ESB NETWORKS

DISTRIBUTION ANNUAL PERFORMANCE REPORT 2022

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Foreword

Welcome to ESB Networks' 2022 Distribution Annual Performance Report. The purpose of this report is to detail ESB Networks' progress and performance during 2022, delivering on the second year of plans approved by the Commission for Regulation of Utilities (CRU) under Price Review 5 (PR5).

At ESB Networks, we are delivering the electricity network for Ireland's clean electric future. This means developing, operating, and maintaining a network that supports the secure and affordable distribution of sustainable low-carbon electricity.

Our 'Networks for Net Zero Strategy' which was published in January 2023 commits us to deliver on our part to achieve the targets set out for 2025 and 2030 in the Climate Action Plan. We will develop the distribution network and supporting systems to meet the changing needs of our customers as we enable decarbonisation of the Irish economy and society.

We are pushing ahead with the transformation of the electricity system, through the connection of renewables, smart meters, flexibility, digitisation, and the refinement of our processes to improve our customer's experiences. All of this must be done while ensuring we have a resilient network which our customers can rely on.

The last number of years have been turbulent both nationally and internationally with COVID-19 and the war in Ukraine having knock-on impacts on the availability of and timeline for materials and resources. We have been taking appropriate measures to ensure that we can maintain the network, and design and build out to meet our targets for 2030. The PR5 Regulatory Contract sets out challenging targets for Network Continuity that seek to improve the reliability of the network each year from 2021 to 2025. This is an important measure for electricity customers and for us in ESB Networks. Unfortunately, the 2022 target was not achieved despite delivering a targeted work programme across the country. We have a strong focus on delivering further improvements in this area over the coming years.

2022 was a record year for the connection of renewables to the electricity system with a significant portion of it to the distribution system. It also saw the first grid-scale solar connected, and we expect there to be strong growth in this area over the coming years. We are also seeing increasing levels of Micro and Mini generation in addition to grid-scale battery growth on the system, all of which are helping us towards our target of 80% in 2030.

This is very positive; however, we need society-wide transformation including in transport, heating, and industry, as well as more renewables, to ensure we meet the Climate Action Plan targets. The next years will be critical to ensure we are well placed come the end of the decade to meet our ambition. Progress can only be achieved through continued collaboration with our customers, stakeholders, and business partners so that we can deliver a clean electric future together. We at ESB Networks are committed to playing our role.

I hope you find the information in this report, which summarises ESB Networks' performance in 2022, both informative and useful.

Nicholas Tarrant
Managing Director
ESB Networks

Executive Summary

ESB Networks are proud to be playing a leading role in the current transformation of the energy system. The distribution system is evolving to become a low-carbon energy system where 80% of the electricity generated in Ireland will come from renewable sources by 2030. The electrification of heat, transport, and our economy will see our customers adopting low-carbon technologies such as heat pumps, electric vehicles, Microgeneration, and Small-Scale Generation such as solar PV. ESB Networks are committed to actively supporting all Irish homes, communities, and businesses in their choices and activities at this time of fundamental change in the energy sector.

An investment of €349.2m of capital expenditure was made in 2022 on the development and renewal of the distribution network. There was a further €336.7m of operating expenditure on distribution operation and maintenance activities.

2022 was a record year for the connection of renewables to the national electricity system including the first grid-scale solar farm. Over 688MW of renewables were connected with 259MW of that to the distribution system. There was a further 79 MW of new large-scale batteries connected (46 MW Distribution and 33 MW Transmission). Furthermore, ESB Networks processed a total of 86 large-scale generator applications in 2022 through the Enduring Connection Policy (ECP) process. This led to connection offers being issued totaling 479 MW for a mix of wind, solar, and CHP projects. It was also a breakthrough year for Microgeneration with 17,624 customers connecting to the electricity system over the course of 2022. Following the very successful launch of our new Mini-Generation connection process in December 2021 we extended the initial pilot significantly in 2022 to accommodate the massive level of customer interest. During the course of 2022 we accepted over 600 applications into the process, representing over 20MW of generation. In September 2022, and in line with the Climate Action Plan targets, we launched a further new application pilot process to enable Small Scale Generation customers to connect via a more streamlined connection process. The total volume of renewables connected to the national electricity system at the end of 2022 was 5,378 GW.

There was a significant increase in the number of demand connections in 2022 compared with 2021, with 38,924 new homes and businesses connected (an increase of 32% on 2021). The smart metering programme continued with 481,793 smart meters installed bringing the total to 1,103,089 by the end of 2022.

In November 2022, we introduced our new Customer Portal, which is a new digital channel for our customers to self-serve and access ESB Networks services at a time that is convenient to them.

ESB Networks have a number of measures underway to improve our continuity performance in the coming years. The focus of the PR5 continuity investment programmes is to minimise the impact of unplanned outages through network automation, wildlife mitigation, and prioritised investments for Worst Served Customers (WSC). These investment programmes aid better flexible operation of the system in times of unplanned outages such that customers experience minimised disruption. This included specific continuity-focused patrolling and remediation works on the worst performing outlets on the MV network in 2022.

ESB Networks' National Network, Local Connection Programme launched 'Beat the Peak' in Q4, which is an umbrella initiative comprised of eight targeted measures to help customers take control of their electricity use and reduce electricity demand at times of peak events.

The Interim Retail Market Microgeneration ('IRMM') Solution went live in June enabling relevant customers to be renumerated for electricity exported to the grid.

In 2022, we successfully completed our award-winning Dingle Project in collaboration with our community partners and ambassadors. The project has had significant impact on the local community's decarbonisation goals and the Dingle 2030 decarbonisation plan.

In terms of Environmental Performance, we continue to actively reduce our environmental footprint, with further reductions across our fleet, buildings, and waste material while working to reduce our emissions in other areas such as SF6 gas.

Contents

ESB Networks DAC is the licensed Distribution System Operator (DSO) in the Republic of Ireland. The Irish distribution electricity system includes all distribution stations, overhead electricity lines, poles and underground cables that are used to bring power to almost 2.5 million domestic, commercial and industrial customers.

