inherently complex and require robust IT systems and infrastructure to ensure effective service to customers, efficient management, regulatory compliance, and normal operation of the business.

ESB Networks has range of existing IT systems and infrastructure in place, established over many years, which forms a strong foundation from which to operate our major business activities. The IT systems and infrastructure include the entire IT landscape, encompassing applications, operating systems, databases, middleware, and networks. Below is an overview of the purpose of the major systems and technology that make up ESB Networks' IT infrastructure and reference architecture:

- Systems and technology to manage customer services, such as new connections, scheduling meter works, managing customer data, and customer service requests.
- Systems to register, maintain, and manage €11 bn+ worth of assets.
- Systems to manage major programmes of work – currently in excess of €1 bn per annum
- Systems for the management, storage, and transportation of new assets and materials, required for the major infrastructure programmes above.
- Systems and technology required to operate the HV, MV, and LV networks.
- Market management systems and technology for retail market services.

ESB Networks' IT infrastructure and architecture are reflected in the power and utility maturity model architecture below, which is an industry reference model.

Figure 40: Power and utility maturity model architecture



ESB Networks has systemised core business processes on industry-standard platforms such as SAP and Oracle. These systems have been incrementally enhanced over time to cater for regulatory requirements, business process improvements, and customer requirements.

More recently, ESB Networks has started to adopt cloud technology, investing in the MS Azure platform, which will enable data, mobile, customer, automation, and collaboration services to support digitisation and the digitalisation of our business.

Maintaining and upgrading the core IT systems and infrastructure is an essential investment. ESB Networks implements a 'get current, stay current' policy across the entire IT landscape, encompassing applications, operating systems, databases, middleware, and networks, and providing the following benefits:

- ***Ensuring IT operational efficiency:*** Continuously upgrading and/or replacing IT infrastructure and systems is necessary to maintain operational efficiency, reliability, and security. Having the latest patches can help prevent software from crashing and enable IT systems to run optimally.
- ***Leveraging of new innovations:*** By staying current with technology advancements, ESB Networks can leverage new innovations (e.g., advanced analytics or Gen AI) to optimise grid performance, enhance asset management, and improve customer service.

- ***Strengthening cyber security:*** To ensure we operate our systems on a current securely patched system to protect from cyber vulnerabilities, as cyber threats and malware are on the increase.
- ***Integration with distributed energy resources:*** Modernising IT systems through investments, and the convergence with OT systems, enables seamless integration with renewable energy sources, electric vehicle infrastructure, and demand response programmes, facilitating the transition to a more sustainable and resilient energy ecosystem.

The PR5 IT and digital submission was set out based on the following categories of investment:

- ***Business operations programmes:*** Upgrade and maintenance of existing systems, system and process improvements, hardware, and new software licensing.
- ***Foundational:*** Establishing foundational elements of data, cybersecurity, connectivity and integration, and emerging technology.
- ***Business programmes of work:*** Traditional IT-enabled business change programmes.

During the early stages of PR5, the Covid 19 pandemic (combined with new and accelerated climate action targets) highlighted the need for a rapid, comprehensive digital roadmap to adapt to increasing customer expectations and remote work environments, as well as to leverage the potential for data to become a significant enabler of ESB Networks and the wider energy ecosystem.

This shift leverages new technologies, data analytics, and artificial intelligence (AI) to drive innovation, enhance customer experiences, and create operational efficiencies. The roadmaps, which are described in the sections that follow, are not just about technology adoption, but also about adapting the business model and processes to harness the full potential of data and digital capabilities to position ESB Networks to achieve the ramp-up and scale needed to deliver our business plan and national priorities.

This change in approach has required ESB Networks to identify and prioritise digital and IT investments in a different way than was set out in PR5. This new approach resulted in a different set of projects of greater scale and ambition than those identified under foundations and business programmes of work in PR5.

Cyber resilience

By 2030, the distribution network will undergo unprecedented changes as millions of endpoint devices are connected. These devices include EVs, heat pumps, batteries, smart meters, renewable generation, network monitoring, and automation devices (and others), which will all interact with one another to enable greater flexibility, continuity, safety, and controllability. As we digitalise the network, the volume of data sent via our telecommunications systems between these devices will increase substantially, giving rise to much greater cyber security threats. Cyber security capability will therefore become a critical enabler of customers and network flexibility.

We will continue to adopt a proactive approach to managing cybersecurity during PR6, increasing our capability relating to technical systems, culture, and governance through the following activities:

- Protect network assets and customer data and ensure the resilient operation of the network through the continued implementation of our IT/OT cyber improvement plans.
- Demonstrate resilience of our national critical infrastructure through compliance with the Network Information Systems directive (NIS 2 directive).
- Demonstrate resilience, stability, and security of our electrical network through compliance with the EU Network Code for Cybersecurity (NCCS).
- Deliver a purpose-built telecommunications network by the end of 2026 to provide resilience, stability, and security for our electrical networks.

Accelerating digital and data

The overall PR6 investment programme will be bigger in scale and ambition than anything we have done before, reflecting the strategic importance of the electricity network in enabling social, economic, and environmental transformation over the coming decades. Our proposed investment in accelerating digital and data will help us to establish the capabilities we need to deliver a considerably increased workload and to improve the service we can provide to our customers. For example:

- Digital tools and automation streamline processes, reduce manual effort and speed up operations. Enhancing organisation effectiveness is crucial when handling a ramp-up in work, as it helps maintain productivity without a proportional increase in resources.
- Investing in digital technologies creates new structured data which allows ESB Networks to use data more effectively, digitise key processes and share better data and insights with customers. Having improved data insights leads to faster decision making and the ability to quickly adapt to changing demands.

Digital and Data
Each time we invest in digital, we ***integrate people***, creating ***new data for insights***.
This drives high performance and eliminates blind spots, enhancing our overall ***capabilities***

- Providing internal and external transparency on infrastructure delivery plans and progress,
- Optimising data insights to plan, manage, and operate the network of the future.
- Keeping pace with developments in technology enables ESB Networks to innovate and offer enhanced products and services to our customers as customer needs evolve and change.

Explainer: Leveraging existing infrastructure to accelerate digital and data

A strong IT infrastructure and technology backbone is essential for accelerating investments in digital and data. The technology stack set out in the table below is relevant to all utility businesses. The IT systems and infrastructure referred to above are represented here in Layers 1 and 2 – core infrastructure and systems of record and operations. These elements of the IT stack are complex and cumbersome to navigate and require specific and scarce capability to update and manage.

Layer 3 – systems of insight and intelligence – enables value to be extracted from data using business insights, analytics and, in the future, artificial intelligence. This layer also enables trusted sharing of data internally and externally to improve effectiveness and increase transparency. Layer 4 – systems of interaction, integration – enables improved customer experiences by meeting customers' growing expectations for digital interaction. This layer also enables more effective data capture in the field through the use of digital apps and devices.