2022 Highlights

Annual Financial Performance

- Approved DUoS revenues of 872.7m
- **€349.2M** invested in Distribution Capital Programmes in 2022
- **€336.7M** of Distribution Operating expenditure

Connecting more Renewable Generation

- **5.378 GW** of renewables connected to date, with 4,621 GW of this being wind generation
- **79 MW** of new large-scale battery storage connected in 2022 (46 MW Distribution, and 33 MW Transmission)
- **17,624** Microgeneration connection applications to the electricity network were facilitated in 2022, bringing the total number to 45,409 by the end of 2022
- **45** new Mini-Generation connections were also completed in 2022 with over 550 further applications accepted and being processed
- **86 ECP-2.2** applications processed during 2022, leading to 51 connection offers totalling 479 MW

New Connections

- **38,924** total new connections
- **33,814** new domestic connections
- **5,110** new commercial connections

Environment

- Compared to 2021, electricity usage in our buildings was down 6.8%.
- Vehicle fleet fuel consumption was lower by 2.2% in 2022 than 2021.

Innovation

- Successful delivery and completion of our award-winning Dingle Project in collaboration with our community partners and ambassadors.
- 9 innovation projects completed and learnings disseminated.

Safety

- ESB Networks successfully retained our certification to the international ISO 45001 Occupational Health and Safety Management System standard.
- Continued to implement our Public Safety Strategy 2021-2025, which is anchored in the core purpose of our business and continues to be a core strategic priority and area of focus for ESB Networks.

Smart Metering

- **481,793** smart meters were installed in 2022
- **1,103,089** smart meters installed in total by the end of 2022

Customer Engagement

- In November 2022, we introduced a new online Customer Account, which is a new digital channel for our customers to self-serve and access ESB Networks services at a time that is convenient to them.
- We consolidated other outage management services in PowerCheck ('Check My Power Status' and 'Log a Fault') and simplified the journey for customers by facilitating access to those services using their Eircode or MPRN.

Distribution System Statistics

- c. **151,400** km of overhead lines
- c. **27,500** km of underground cable
- c. **563** HV substations
- c. **23,343** MV ground-mounted substations
- c. **249,148** MV pole-mounted transformers
- c. **49.5** MW of HV transformer capacity added

2023 Performance Summary

Metric	2022 Target	2022 Perfor -mance	2022 Financial Incentive	2021 Perfor -mance	2020 Perfor -mance	2019 Perfor -mance	2018 Perfor -mance
Customer Minutes Lost (CML) – unplanned outages	82.9	103.34	€-10.0m	95.99	94.9	87.47	97.43
Customer Interruptions (CI) – unplanned outages	116.9	127.12	-€5.11m	1.2041	1.26	1.23	1.23
Customer Satisfaction (ESATRAT)	90%	83.58%	-€5.35m	85.90%	90.53%	91.17%	91.75%
Customer Satisfaction Survey	81.50%	81.07%	-€0.32m	82.88%	82.16%	80.82%	78.63%
Smart Metering Delivery	458,255 (adjusted target agreed with CRU)	481,793	€0.24m	382,188 Meters	239,347	15,000 Meters	N/A
Smart Metering Functionality	New functionality in place by Q4 2022	Partially completed with some deferred	€0.20m	Completed	N/A	N/A	N/A
Smart Metering Customer Satisfaction	>80% Customer Satisfaction	96% net satisfied	€0.36m	97%-98% net satisfied	N/A	N/A	N/A
Stakeholder Engagement	10	7.63	€0.57m	7.54	7.2	7.5	6.8
Delivering New Connections (ECP-2.1)	Process ECP offers 30 days before batch deadline	Completed	€1m	Completed	Completed	Completed	Completed
Outage Information	Balanced Scorecard	100%	€0.9m	81%	N/A	N/A	N/A
Flexibility	Balanced Scorecard	98%	€2.95m	100%	N/A	N/A	N/A
Visibility	Balanced Scorecard	39%	€1.17m	98%	N/A	N/A	N/A
Joint DSO/TSO Coordination	Balanced Scorecard	71%	€2.13m	59%	N/A	N/A	N/A
Independent Role of the DSO	Balanced Scorecard	85%	€0.85m	82%	N/A	N/A	N/A

Metric	2022 Target	2022 Perfor -mance	2022 Financial Incentive	2021 Perfor -mance	2020 Perfor -mance	2019 Perfor -mance	2018 Perfor -mance
No. of registered vulnerable customers	N/A	70,520	N/A	66,936	52,818	48,855	46,767
Total number of outages (planned and unplanned)	N/A	45,540	N/A	42,687	52,682	38,930	38,646
New Demand Connections	N/A	38,924	N/A	29,553	29,024	30,206	26,954
Capital Expenditure	Within PR Allowance	€349	N/A	€328m	€336m	€267m	€244m

1 Customer Service

1. Customer Service

We work hard to deliver a first-class customer experience, developing our customer service channels, touch points and offerings. We are committed to improving on our performance every year to ensure customers' needs are met.

Our Customer Charter is a set of commitments to our customers.

1. We aim to restore supply in less than four hours for 95% of fault outages.
2. We will give you at least two days' notice of an outage for planned work on the network.
3. If your main ESB Networks fuse has failed, we will call out free of charge, within three hours if you call us between 8.30am and 11.00pm, or before 11.30am the next morning if you call after 11.00pm.
4. We will install an electricity meter for you within three working days (for domestic customers, five working days for business customers).
5. We will send you a cost quotation for your new connection if you are building a new house or farm building, setting up a small business or renovating an older property, within seven working days if no site visit is required, or 15 working days if a site visit is required.
6. We will complete your new connection to your new house or premises within two weeks of receiving your 'Safe Electric Completion Certificate' if you apply and pay giving us ten weeks' notice.
7. We will contact you within ten working days if you are concerned about your supply voltage.
8. We will resolve verified voltage concerns within 12 weeks (unless major reinforcement is required).
9. If you request a visit from an ESB Networks' network technician, we will visit at an agreed time, or contact you the day before if we cannot make the agreed appointment.
10. Where we agree that you are entitled to a refund, we will make the refund within five working days.
11. If you use the CRU complaint resolution service, we will honour any financial settlement they direct within ten working days.
12. If we fail to meet a charter commitment, or (for 1 and 2) receive a valid claim, we will send you a cheque within ten working days or pay you an additional €35.

3,631 Charter Payments were made to our customers in 2022 versus 2,068 in 2021 and 1,485 in 2020.

Putting customers at the heart of what we do

In 2022, we continued our focus on key customer journeys to streamline and introduce digital online self-serve options to make it more convenient and simpler for customers to interact with us.

Our Customer Experience (CX) programme is committed to servicing our customers with connections and a resilient network as well as facilitating customers to adopt low-carbon technologies like EVs, solar, and heat pumps. Digital is a key enabler helping to streamline customer journeys, offer new self-serve platforms, and simplifying interactions. Some examples of customer initiatives:

1. **Customer Centricity.** A key objective of the CX programme is to embed customer centricity across ESB Networks. We developed a KPI dashboard on customer satisfaction, customer operations, complaints, brand, and customer touchpoints which is shared monthly with relevant teams.
2. **New Connections.** Over 30,000 homes and businesses require network connection per annum. Our objectives are to deliver a simpler, online application process, proactive communication, and an enhanced tracking service.
3. **Power Outage.** Proactive, accurate outage information was identified as a critical area for improvement. Powercheck.ie was relaunched as a cloud-based application in 2022 with new features including a "Keep Me Updated" service.
4. **Website.** esbnetworks.ie evolved consistently with an improved user navigation experience, providing relevant information for key customer journeys plus enhanced functionality.
5. **Online Customer Account.** Launched in November 2022, bringing personalised digital services together to enable customers to access electricity consumption data, submit Meter Readings, view power outage status, Find my MPRN and the New Connections service.
6. **Contact Centre of the Future.** Aligns with our strategy to transition simple tasks from call centre agent to self-serve. In 2022, a deep-dive analysis identified improvements to our service with a full-scale programme now underway.

Online Customer Account

- In November 2022, we introduced our new online Customer Account, which is a new digital channel for our customers to self-serve and access ESB Networks services at a time that is convenient to them.
- The initial services offered in the Customer Account are Access Energy Consumption Data (Including Smart Metering Data), Submit a Meter Reading, Check My MPRN, New Connections, and Outage Information. Further services will be added in 2023.
- The Customer Portal represents a step change for ESB Networks as it creates an enduring digital relationship with our customers. Registrations have exceeded 30,000.

New Connections

- In November 2022, we integrated the New Connection Online Application Portal with the new Customer Portal to consolidate ESB Networks online services in one place with a single login.
- New Connections, Domestic, Commercial and Development online applications saw 87% customer adoption by year end 2022.
- Automation of the processing of these online new connection applications for the New Connections Team will reduce the Time to Quote for our customers.

Outage Management

- In 2022 we launched our new digital notification service 'Keep Me Updated' on www.powercheck.ie. Our customers can request ESB Networks to keep them updated, by SMS or email, on a power outage (planned or unplanned) in which they are interested (e.g., changes to Estimated Restoration Times, Power Restored Times).
- We consolidated other outage management services in PowerCheck ('Check My Power Status' and 'Log a Fault') and simplified the journey for customers by facilitating access to those services using their Eircode or MPRN.
- PowerCheck was re-platformed to the cloud to enhance performance and customer experience across customer devices, as well as future-proof it for future developments.
- A Disaster Recovery solution was introduced for PowerCheck, recognising its importance for providing our customers with updates on power outages. Power outages result in the biggest volume of customer interaction.
  A large portion of our customers affected by an outage contact ESB Networks through PowerCheck.
- ESB Networks' vision and solution for digital outage notifications was completed in 2022 with a view to delivering it in 2023.

How customers interact with ESB Networks

National Customer Care Centre

ESB Networks' National Customer Care Centre (NCCC) is an award-winning contact centre with 13 years of accreditation from the Contact Centre Association. The 24/7 facility is the gateway for all 2.4 million electricity customers who make queries relating to their electricity supply, faults, new connections, emergencies or general queries. Customers contact us across various channels such as phone, email, and social media apps on a 24/7 basis.

In 2022, 1,429,448 customer contacts were handled, compared to 1,446,677 in 2021.

The contact breakdown is as follows:

443,510 telephone calls

342,005 emails, meter reading, social media management

643,933 automated responses to customers on no supply, meter reading, fault logging services

Contact Centre Association standards

ESB Networks' Customer Contact Centre continues to be a member of the Customer Contact Association (CCA) and actively engages with the members on developing contact centre trends, sharing experiences of and responses to remote working challenges and employee support through periods of full lockdown.

Customer Interactions During Storms

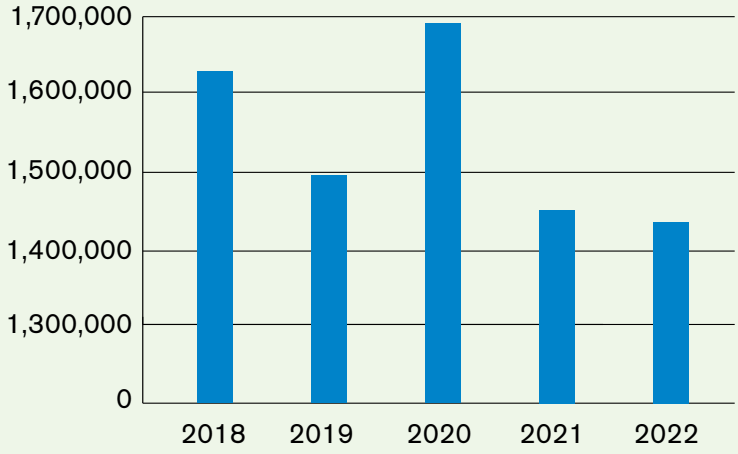
Weather-related outages or damage cause significant disruption to ESB Networks customers. During such incidents, customers contact ESB Networks via a variety of engagement channels including telephone, Interactive Voice Response (IVR), ESB Networks website, powercheck.ie, email, and social media, resulting in peaks of activity across all channels. Mainstream media, TV, and radio campaigns are also used to communicate and engage with customers in a timely and proactive manner. ESB Networks also has a support service with an external partner to provide additional support for no supply/emergency calls, particularly during periods of severe weather and large electricity outages.