Layers 3 and 4 together make up a digital layer which sits on top of the core infrastructure and systems of record/operations. This digital layer provides many benefits, particularly as we ramp-up to meet a significantly larger workload. For example, it enables improved organisational effectiveness by leveraging data insights to support faster decision-making and facilitates greater organisational agility to enable ESB Networks to quickly adapt to changing demands.

Layer	Technology Stack
Layer 4	Systems of interaction, integration
Layer 3	Systems of insight, intelligence
Layer 2	Systems of record, systems of operation
Layer 1	Core infrastructure

Our investment in digital and data is a strategic move focused on the digitalisation of major customer journeys and business processes, and presents opportunities to the delivery of the increased workload by enhancing organisation effectiveness, using data insights to enable faster decision making and having the ability to quickly adapt to changing demands.

Digitalisation of major customer journeys and business processes converts unstructured information into useable data that can be analysed, interrogated, and reported on. An example of this might be where customer requirements were previously captured in an analogue format (e.g., in handwritten notes or an email) but through digitalisation can be captured in a consistent format through a digital process (e.g., by filling out mandatory fields in an app).

Digitalisation is considered holistically across the business, focusing on data and insights and modernising the existing landscape to layer in new technologies (e.g., digital solutions for customers, digital solutions to integrate ESB Networks' teams, data lake, AI).

ESB Networks' programme to accelerate digital and data spans Price Reviews, starting during PR5 and continuing into PR6 and beyond. This is similar to the strategic approach taken by Ofgem and the UK DNOs in relation to RIIO ED1 and RIIO ED2. Our accelerate digital and data investment programme approach is aligned with the digitalisation strategies of Northern Powergrid, Scottish and Southern Electricity Networks, National Grid (Western Power Distribution) and Scottish Power Energy Networks.

10.5.2 Progress during PR5 – Customer Journeys

ESB Networks took a proactive approach to accelerating our investment in digital and data during PR5. Taking this proactive approach was critical to meeting the evolving needs of our customers and stakeholders and adapting quickly to the acceleration of climate action targets, the ramp-up of housing development as well as strong economic growth. We aligned our digital and data programme to the approach taken by Ofgem and the UK DNOs over the past few years.

The table below summarises some of the progress we have made during PR5 in delivering improvements to customer journeys enabled by digital and data.

Customer Journey	Digital and Data Solution
New Connections Process	Digitised new connection application, offer and acceptance saves time, provide transparency and make it simpler for customers.
Planned Outage Notification	Customer receives timely digital notifications in relation to power outages (before, during, and after the outage), customer option to stay informed in line with preferred communication method, transparency in relation to estimated restoration times for planned outages.
Unplanned Outage Notification	Enhanced PowerCheck to give customers to option to receive personalised SMS updates on estimated restoration times.
Customer Service Requests	Digitised customer requests enabling the requests to get to supervisors and field workforce faster, resulting in faster response times, enabling trend analysis and proactive services.
Voltage Query Processing	Voltage quality dashboard facilitates desktop assessment, using smart meter data if available to streamline our response to customers.
Empowered Customers	Delivered the ESB Networks online account, giving customers access to energy usage insights and a range of services.
Referrals and Complaints	Digitised referrals and complaints to support internal response, management and increase transparency
Microgen Registration	Developed robotic RPA to quickly process customer Microgen data.
Contact Centre Call Agents	Created a digital knowledge base for call agents to support prompt response to customer calls.
Capacity Heatmaps	Published the capacity heatmap to provide transparency.
Generator Calculator	Created a generator connection costs ready reckoner for developers.

10.5.3 Our Plan for PR6

Accelerate digital and data roadmaps

The accelerate digital and data roadmaps are designed to deliver new capability and outcomes, focused on making progress across a number of price review periods. A high-level overview of the accelerate digital and data roadmaps, plans for PR6 into PR7 and outcomes are presented in the table below, along with information on progress made during PR5.

	PR5 2021 to 2025	PR6 2026 to 2030	PR7 2031 onwards	Outcomes
Strategic Asset Management: Enhanced and optimised network development and asset management.				
Network Development Digital and Data Roadmap	Rationalised network planning tools; Network planning data consolidation and warehouse; Multiple data use cases: for example, SCADA load estimation, special load readings report, load index report, capacity added dashboard, capacity heatmap, capacity pathways report, LV visibility.	Enhancing capacity planning and tracking; Real-time network model; Self-serve budget estimator for customers; Joined MV/HV model; Enhanced network development tools and integration; Integration with operations; Third-party collaboration on network development plans and insights.	Digital twin; Enhanced external collaboration	Integration of data, tools and systems leads to faster response; Improved transparency on development plans; Self-serve options for customers.

	PR5 2021 to 2025	PR6 2026 to 2030	PR7 2031 onwards	Outcomes
Asset Management Digital and Data Roadmap	Development of 20+ asset health models; Asset data consolidation; Asset data quality assessment and improvement plans; ESB Networks' investment value framework; Investment decision support tools; Centralised ESB Networks' business risk management solution.	Asset performance management system (APM); Investment optimisation integrates the assessment of flexibility options; Business risk management enhancement; AM data collection, management, insights and sharing, including 3D models; Network resilience assessment leveraging third-party data.	Integration with operations; Digital twin; Asset life cycle optimisation.	Optimised asset life cycle management by using data to target predictive maintenance, leading to improved reliability and resilience
Standard HV Station Design Roadmap	Advance site purchase and order of long-term materials; Standard greenfield design and layout and costing.	Implementation of new HV station design.	N/A	Predictable timeframe and transparency on progress to deliver HV station projects.

	PR5 2021 to 2025	PR6 2026 to 2030	PR7 2031 onwards	Outcomes
Work Management, Planning & Delivery, and Outage Management: Enhanced and optimised planning leveraging digital and data.				
Planning: 3Ps Digital and Data Roadmap	Workforce planning – MVP; Annual work programme – data model, MVP1,2; Annual work programme progress report; Renewables projects dashboard; Portfolio allowance dashboard; Site acquisition dashboard; Standard project timelines.	Enhanced work programme data model; Work programme progress dashboard including contractor; Transparency on progress (project management).	AI-enabled work programme.	Improved strategic, tactical and operational planning, collaboration and transparency on progress via integration of data, tools and systems.
Engineering Design Digital and Data Roadmap	Centralised design function; Virtual design office MVP1; Generator online cost calculator; LV design – leveraging smart meter data.	Continue to enhance VDO; 3D design/design consolidation; Transparency on progress (customer notifications).	More self-serving options for customers.	Digital collaboration with the design function; Providing transparency on status of designs; Self-serve options for customers.
Material Management Digital and Data Roadmap	SAP upgrade for material management.	Improving material visibility, planning and logistics; Enhancing material forecasting and ordering.	AI-driven logistics and route management; Warehouse automation and technology.	Optimised collaboration, sourcing, logistics and work delivery through integration of planning data (3Ps) with material management, tools and systems.