PowerCheck provides customers with Real-Time Fault Information on all major faults across Ireland. You can use PowerCheck to view what faults and fault clusters are known to our team of engineers and view active planned outages.

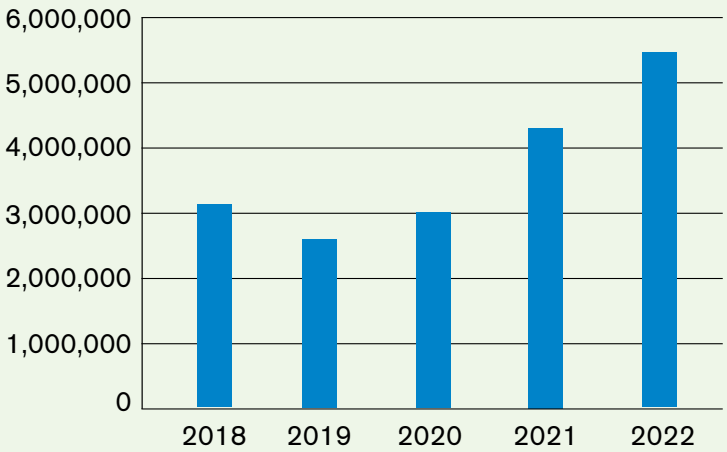
Performance in Customer Contact Centre

Call Handling Response	2018	2019	2020	2021	2022
Percentage of calls answered within 20 seconds[1]	90.31%	90.83%	84.23%	75.44%	73.85%
Percentage of calls dropped[2]	2.74%	2.57%	4.59%	11.13%	11.98%
Networks customer calls to the call centre[3]	451,494	429,589	451,147	401,730	443,510

Calls and Emails Answered



PowerCheck Pageviews



1 *Figures are inclusive of storms, which involve much higher call volumes during these events. This results in challenges regarding the call handling and percentage-of-calls-dropped performance metrics.*
2 *Where the customer has terminated the call without waiting for a response.*
3 *Calls relating to ESB Networks excluding Interactive Voice Response.*

Website and Social Media

The ESB Networks website was re-launched in 2021 with a new design centred on improving customer experience by building a mobile-first user interface and improving the key customer journeys throughout the website. Enhancements include a "Storm Mode" version of the website, which is implemented during large-scale weather events, making it easier for customers to report a fault and find estimated restoration times for outages affecting them. The re-launch ensures a better user journey for our customers and aligns our website with our security and accessibility standards. It also compliments other customer touchpoints including the National PowerCheck and new connection applications.

The ESB Networks website and social media platforms are significant touchpoints to our customers. There are now 63,000 Twitter and 41,000 Facebook followers, and a further 4,400 Instagram followers, achieving more than 93 million combined impressions in 2022 between paid media placements and organic content. There was a combined 12% growth on our social media channels. Our website is seen by our customers as one of the most important touchpoints, in particular the section on outages and Powercheck.ie, which gives real-time information on planned outages, faults, and estimated restoration times.

In addition to providing customers with up-to-date information and assurance, the use of social media supports our efforts to provide information to customers via channels other than direct voice contact to the NCCC during fault events. This facilitates our customer service advisors to be more accessible for handling emergency activity during the major outage events. Social media channels allow us to provide a source of proactive contact to customers with advice on storm readiness both in the home and work environments.

Social Media

63,100 Followers on Twitter

41,000 Followers on Facebook

4,400 Followers on Instagram

5.4m Page views on PowerCheck

Customer satisfaction scores 2022

- **83.58% ESATRAT (satisfaction rating of NCCC).**
- **81.07% Behaviour and Attitudes Survey (customer satisfaction rating).**

Customer Satisfaction Scores Explained

(1) National Customer Care Centre

The incentivised satisfaction rating of the National Customer Care Centre out-turn score is derived from five Key Performance Indicators (KPI).

In 2022, our combined incentivised out-turn stood at 83.58%, compared to 85.92% in 2021. The combination of ongoing resourcing challenges and complex customer contacts across all customer contact channels, arising from backlogs during the ongoing Covid-19 pandemic restrictions during Q1, impacted negatively on service level and abandonment rate performance throughout 2022. The engagement performance for the mystery shopper and customer call-back KPIs remained stable and increased slightly during Q3 and Q4, based on information accuracy and improved call wait times for customers.

Breakdown of National Customer Contact Centre ESATRAT Incentive

	2019 Target	2019 Actual	2020 Target	2020 Actual	2021 Target	2021 Actual	2022 Target	2022 Actual
Speed of telephone response	88%	90.83%	88%	84.23%	89%	75.40%	89%	73.85%
Call abandonment rate	4%	2.60%	4%	4.59%	4%	11.10%	4%	11.98%
Customer call-back survey results	88%	90%	88%	95.00%	89%	94.00%	89%	89.00%
Mystery caller survey results	83%	85%	83%	89.00%	84%	87.00%	84%	82.00%
First contact / call referral	10%	9.30%	10%	9.54%	10%	11.00%	10%	10.95%
ESATRAT (total)	**90%**	**91.20%**	**90%**	**90.53%**	**90%**	**85.92%**	**90%**	**83.58%**

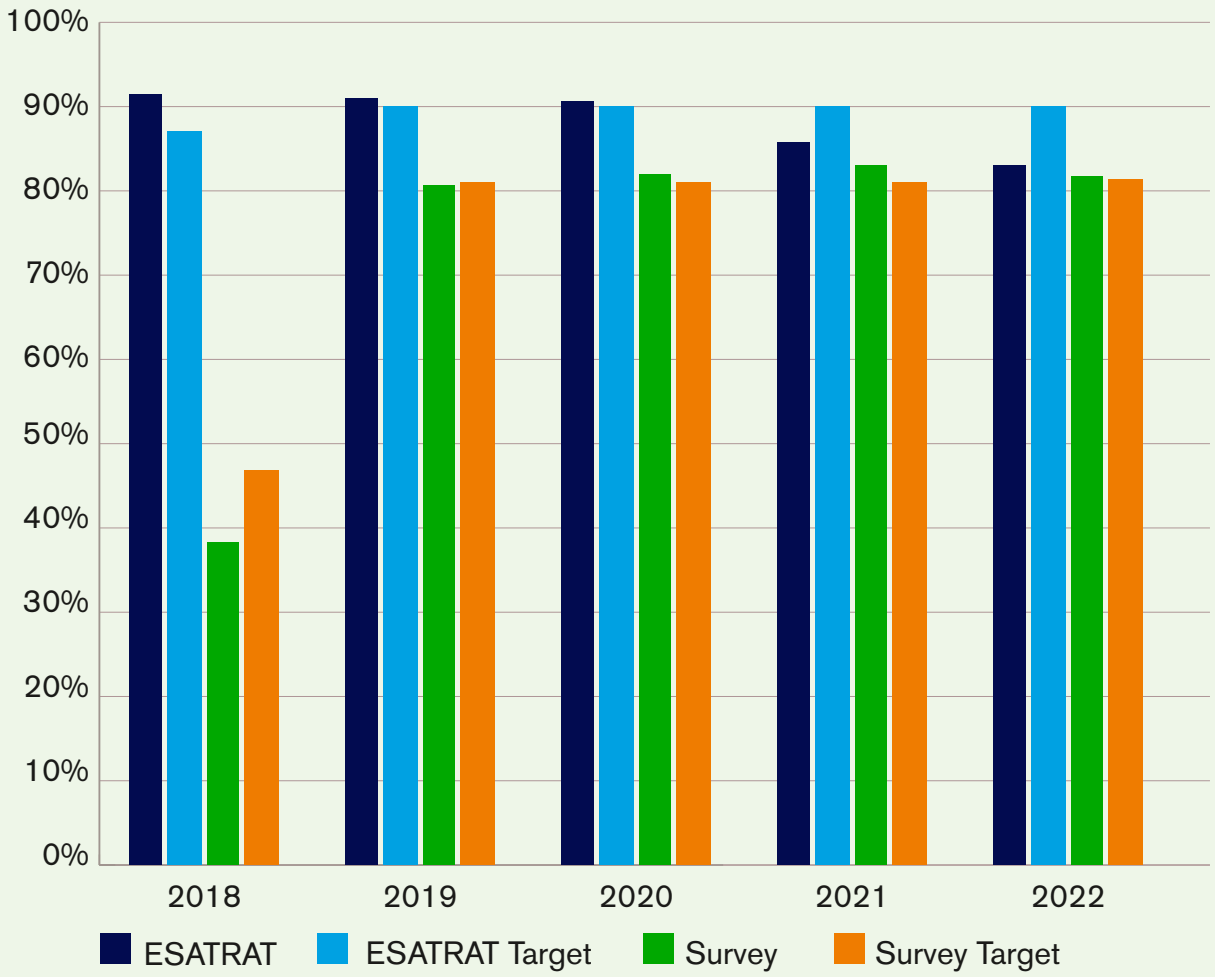
(2) Customer Satisfaction

The incentivised National Customer Satisfaction Rating (Behaviour & Attitudes Survey) out-turn score is the average of six KPIs:

Customer Satisfaction Rating (Behaviour and Attitudes Survey)	Overall 2020	Overall 2021	Overall 2022
Voltage Complaint Rectified (1 year rolling due to small base size)	85.40%	84.32%	71.28%
Unplanned Electricity Interruptions	81.03%	78.41%	82.42%
Planned Electricity Interruptions	87.01%	86.03%	86.84%
New Connection - Scheme Builders	80.10%	83.71%	80.16%
New Connection - Non scheme	84.80%	86.62%	89.54%
New Connection - Business	74.64%	78.18%	75.17%
Average	**82.16%**	**82.88%**	**81.07%**

The overall incentivised score was 81.07% for the year 2022, down from 82.88% in 2021. This was driven by decreases in the KPI for New Connections - Business (from 78.18% in 2021 to 75.17% in 2022), New Connections Scheme Builders (from 83.71% in 2021 to 80.16% in 2022) and voltage issues (from 84.32% in 2021 to 72.28% in 2022). Satisfaction among Non Scheme Builders improved (from 86.62% in 2021 to 89.54% in 2022) as did unplanned interruption satisfaction (from 78.41% in 2021 to 82.42% in 2022).

Customer Satisfaction Scores



Customer service performance for 2022 is explained in detail in this report. The previous year-on-year changes can be summarised as follows:

- In 2020, the ESATRAT score decreased slightly despite strong performance in Q1 and Q2 across all elements of ESATRAT. However, the combination of increased customer contact activity across all customer contact channels in Q3 and Q4 arising from backlogs during the ongoing Covid-19 pandemic, and as a result of Storm Ellen in August, impacted negatively on service level and abandonment rate performance. In contrast, performance on mystery shopper and customer call-back KPIs remained strong throughout 2020. Meanwhile, our Customer Satisfaction Survey score saw further improvement, mainly driven by service improvements for New Connections - Scheme Builders and Voltage Complaints Rectified, but we also saw an improvement for Planned Electricity Interruptions. KPI was down slightly for Unplanned Electricity Interruptions.
- In 2021, Covid-19 was still a feature of society and the number of customer calls into the contact centre was circa 46,000 less than 2022. From May 2021 the number of abandoned calls increased as society opened back up for work, impacting negatively on the service level. Recruitment and retention of customer service advisers continued to be challenging.

The table below outlines the number and type of complaints. The volume of customer complaints has increased by 7% year on year and the volume of CRU complaints has increased by 77%. The six most frequently made complaints relate to frequent outages (down 16% YOY), communications (up 39% YOY) and operations delays and overruns (up 86% YOY), Staff contractors performance (up 11%) and smart metering complaints (up 132%) as the customer base grows.