	PR5 2021 to 2025	PR6 2026 to 2030	PR7 2031 onwards	Outcomes
Construction Planning Digital and Data Roadmap	Delivery and quarterly plans – MVP1, 2; Regional insights; Virtual supervisor office; Digital construction plans; Voltage quality dashboard; Work progress dashboard – by team.	Continue to enhance VCO; Transparency on progress (customer); Quarterly plan progress report for all work including contractors; Optimising route to approval capability development.	AI-enabled work planning to optimise outage opportunities.	Standardised and streamlined approach to construction planning, providing transparency on plans and progress.
Work Scheduling Digital and Data Roadmap	Oracle field workforce rolled out for meter works and service requests; Integration of craft capability dashboard to match skills; Digital customer notifications.	Faults scheduled via the new solution integrated with project customer appointment option and feedback.	Maintenance work scheduled via the new solution.	Creating a seamless customer experience by optimising field workforce response to customer work and fault while scheduling other work.
Asset Registration Digital and Data Roadmap	Digital solution for asset registration; As-builts improvement.	Transparency on progress for asset registration and as-builts (dashboard); Digital solution for asset registration for third parties.	Automated asset scanning (linked back to material management).	Streamlined asset registration and work closure via integration of data, tools and systems.
Contractor Management Digital and Data Roadmap	Contractor framework reporting; Contractor portal – commercial manager; Timber management digital solution; System access.	Integrated safety management system for contractors; Integrated work programme and progress reporting.	Contracting strategy development.	Optimised collaboration and transparency on progress and performance via integration of contractor planning data with work plans (3Ps).

	PR5 2021 to 2025	PR6 2026 to 2030	PR7 2031 onwards	Outcomes
Outage Management Digital and Data Roadmap	Transmission outage plan (JOTP) and distribution outage plan MVP; LV/MV planned outage notification (customer); Power Check update.	JOTP delivery and digital collaboration with EirGrid; Distribution outage plan enhanced; Transparency on outage plans (transmission, distribution, LV/MV); Power Check enhancements.	Predictive distribution outage planning; Risk-based outage planning management optimisation.	Collaboration to optimise outage plans and maximise work done via integration of data, tools and systems; Provide transparency of outage plans, progress and performance including customers.
Managing Data and Insights: Expanding and scaling digital and data capabilities across the organisation				
Manage Data and Insights	Targeted investment in data quality, insights and new data; Discovery and understanding potential of good data and benefits of insights to enable effective decision making.	Set up ESB Networks' data management office and continue to progress; *Data is an asset;* *Data is trusted;* *Data is managed;* *Data creates value.*	Ability to share and collaborate insights and data with wider stakeholder groups and customers.	Drive value from data through insights to meet our customer and stakeholder needs; Provide transparency and collaborate internally and externally by sharing trusted data and insights.

10.5.4 Investment and outcomes

The table below sets out the investment required to leverage digital and data to deliver the roadmaps and associated new capabilities and outcomes. This investment will transform how we work in ESB Networks to achieve the ramp-up of work needed, drive innovation, enhance operational effectiveness, and ensure that we keep pace with the evolving needs of customers and stakeholders.

ESB Networks is well positioned to build on the progress made during PR5 and maintain the momentum needed into PR6. During PR5 and into PR6 and beyond, we propose to accelerate our investment in digital and data to transform how we empower our customers, how we operate the network, and how we do our work in ESB Networks to serve and benefit our customers. This programme of investment is vital in enabling the ramp-up in delivery required during PR6.

Digital and Data Investment Area	PR6 (Baseline)	Outcomes
Core Foundation Systems	€44m	Risk mitigation and compliance
Cybersecurity	€35m	Risk mitigation and compliance
Strategic Asset Management	€22m	Integration of data, tools and systems for network planning and asset management
Work Management, Planning and Delivery	€49m	Integration of data, tools and systems for strategic projects and programme planning, engineering design, material management, construction planning, outage planning, work scheduling, asset registration and contractor management
Managing Data and Insights	€44m	Drive value from data through insights to meet customer and stakeholder needs
Total	**€194m**	

10.5.5 Cost benefit appraisal

ESB Networks took a proactive approach to accelerating our investment in digital and data during PR5. Taking this proactive approach was critical as the needs of our customers were evolving and changing. We were also faced with the acceleration of climate action targets, the ramp-up of housing development, and meeting the requirements of economic growth. This is aligned to the approach taken by Ofgem and the UK DNOs over the past few years. We have set out below the alternative conditions which would exist if ESB Networks did not take this proactive approach to accelerate this investment. For example, making progress to empower our customers and providing transparency and collaboration would be protracted and delayed.

When investing in IT, digital and data, we ensure value for money by leveraging and exploiting existing technologies, reusing technical components, developing solutions with the end in mind, to avoid stranded investments and continuously optimising our resources to drive innovation and efficiency.

ESB Networks is now well positioned to build on the progress made during PR5 and maintain the momentum needed into PR6. During PR5 and into PR6 and beyond, we are accelerating our investment in digital and data to transform how we empower our customers, to transform how we operate the network, and also to transform how we do our work in ESB Networks – all of which will provide transparency, confidence, and assurance to our customers and stakeholders.

A cost benefit appraisal was completed for each accelerate digital and data roadmap investment. The benefits and value were assessed in the context of five value drivers. ESB Networks uses these value drivers to assess, prioritise, and give assurance on delivering value from the various digital and data investments. ESB Networks has an established approach to assess adoption of the new capabilities, solutions and tools to ensure value is delivered. The benefits and value, outputs and customer value proposition resulting from the accelerate digital and data investment programme, during PR5, throughout PR6 and into PR7 are summarised in the tables below.

Benefits and Value				
Customer and Stakeholder Commitments and Expectations	**Strategic Alignment and National Priorities**	**Organisational Effectiveness**	**Risk and Compliance**	**Transparency with Trusted Data and Insights**
Enhance transparency; Improve collaboration; Share predictable plans; Develop self-serve options; Digital engagement tools; Share trusted data and insights; Improved time to quote.	Transparency on strategic plans and progress; Integration with operations systems to enable ADMS.	Integration of data sources to support optimised planning; Data at the point of need; Scenario planning to optimise investment and delivery plans; Enhanced effectiveness allowing redeployment of FTE effort.	Data quality known; Data quality improvement plans in place; Increasing confidence in data to make informed decisions.	Integration leading to improved transparency; Transparency on plans and progress; Transparency on bottlenecks; Trusted data to support self-serve options; Single source of truth.

Outputs

- Integration of data, tools, and systems to enhance organisation effectiveness to serve our customers.
- Data at the point of need for customers and employees.
- Improved digital collaboration between customers and ESB Networks and also across business teams.
- Self-serve options for customers.
- Centralised, standardised approach to key business processes, facilitating transparency.

Customer Value Proposition

- Predictable response times on applications, service requests or queries.
- A personalised service through digital notifications.
- Self-service options using digital service requests.
- Self-serve options for different types of connections.
- Transparency and predictability on the status of new connections, network development, renewable connections, and other customer services.
- Predictability on the status of new connections, network development, renewable connections, and other customer services.
- Empowered by the sharing of trusted data and insights.
- A better customer experience, as call centre agents have access to a digital knowledge base.
- Fix faults faster by scheduling fault work.
- Minimise planned outages and collaborate on the status.
- Make informed decisions based on network performance.