We continue to establish and analyse insights monthly to address the concerns raised by our customers through the complaints process and endeavour to close complaints with a meaningful response within five working days.

Complaints Handled by National Customer Care Centre

Complaints Received	2018	2019	2020	2021	2022
Concerning low voltage	21	28	20	28	18
For frequent outages	1,199	1,655	1,931	1,668	1,511
Time to connect customers	48	33	17	48	58
Operation delays and overruns	148	186	171	167	336
From suppliers	0	0	0	0	0
On connection costs and budget quotations	-	-	-	3	0
On meter reading and estimated reads	444	247	138	321	360
Other	1,542	1,616	1,811	1,840	2,517
Total complaints received	**3,402**	**3,765**	**4,088**	**4,075**	**4,800**

CRU Contacts and Complaints

ESB Networks customer contacts to the CRU increased overall by 125% with 292 contacts in 2021 vs 656 in 2022.

In 2022 there were 55 complaints referred to the CRU, a 77% increase from 2021.These complaints had previously completed ESB Networks' internal complaints process. The main drivers being Smart Meter (13), Quality of Supply/Frequent Outages (seven) and Customer Service/ Communications (six).

29 of the 55 complaints logged were closed in 2022 with 12 upheld and 17 not upheld. The remaining 26 complaints were pending at year end.

Vulnerable Customers

We all rely on a safe, reliable electricity supply; however, some customers are more vulnerable to loss of electricity supply. A 'vulnerable customer' is a household which is critically dependent on electrical devices, such as medical equipment, or which is particularly vulnerable to power outages during the winter months for reasons of advanced age or physical, sensory, intellectual, or mental health. Vulnerable customers receive priority attention when there is a fault on the network and they make contact with our Customer Contact Centre. We take care to give vulnerable customers at least three days' notice of upcoming planned outages so that they have time to make alternative arrangements.

In 2022, 70,520 customers were registered as vulnerable customers, an increase of 3,584 from 2021. To register as a vulnerable customer, please contact your electricity supplier who will then notify ESB Networks.

Meter Reading

ESB Networks Meter Reading consists of three streams, namely Quarterly Hour Remote Reading, Smart Metering and Legacy Meter Reading. The focus of Legacy Meter Reading continues to be on obtaining as many meter readings as possible each year and the function utilises email campaigns, text campaigns, and initiatives such as visiting holiday homes during summer months.

For manually read legacy sites, ESB Networks schedules four reading visits per customer each year. Where a read is not obtained due to an access issue, a meter reading card is left to alert the customer to submit a reading. If no meter reading is subsequently submitted by the customer, ESB Networks sends a letter when a customer approaches 12 months without a reading. This can also be followed with an email if there is an available customer email address.

Following the challenges presented by Covid-19 and various localised lockdowns, we resumed the manually reading activity fully in April 2021. In addition, ESB Networks expected the ongoing rollout of Smart Metering to impact on the performance level of traditional (legacy) meter reading.

With the roll out of a new Legacy Meter Reading framework contract in Q1 2022 against the backdrop of an increasing number of smart meter installations, ESB Networks has successfully delivered 91.5% of customers with four scheduled visits (up from 56% in 2020) and 98.6% of customers with at least two such scheduled visits. ESB Networks also aim to obtain one actual meter read per year for 98% of all customers (either from our meter reading staff and contractors or from the customer). In 2022 as ESB Networks worked through the various challenges above, the result achieved was 96.9%. ESB Networks have a target of 99% of customers without back-to-back meter estimates and the result delivered for 2022 was 97.7% (up from 81.5% in 2020).

ESB Networks supported billing and adjustments for 2,299,111 customer meter reads in 2022. In addition, electricity suppliers issued 1,911,318 reads to ESB Networks for review and validation and a further 3,878,793 customer reads were received through internal systems. These particularly high volumes of traffic reflect the external environment at the time where customers faced energy bill increases on a regular basis and the customer responded with sending in more frequent meter readings to ensure bill accuracy at the right tariff.

ESB Networks' key focus is to maintain a presence of readers through a geographical spread of 34 planner groups in support of the manual read activity. This work compliments the roll out of Smart Metering nationally to ensure our systems and processes are best positioned to deliver an exceptional customer delivery and experience.

Meter Reading Performance

	2018 Performance	2019 Performance	2020 Performance	2021 Performance	2022 Performance
Two scheduled reading visits per annum	99.99%	99.99%	99.95%	99.68%	98.60%
Four scheduled reading visits per annum	99.64%	99.60%	55.72%	89.42%	91.50%
One actual read per annum	97.80%	97.82%	96.15%	96.77%	96.90%
No back-to-back meter estimations	99.85%	99.94%	81.53%	96.19%	97.70%

Estimated Restoration Time (ERT) for fault outages

The new Estimated Restoration Time (ERT) Accuracy incentive is a project that runs over the PR5 period and measures the performance of the DSO in improving ERT Accuracy for fault outages across the network. In recognition of the importance of customers planning around the outage information provided to them, this incentive focuses on the accuracy of the information provided as opposed to the speed of power restoration.

In the initial two years (2021, 2022) the focus is on establishing the new ERT monitoring, recording, and data assurance processes for fault outages and setting future ERT targets. The milestones in the final years of PR5 focus on the actual ERT targets and the performance against them.

The CRU outlined five aspects to be delivered in the second year of PR5 as detailed below. ESB Networks has delivered on all five of these key milestones in 2022. .

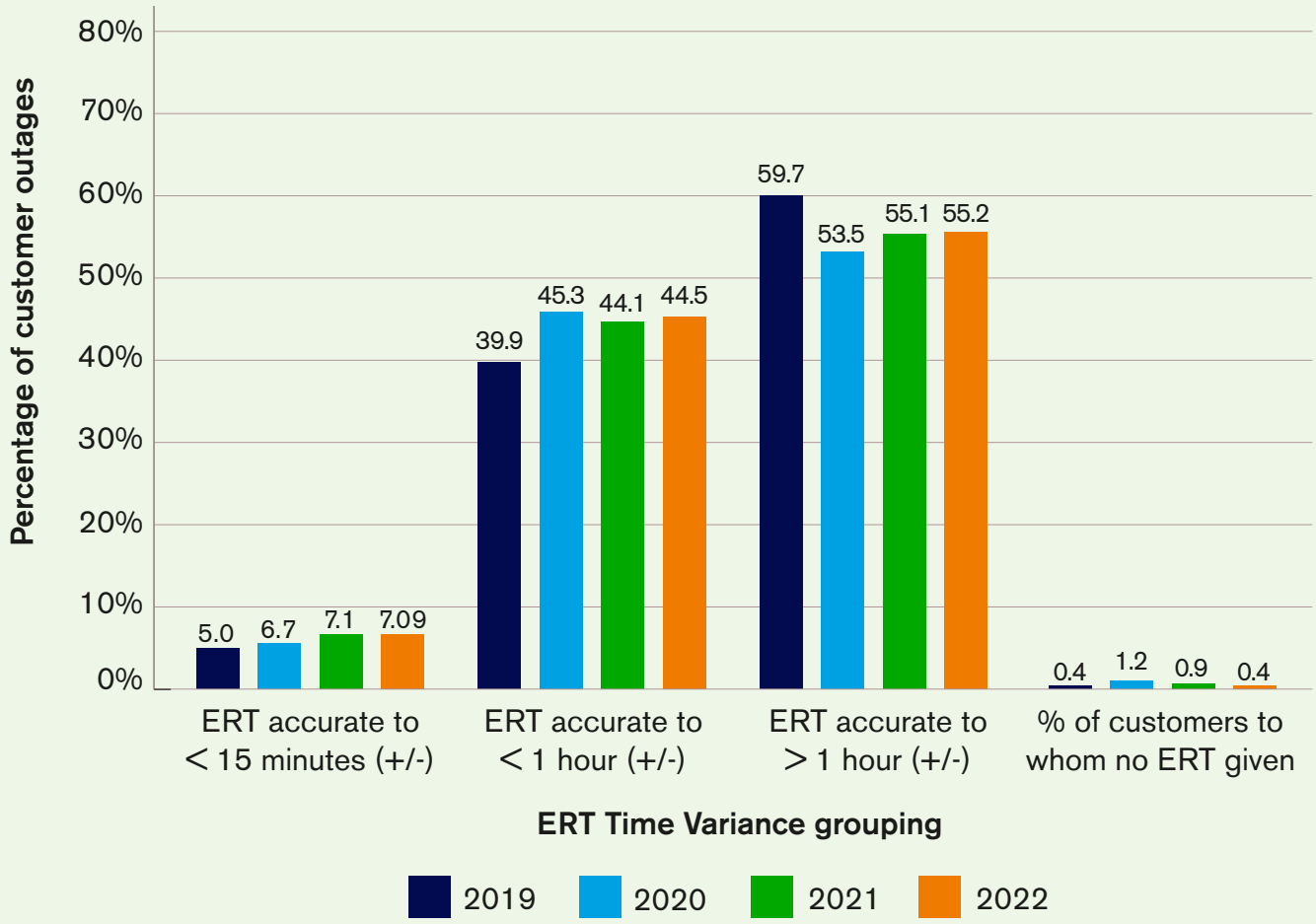
Detailed ERT Accuracy Incentive Balanced Scorecard Requirements

Aspect	Required Evidence
Application of Monitoring and Recording Process	DSO to report on the application of monitoring and recording process. This should correlate to the DSO's 2021 established monitoring, recording, and data assurance processes. Report on developed storm process and out of hours improvements.
Formal Update and Approval of Monitoring, Recording, and Data Assurance Processes Based on 2021 Lessons Learned	DSO to report on updates relative to the 2021 lessons learned and how consultation feedback (if any) has been addressed and incorporated.
Application of Data Assurance Process	DSO to report on progress of the systems and process for data collection / assurance processes as well as proposals on data assurance for ERT accuracy going forward.
Annual Performance Report	DSO to report on ERT configuration and preliminary data collected from Pilot Stages 1,2 and 3. This includes the implementation of improvements identified. DSO to report on ERT rounding impact and any rounding configuration changes.
Proposal of Preliminary Target (for Year 3), based on Preliminary Data, Through the DSO's Submission of Multiyear Plan to CRU in Q3 Each Year.	Report on the proposed target structure and preliminary ERT target for year.

Specifically, ESB Networks has:

- Completed the data analysis for the 2022 ERT fault outage data using the ERT monitoring and recording processes developed in 2021.
- Submitted the results of the analysis of historical ERT accuracy including the data distributions for the years 2019-2022.
- Completed the data assurance checks on the 2022 fault outage data and submitted the outcomes of these checks.
- Reviewed and verified randomly selected customer outages and verified that all outages were correctly recorded and reported.
- Agreed and developed a new Storm Process with ESB Networks Stakeholders.
- Investigated if Out of Hours ERTs can be managed within the Outage Management System.
- Detailed lessons learnt from 2021 and issued a Public Consultation.
- Investigated the impact of ERT rounding.
- Developed and rolled out an ERT pilot to seven areas and performed detailed analysis of the ERT accuracy for the pilot and non-pilot areas.
- Proposed preliminary ERT accuracy targets for Year 3.