10.5.6 Alternatives considered

We assessed the alternative conditions which would exist if ESB Networks did not take this proactive approach to accelerate the investment in digital and data. For example, making progress to empower our customers and providing transparency and collaboration would be protracted and delayed.

Alternative: Do Nothing				
Customer and Stakeholder Commitments and Expectations	**Strategic Alignment and National Priorities**	**Organisational Effectiveness**	**Risk and Compliance**	**Transparency with Trusted Data and Insights**
Limited transparency; Limited collaboration; Limited self-serve options; Limited digital engagement tools; Limited data sharing.	Limited transparency on strategic plans and progress; Delays to integration with operations and ADMS.	Limited data integration leading to sub-optimised network planning; Limited data at the point of need; Additional FTE needed to deliver the ramp-up.	Data quality continues to be an unknown issue and a business risk.	Poor integration leading to limited transparency; Limited transparency on plans, progress, and bottlenecks; Poor confidence in data and insights, impacting decision making.

10.5.7 Customer benefits

During PR6, we plan to leverage our existing investments in IT infrastructure and systems to establish the foundations to become a digital utility. By investing in the digital and data layer, this enables us to improve business integration, make relevant high-quality data available to customers, employees and partners to support decision-making and productivity, and enable greater organisational agility. These new solutions will enable us to capture and process large volumes of data and will support fundamental changes in the way we operate the distribution network. The changes we are proposing are critical in enabling the achievement of critical national policies, including the Climate Action Plan.

IT, digital and data investments will create a strong foundational capability for ESB Networks that will deliver a range of customer benefits now and in the future, including:

- Creating different engagement options for customers to suit their needs and preferences. For example, an enhanced contact centre experience, self-service options, and personalised service through opt-in digital notifications.
- Providing customers with access to the information, tools and market systems they need to engage with demand response (flexibility) initiatives. We will do this in a way that is inclusive and accessible, recognising demographic shifts in Irish society and the fact that some of our customers are at risk of being left behind in the energy transition.

- Providing transparency on plans and processes to support predictable outcomes as we ramp-up the delivery of new connections, network development, renewable connections, fault response, and other customer services. Our PR6 investment will give customers, partners, employees, and stakeholders access to information and data that was previously inaccessible, allowing them to self-serve to make informed decisions.
- Unlocking the value of data as a strategic asset to create value for customers, policy makers, regulators, and employees. Through digitisation, we can capture data from multiple sources, integrate it across different systems and tools, and make it accessible for analysis and insights.
- Empowering customers by sharing data and useful customer insights. **The wider energy ecosystem** will also benefit from a collaborative approach to sharing data and insights, based on trusted data and good governance. This will support innovation and encourage a whole-of-system approach to the energy transition.

10.6 Telecoms

10.6.1 Reasons to invest

ESB Networks Telecoms provides mission-critical telecommunication services to support the operation of the electricity system. These services support communications between network infrastructure (including wind and solar farms, transformers, automation devices, etc.) and the control centres to ensure the safety and stability of the electricity networks. ESB Networks Telecoms is an operator of essential services (OES) responsible for critical national infrastructure (CNI) under the Network Information Systems (NIS) directive. The Networks Telecoms telecommunications network enables the safe and secure operation of the national electricity network.

As more distributed energy devices connect to the electricity network, including EVs, heat pumps, storage devices and renewable generation, telecommunications will become an increasingly important operational capability in the transition to a decarbonised society. Our telecommunications systems must be ready to cope with significantly higher quantities of data transfer, while at the same time managing the increased risks associated with cybersecurity. The telecommunications network of the future enables greater visibility and connectivity between devices to support increased automation on the network and enable flexible operations.

During PR5, Networks Telecoms developed an operational network development plan (ONDP) setting out our technology roadmap for the development of operational telecommunication infrastructure to meet the current and future requirements of the electricity network. This is focused on the following objectives:

- Improving connectivity solutions for HV stations and other key locations to optimise control, safety and security of network operations.
- Expanding coverage, connectivity, and capability of telecoms across the LV, MV and HV network to enhance visibility and enable robust and flexible operations, including the establishment and operation of flexibility markets.
- Strengthening the physical and cybersecurity of the telecommunications network to ensure the secure and safe operation of the national electricity network.
- Maintaining and enhancing operational voice and telephony services to improve customer services through the national customer contact centre and enabling robust communications between ESB Networks staff, black start locations, DSO, and control centres.
- Improving the resilience of communications by improving the geographical diversity of the fibreoptic network and replacing aging assets.

During PR6, Networks Telecoms will continue to develop a class leading utility-grade telecommunications network. This will enable the electricity system to adapt to the future needs of the electricity market and support our customers through reliability and flexibility in meeting their electricity requirements. Notable elements of the utility-grade telecommunications network include:

- Improving the resilience of communications by improving the geographical diversity of the fibreoptic network and replacing aging assets. Operating the telecommunications system in the most effective way.
- Developing the existing telecommunications network in a manner that leverages existing infrastructure technically and from a commercial perspective.
- Developing a private LTE network, we will enable faster, more reliable and more secure connectivity to new renewable generation connections.
- Supporting the TSO by developing the telecommunication systems for scalable development of the transmission system.
- Enabling the DMSO by providing enhanced visibility of the LV network and connectivity at scale to support grid-edge devices.
- Transitioning to IP-based technology, we can improve system reliability and support a greater scale of activity.
- Developing strong cybersecurity infrastructure, the essential telecommunication systems are protected in a challenging modern environment.

- Building a network that is scalable and can adapt to the needs of the electricity industry and our customers.
- Availing of network expansion and modernisation to modernise and expand the communications network to enable the electrical grid to function safely and securely.
- Implementing a fibreoptic asset renewal programme to mitigate the risk of the aging fibre network in a proactive manner to maximise the work done during outage opportunities in the spirit of Build Once for 2040.
- Developing and implementing a strategic fibreoptic programme to develop an integrated fibre network that meets the needs of the entire electricity system to 2040 and beyond.

In preparing the PR6 submission, Networks Telecoms has considered scope that needs to be addressed from several perspectives and anticipated the future requirements of our customers. The PR6 submission includes a scale of ambition to meet the challenges of decarbonising our society through the development of a strong electricity system. The development of a world-class utility-grade telecommunications network underpins the electricity network of the future.

10.7 Buildings, equipment and fleet

Significant investment is required in building, fleet, tools and equipment to support a ramp-up in capital investment, ensure regulatory and legislative compliance, and protect the safety and wellbeing of our employees and contractors. Over the course of PR6, we plan to implement a range of measures to improve our building stock in line with emission-reduction targets and invest in our yellow van fleet both to meet the needs of an expanded workforce and achieve our target to have a fully decarbonised fleet by 2040. Key areas of investment for PR6 include:

- ***Operations control centre:*** To comply with EU directives, we are planning to build a new purpose-built technical assets building at our Leopardstown Road headquarters. This building will contain functions that are of critical national importance, including the national distribution control centre (NDCC), the telecoms operations centre (TOC) and the supervisory control and data acquisition (SCADA) equipment. These functions have been identified as critical national infrastructure (CNI) under the EU Network Information Security directive (NISD) and require specialist security measures to be in place. We anticipate that the smart metering operations centre (SMOC) currently located in Gateway Three may also be identified as CNI in the future. The new operational control centre will enable ESB Networks to manage and monitor the electricity network more efficiently through improved supervision and telemetry solutions that allow system management information to be brought back to the control centres from various stations across the country. The control centre will facilitate the integration of new technologies and services, such as automation and control of grid devices, electric heating, electric vehicles, and distributed renewable generation. This is crucial for enabling a more flexible network and optimising the use of renewable generation when it is available.
- ***Fleet and equipment:*** Our ability to deliver capital projects at the scale and speed required under PR6 is dependent on having the appropriate vehicles, facilities, and equipment to ensure that our employees and contractors can proceed with work safely, and without interruption or delay. As the network expands and becomes more complex, we also need to invest in more sophisticated tools and equipment to deliver required upgrades and capacity reinforcements as efficiently as possible. We will also require additional storage to strategically stock materials to overcome supply chain challenges and intend to double the size of our Ballycoolin stores. We also require new vehicles and tools to meet the needs of our expanded workforce. During PR6, we plan that 69% of our van fleet will transition to electric, i.e., 1,150 vans out of a total of 1,657, to meet the needs of a larger workforce and support CAP24 electrification targets.

- ***Safety and efficiency:*** ESB Networks has a statutory obligation to reduce carbon emissions from our own activities, including buildings and fleet. We plan to implement carbon reduction and energy efficiency measures across all current and future building upgrade works to reduce our building CO2 emissions by at least 51% by 2030. We also plan to bring all buildings up to a rating of at least BER B and 40% of buildings at a BER A standard by 2030. At the same time, we intend to bring all buildings up to standard to meet fire and safety requirements. We continue to transition our fleet of approximately 2,000 vehicles away from fossil fuels to reach the target of 100% by 2040.

10.8 Stakeholder and community engagement

The scale of our investment programme during PR6 means that it will have a bigger impact on individuals and communities around Ireland as we build out the electrical infrastructure necessary to support housing, industrial growth, and climate action. Given the importance of our planned investments in terms of achieving social, economic, and environmental outcomes, it is critical that we maintain public support for the work we are doing.

During PR6, we will continue to proactively engage with communities and stakeholders to inform them of our plans, explain the benefits, and mitigate impacts. This will involve attendance at community and industry events, proactive communications regarding our plans, and regular consultations with stakeholder and customers.

We will also run integrated communications, advertising and social media campaigns to educate and inform customers about energy efficiency, reducing consumption at peak times and encouraging participation in pilots and community energy schemes. By maintaining strong, trusted relationships with the communities, stakeholders and customers we serve, and demonstrating the benefits of the work we are doing, we hope to enhance public support and acceptance for electrical infrastructure projects and facilitate faster project delivery.

10.9 Forestry and wayleaves

The Electricity (Supply) Act 1927 outlines the statutory provisions governing the installation of electrical infrastructure on private lands. In accordance with these provisions, landowners have a statutory entitlement to seek compensation when an electric line is placed, altered, or repaired on their lands. This includes payments for mast interference and forestry easement and is essential for maintaining good relationships with landowners and ensuring the smooth operation of the network. Payments are also provided to cover the cost of restoring land affected by network operations in line with our commitment to responsible and considerate land management practices.

A new agreement currently being finalised with the Irish Farmers' Association (IFA) is likely to extend beyond the current timeframe and extend into PR6, leading to a period of increased activity and financial commitment for ESB Networks.

10.10 Proposed investment

Description (€' bn)	PR5 Forecast	PR6 (Baseline)	PR6 (Baseline + AIF)
IT	0.09	0.19	0.19
Fleet and Equipment	0.09	0.17	0.17
Property	0.10	0.20	0.20
Telecoms	0.06	0.16	0.16
Wayleaves	0.02	0.05	0.05
Others	0.01	0.02	0.02
Total	**0.37**	**0.79**	**0.79**

11 Financing Our Plan

11.1 Financeability and weighted average cost of capital (WACC)

ESB Networks is entering into an extensive investment programme which is far from business as usual. This programme of investment will last significantly beyond PR6 and, due to its scale and strategic importance, ESB Networks must adapt to materially heightened risk in the process. ESB Networks' ability to deliver the scale of investment outlined in this plan will depend on our financial strength.

The landscape of capital markets has dramatically shifted since PR5. In response to a variety of global shocks, the period of ultra-loose macroeconomic policy has ended. Over the last few years, there has been a significant rise in interest rates and the cost of borrowing.

These challenges are arriving at a time when investors have many competing opportunities (projects, companies and geographies) into which they can deploy capital, as countries all over the world also seek rapid progress towards a decarbonised future. As a result, electricity networks around the world are facing intense global competition for capital from a multitude of projects aimed at supporting each country's own decarbonisation efforts.

To fund this ambitious programme, ESB Networks must maintain continuous access to capital at reasonable rates. Setting an appropriate WACC at 4.23%, aligned with the target credit rating set at least at BBB+/A-, is essential to ensuring access to capital. Misalignment in allowed returns could jeopardise ESB Networks' ability to raise the necessary funds to the detriment of consumers. This is supported by clear legal obligations relating to financing capability, previous regulatory decisions. and by credit ratings of similar network companies.

Given the importance of this, ESB Networks has commissioned Frontier Economics (Frontier) to carry out an independent assessment of the appropriate WACC and target credit rating for PR6. ESB Networks has separately prepared a comprehensive assessment of financeability and funding requirements for PR6.

11.2 Financeability

To fund the PR6 programme, ESB Networks needs to maintain uninterrupted access to the debt capital markets at the lowest possible rate, as it is imperative that ESB Networks delivers financial metrics consistent with a strong investment grade credit rating. For PR6, we are targeting an investment grade credit rating of BBB+/A-. This is consistent with PR5 regulatory precedent, as well as with credit ratings of peer comparators in GB.

A reduction in ESB Networks' notional standalone credit rating metrics would be considered a significant negative event and not in the interest of customers. This would, inter alia, reduce ESB Networks' ability to access funding at reasonable rates and would increase ESB Networks' cost of debt to the detriment of customers. This is because investors will typically seek a higher premium if the risk of the entity to which they are lending is perceived to be higher.

A lower credit rating signals to investors that the entity is riskier. The scale of the impact that a credit downgrade can have on the cost of debt is discussed in the Frontier report. A financial assessment has been completed to determine the target notional financial metrics that would be required for ESB Networks on a standalone basis to maintain a BBB+/A- credit rating, and to review the ESB Networks PR6 business plan to determine if the projected financial metrics meet the targets.

In the baseline investment proposal, ESB Networks is seeking €10.2 bn revenue to support the increased investment needed in PR6, while continuing to deliver financial metrics in line with a strong investment grade credit rating.

A financeability report accompanying this plan has been submitted to the CRU. This includes assumptions necessary for an acceptable financeability outcome, such as a reduction in technical lives for both distribution and transmission assets.

The baseline investment proposal delivers a plan that is deemed financeable from a Price Review perspective. When considering the 5 years of the Price Review period, the difference between the total estimated nominal cash outgoings and the total projected revenues is circa €4.6 bn. Keeping the gearing at 55% of the Regulated Asset Base, in accordance with the regulatory model, means that circa €3.7 bn can be financed through increased borrowings. This leaves a remaining funding requirement of circa €1 bn, which would ordinarily be addressed through equity.

The financeability of the baseline + AIF scenario remains unresolved in our business plan submission and will require consideration through the PR6 process. In addition, the residual funding requirement of circa €1 bn in the baseline plan, referred to above, would be significantly bigger under the baseline + AIF scenario.

The funding of investment in the networks is ultimately a matter for ESB as owner of the assets. ESB Networks envisages that these residual funding requirements, under both scenarios, will require resolution between ESB and ESB's Ministerial stockholders before the final determination for PR6 is settled.

11.2.1 Weighted average cost of capital

The weighted average cost of capital (WACC) is the appropriate level of return required to compensate lenders and investors.

ESB Networks must deliver strong investment credit rating metrics to ensure we can finance our activities for the PR6 period, therefore it is important to set an appropriate WACC based on a cost of capital that is consistent with BBB+/A- credit rating.

The approach adopted to estimate ESB Networks' WACC for PR6 is based on four key principles:

- Consistency with regulatory precedent to ensure regulatory stability.
- Reflecting the cost of capital and capital structure of a notional benchmark entity based on market data and regulatory precedent.
- Consistency between target credit rating used for the finance ability assessment and setting the allowed WACC.
- Use of the capital asset pricing model (CAPM) methodology to estimate the cost of equity.

ESB Networks is proposing a real, pre-tax WACC of 4.23%. Including some headroom in the WACC allowance, through aiming up, is appropriate in order to account for:

- The disproportionate cost of under-investment compared to the societal costs consumers might face from marginally higher tariffs due to a higher WACC setting – especially considering the extensive investments required for PR6.
- The greater risk environment.
- Rising market rates and substantial uncertainty around how they might evolve during PR6.
- The long-term historical and forecast gap between German and Irish inflation, and uncertainty on how it might evolve during PR6.

12 Ensuring Efficiency

12.1 Cost efficiency

At the end of PR4, ESB Networks commissioned independent benchmarking of relative costs compared to the costs incurred by the GB electricity distribution companies. That analysis confirmed that ESB Networks was efficient relative to the average costs incurred by the GB distribution companies. As ESB Networks transitioned into PR5, we substantially increased our scale of investment compared to PR4 (from €3.2 bn in capital expenditure over PR4, to €5.0 bn forecasted for PR5 (all 2024 money).

ESB Networks has commissioned similar independent analysis to assess the efficiency of our costs during the PR5 period. This has concluded that ESB Networks' PR5 costs are efficient, even with the step up in expenditure compared to PR4. Specifically, ESB Networks' total expenditure (excluding load-related capex) is on average 6.7% more efficient than the mean efficiency level of GB DNOs over the PR5 period.

The implications of the benchmarking results are twofold:

- ***PR5 efficiency:*** No lookback efficiency adjustment is needed for the PR5 period. The totex benchmarking analysis shows that ESB Networks' total expenditure is 6.7% more efficient than the mean performance in GB during PR5.
- ***Setting PR6 efficiency target:*** Cost benchmarking is essential to informing the next price control, integrating efficiency targets into the regulator's 'base-trend-step' approach for setting future allowances. ESB Networks used 2023 as the base year for PR6. The results confirm ESB Networks' cost efficiency in 2023 and throughout the PR5 period. Consequently, ESB Networks should not be subject to any efficiency-related adjustments when establishing the base year costs for PR6 expenditure.

ESB Networks is seeking cost allowances during PR6 that are materially above base year costs, due to several factors.

Firstly, ESB Networks plans to significantly scale up delivery across most existing work programmes and take on new activities. Key areas of focus include:

- Adding 562 MW of firm transformer capacity at 110 kV in Dublin, 1.1 GW of firm transformer capacity at 38 kV, and 1.5 GW of firm transformer capacity at medium voltage to manage an increase of circa 3% annual demand growth, as well as 4.4 GW renewable energy, significantly higher than in PR5.
- Connecting over 280,000 new customers, up from 197,000 forecast in PR5.
- Delivering a significantly expanded transmission programme to meet the needs of the TSO.
- Establishing a new distribution markets and system operator (DMSO) function to implement advanced distribution management systems, manage smart meter deployment, and support retail and flexibility markets.
- Developing the tools, products, and market structures necessary to empower customers to take more control over their energy costs.
- Undertaking extensive maintenance and replacement of existing network assets to ensure safe, reliable, and reliant electricity supplies for customers now and in the future.
- Implementing automation technologies and improved vegetation management to reduce unplanned customer outages.

Secondly, challenges in procuring external contract resources and securing materials have escalated costs. During PR5, ESB Networks experienced challenges in procuring external contractor resources needed to deliver the increased work programmes. To retain critical contracts, ESB Networks had to agree to higher rates, reflecting the contractors' own rising costs in recent years. This was the outcome of competitive procurement processes, thereby ensuring that the higher rates were market-tested. We understand that the escalated costs ESB Networks has incurred for securing materials reflects trends identified by other network utilities in the Republic of Ireland and other jurisdictions. With a substantial increase in reliance on external contractors planned for PR6, these costs are expected to rise further.

Taking these factors together, it is clear that ESB Networks will face significantly higher expenditure across a broad range of cost categories during PR6. The justification for these expenditures and the steps we have taken to ensure efficiency are outlined in detail in the technical cost narratives that have been submitted to the CRU.

Nonetheless, ESB Networks remains committed to maximising efficiencies by organising the business to deliver more quickly and cost-effectively, leveraging cost savings from data and digitalisation initiatives, and utilising flexibility wherever possible.

During PR6, our Powering Ahead business transformation programme (see Section 10.5) is planning further investments in IT, digital and data to support a fully integrated workforce equipped with digital tools, data insights, and connected services to enable smarter working, efficient resource usage, and empower them to provide a better customer experience. The combination of these initiatives, together with our enduring focus on cost management, will enable us to deliver efficiency savings through a variety of areas as we scale up delivery, including:

- Use of digital technologies to better connect our processes, data and platforms, leading to further integration of teams and working practices.
- Modernising business processes to provide experience-driven, digitalised and intelligently automated key processes, for example process automation programmes.
- Improved data access and information provision to facilitate more efficient usage of existing network assets.
- Enabling continuous improvement through learning from employees, customers and stakeholders, e.g., other DNOs/utility operators.
- Effective procurement strategies.
- Design of the right engineering solutions to network problems.

12.2 Real price effects and productivity

The benchmarking evidence outlined above shows that ESB Networks' out-turn costs for PR5 and the base year for PR6 (based on 2023 out-turn) represent an efficient level of cost. As in previous Price Review periods, these allowances will be indexed to inflation to account for changes in the general price level over time. However, to ensure that ESB Networks is provided with an adequate cost allowance, regulators also need to make provision for changes in costs associated with:

- ***Real price effects (RPEs):*** On average over time, many of the inputs we use will increase in price more quickly than the basket of goods considered in the general inflation indices (such as HICP) which are used to index allowances. This deviation between the increase in the price of our inputs and the increase in general inflation is referred to as 'real price effects' or RPEs.
- ***Ongoing productivity:*** While ex ante allowances are set on what would be required to run an efficient network, regulators typically expect even the most efficient regulated utilities to strive to achieve the same level of productivity gains seen in the wider economy, and so they adjust the cost base for expected annual productivity improvements over the price control period.

ESB Networks commissioned Frontier Economics to provide an independent assessment of the real price effects which we are likely to experience over the course of PR6, and to assess the likely scope for productivity improvements over PR6. Frontier's report has been submitted alongside our business plan.

Frontier found that:

- ***Real price effects*** will create a challenging price environment for PR6, with the external evidence pointing to above-inflation increases in labour and material prices of between 1% to 2%.
- ***Productivity growth*** estimates for the wider economy suggest a negative growth range of -0.9% to 0.3% over the PR6 period.

While Frontier's independent assessment of the external evidence points to declining productivity in the wider economy (i.e., a negative productivity adjustment which would have the effect of increasing allowances) for PR6, ESB Networks is conservatively not factoring into our allowances for PR6 any equivalent adjustment for productivity. In effect, therefore, we are targeting outperformance of the wider economy in terms of our ongoing productivity.

In addition, while the external evidence points to significant input cost pressures greater than inflation, we are cognisant that regulatory precedent in Ireland has been to address RPEs through setting appropriate ex ante costs allowances and the ex post assessment, rather than an explicit RPE allowance. ESB Networks cost submissions reflect this standard practice, and ESB Networks is not seeking a further ex ante allowance for RPEs, outside of the ex post review process (where ESB Networks would expect to recover efficiently incurred RPEs).

12.3 Performance incentives

Performance incentives are typically used by regulators to incentivise network companies to achieve service improvements. These incentives refer to outputs which are linked to penalties and/or rewards to drive improvements in areas most important to customers. For example, regulators can create an incentive for the licensee to deliver to an accelerated timeline, or to outperform the level of performance for which the CRU approved investment.

For PR5, our incentive framework was expanded compared to PR4 reflecting the transformation of our role as DMSO and our ambitious plan for PR5.

ESB Networks is preparing a separate submission on potential incentives for PR6, and we look forward to engaging with the CRU on the scope and calibration of the regulatory incentives. Our proposal will include several existing incentives carried forward from PR5, some revised measures and a number of new metrics for PR6 to reflect the changes in the energy landscape since the PR5 targets were set in 2020.

13 Impact on Customers' Bills

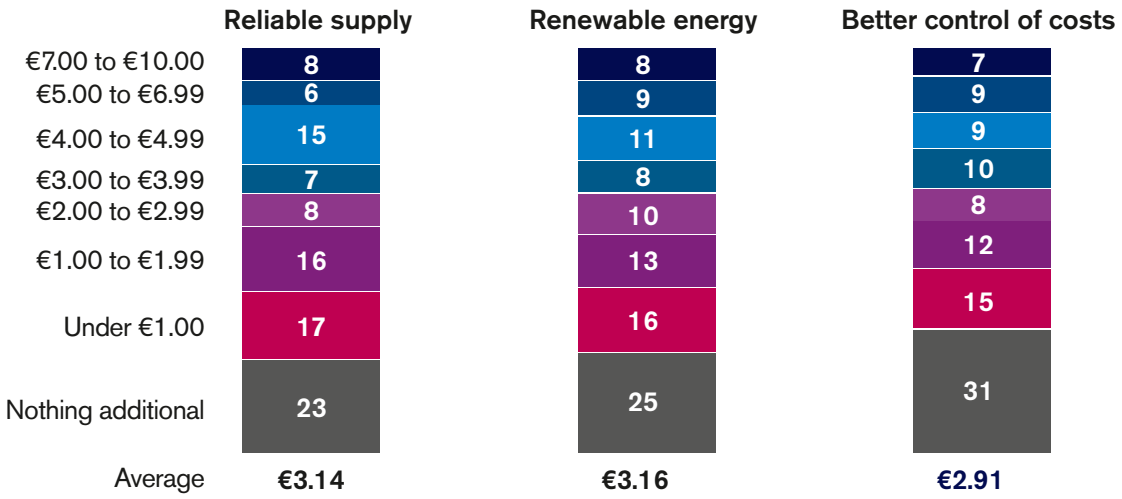
Ireland is going through a process of fundamentally recalibrating our energy system away from high-carbon fossil fuels for heating and transporting towards clean, sustainable electricity. This will result in significant societal benefits including greater energy independence, air quality improvements, carbon reduction (reducing both climate change impact and potential fines for failing to meet binding targets) and ultimately cost savings. However, substantial and sustained investment in the electricity network out to 2040 is needed to enable this transmission.

We have listened carefully about what customers and stakeholders have told us about their needs and priorities, and their willingness to pay. We are acutely aware of the cost-of-living increases that customers have had to bear over the past few years and the impact that this has had on both domestic and business customers.

The chart below illustrates the weekly amounts that customers have indicated that they are willing to pay for reliable supply, access to renewable energy and better control of their electricity costs.

Figure 41: Amounts that customers are willing to pay for reliable supply

A core group; one in four to 30% depending on the benefit assessed, is opposed to paying anything additional on a weekly basis to benefit from a more reliable network, access to renewable energy, or better control of costs



Given the scale of investment necessary to meet the needs of customers and stakeholders during PR6, it is critical that we remain efficient and that we manage risks effectively to avoid placing undue costs on customers. For this reason, we are proposing the agile investment framework outlined above, which allows for a very ambitious work programme during PR6, without committing customers to costs earlier than necessary.

Under the regulatory model, investment in the electricity network is recovered through customers' bills over the long term, which means that customers do not have to fund a peak in investment in the short term within a Price Review period.

Notwithstanding this, our baseline investment proposal would result in an increase in distribution network charges on customers' bills, due to the overall scale of the investment programme. The existing typical cost for a domestic customer for distribution charges to fund investment and operating costs for the electricity distribution network is circa €254 per year. This is a portion of a customer's total electricity bill, which is, on average, just over €1,900 (incl. VAT) per annum for a domestic customer*. With an assumed distribution demand growth of c.3% per annum on average during PR6, there would be an average unit price increase of circa 33% for distribution network charges across the period to 2030 under the proposed baseline investment scenario. This would bring the typical distribution network cost for domestic customers from €254 per year to €337 per year on average over the period. This represents an increase of circa €1.60 per customer per week over the period, prior to any inflation.

This equates to approximately a 4.8% total increase in the annual overall electricity bill of a typical domestic customer across PR6 using today's estimated price of electricity. Any investment above our proposed baseline investment of €10.1 bn (as we strive to deliver the full transmission and distribution programme), would increase the impact on customers' bills.

We are forecasting that the additional 33% average increase in distribution network charges to customers during PR6 will cater for:

- Significant network reinforcements to provide capacity to connect houses, support economic growth, and advance electrification.
- Maintenance and replacement of existing network assets to ensure safe, reliable and resilient electricity supplies for customers now and in the future.
- Implementation of automation technologies and improved vegetation management to reduce unplanned customer outages.
- Development of a smarter, more flexible network capable of safely and securely handling flows of electricity between millions of distributed devices (e.g., solar panels, EVs, heat pumps).
- New tools, products, and market structures to empower customers to take more control over their energy costs.
- Increased volumes of customer-driven work, including new housing connections and retrofits.
- Significant renewable generation connections, from domestic rooftop solar to large utility-scale generation.

Note - link to bonkers.ie article on What is the national average energy consumption?

Conclusion

The programme of investment we have put forward for PR6 reflects the strategic importance of electricity to Irish society as it transitions to a Net Zero future and prepares to support a much larger population.

While substantial and sustained investment in the network is needed to support the transition, we have taken steps to minimise the impact of this on customers in the context of significant uncertainty. We are proposing a phased and targeted approach to new infrastructure investment, the deployment of smart, flexible, and digitally enabled solutions to reduce peak demand and empower customers to take better control over their own energy use, optimisation of our existing assets, and an evidence-based approach to managing asset risk so that we target investment to priority areas. We are also proposing a risk-informed investment framework, which minimises upfront costs for customers.

Since our foundation, ESB Networks has always played a key role in Ireland's social and economic development. The investments we make during PR6 will address the immediate needs of customers and put in place the foundations for a clean electric future. We recognise our unique role as a catalyst for change and our responsibility to deliver core electricity infrastructure to enable Ireland's transition to Net Zero by 2050. PR6 is a vital stepping stone towards this goal. Through our investment programme, we intend to deliver substantive changes to meet Ireland's 2030 targets and ensure that the network can be Net Zero ready by 2040.

The energy transition will not be achieved without ongoing active customer and stakeholder participation, engagement and support. We thank all of the customers and stakeholders who took the time to contribute to this plan.

Glossary of Terms

- **Asset Management**: The systematic process of operating, maintaining, and upgrading physical assets in the distribution network to ensure optimal performance and long-term sustainability.
- **Climate Adaptation**: Strategies and measures taken to prepare the network for and respond to the impacts of climate change, such as increased frequency of extreme weather events.
- **Customer Interruptions (CIs)**: A performance measure used to track the number of customers affected by power outages over a specific time period.
- **Customer Minutes Lost (CMLs)**: A metric used to quantify the duration of power interruptions, representing the average number of minutes that a customer experiences a loss of supply over a year.
- **Demand Side Response (DSR)**: A system where consumers adjust their electricity usage in response to signals from the grid, such as price changes or incentives, to help balance supply and demand.
- **Distribution System Operator (DSO)**: A company responsible for operating, maintaining, and upgrading the electricity distribution networks that carry electricity from the transmission system and generators to homes and businesses.
- **DMSO**: The Distribution Markets and System Operation team is the team within ESB Networks that is responsible for implementing advanced distribution management systems, managing smart meter deployment and supporting retail and flexibility markets.
- **Electric Vehicle (EV) Charging Infrastructure**: The network of charging stations and associated infrastructure needed to support the mass adoption of electric vehicles.
- **Energy Efficiency**: The practice of using less energy to provide the same service or output, achieved through the deployment of more efficient appliances, lighting, heating, and industrial processes, contributing to the overall reduction in energy demand.
- **Energy Transition**: The shift from a fossil fuel-based energy system to one based on renewable energy sources and low-carbon technologies, which is necessary to meet Net Zero targets and address climate change.
- **Flexible Connections**: A type of connection agreement that allows generators or large consumers to connect to the grid with more flexible terms, often in return for managing their energy usage during peak demand times or grid constraints.
- **Load Management**: Techniques used to manage electricity demand across the network, ensuring that supply can meet demand and avoiding overloading of infrastructure.
- **Low Carbon Technology (LCT)**: Technologies that produce fewer greenhouse gas emissions than traditional fossil-fuel-based solutions, including electric vehicles (EVs), heat pumps, solar photovoltaics, and wind turbines.
- **LV Network Visibility**: Refers to the ability to monitor and understand what is happening on the low voltage (LV) network.

- **Maximum Import Capacity (MIC):** MIC stands for Maximum Import Capacity. It is the maximum volume of electricity in kVA that a customer is permitted to import.
- **Microgeneration:** Refers to LV connected generation operating in parallel with the LV system with a capacity of up to 6 kW for single-phase and 11 kW for three-phase connections. These connections have been successfully implemented without application fees.
- **Mini-Generation:** Refers to inverter-connected generation installed by customers to produce clean electricity primarily for self-consumption. It operates in parallel with the electricity network and covers capacities from 6 kVA to 17 kVA for single-phase, and 11 kVA to 50 kVA for three-phase connections.
- **Net Zero:** The UK government's target to reduce greenhouse gas emissions to Net Zero by 2050, which requires transitioning to a low-carbon economy, including decarbonising electricity generation and consumption.
- **Network Capacity:** Network capacity refers to the amount of electricity that the electricity distribution network can safely handle.
- **Resilience:** The ability of the electricity infrastructure to withstand and recover from extreme weather events, cyberattacks, or other disruptions, ensuring a continuous supply of power.
- **Reliability:** The capability of the electricity network to consistently supply power to consumers without interruptions or outages, especially during periods of peak demand.
- **Smart Grid:** A modernised electricity network that uses digital technology and automation to improve efficiency, reliability, and flexibility, enabling better integration of renewable energy sources and LCTs.
- **Totex (Total Expenditure):** The total costs that DNOs incur to deliver their services, including both capital expenditure (capex) for long-term investments and operational expenditure (opex) for the day to day running of the network.
- **System Flexibility:** The ability of the electricity system to respond dynamically to changes in supply and demand, incorporating flexibility services such as DSR, energy storage, and flexible generation.
- **Transformer:** A device that transfers electrical energy between two or more circuits through electromagnetic induction, typically used to increase (step-up) or decrease (step-down) voltage levels.
- **Small Scale Generation:** Refers to customer-installed generation at demand premises, including both synchronous (e.g., CHP) and inverter-connected (e.g., PV) systems. These generators produce clean electricity primarily for self-consumption fuels. They operate in parallel with the electricity network up to 200 kVA.
- **Substation:** A part of the electricity distribution system that transforms voltage from high to low or vice versa and performs various other important functions like protection and switching.

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