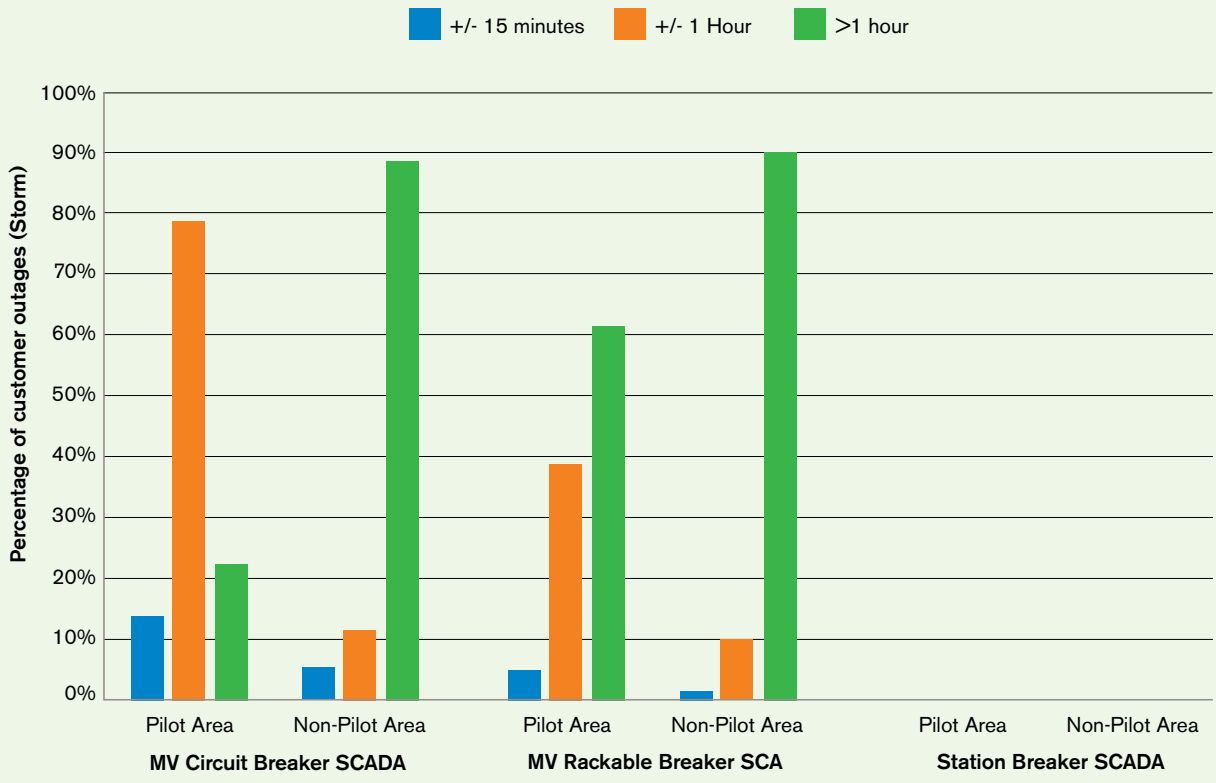
Percentage of Customers Outages by ERT Restore Time Variance Non-Storm Day

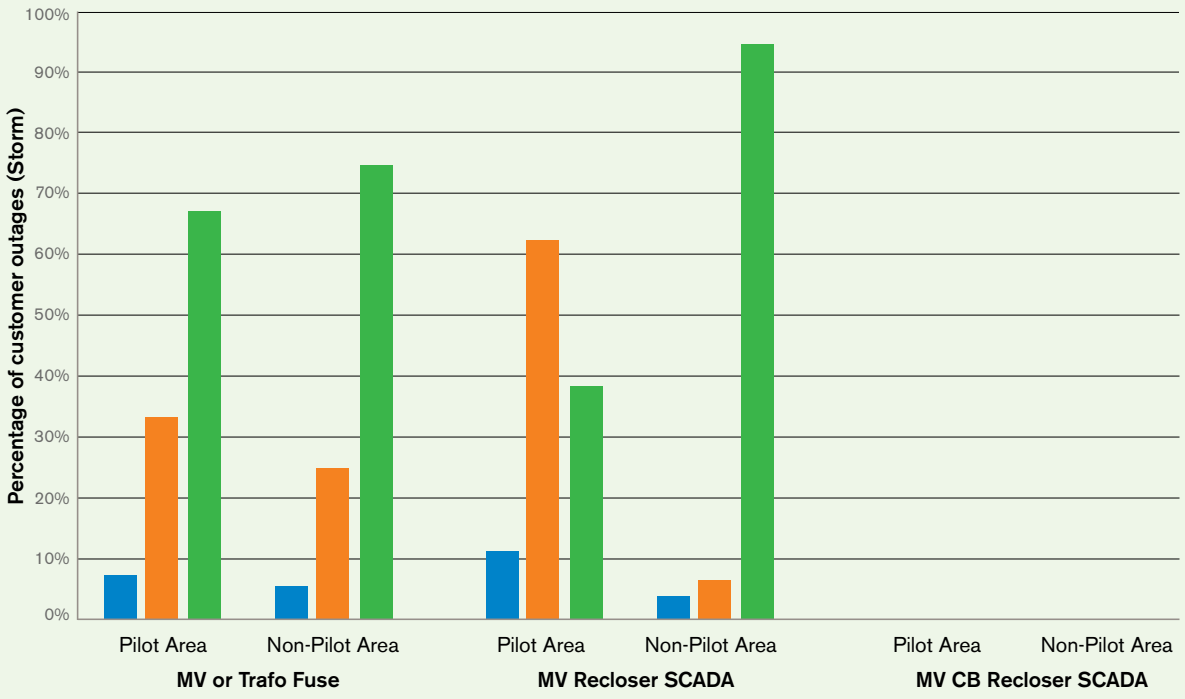


In 2022, ESB Networks commenced an ERT pilot. This pilot looked at improving the ERT's accuracy for a number of selected device types in the pilot areas. The initial outcome of the pilot has shown a positive improvement in the initial ERT accuracy for the selected device types in the pilot areas. Outage data over a two and half month period for the seven pilot areas and the 27 non-pilot ERT areas was analysed and compared. From the analysis it was found:

- There was an increase in the percentage of customers within 15 minutes (+/-) of the initial ERT for seven out of 13 device types. For the other 4 device types the non-pilot areas performed better. The percentage of customers varied from 5% to 45%.
- There was a significant increase in the percentage of customers within one hour (+/-) for all device types where outage data was available, i.e. 11 out of 13 device types. The percentage of customers 24% to 100%.
- The improvement in the percentage of customers within 15 minutes (+/-) and within one hour (+/-) has resulted in the ERT accuracy > one hour reducing.
- For the non-pilot areas it was found that the percentage of customers within 15 minutes (+/-) and within one hour (+/-) was significant less when compared to the ERT accuracy for the pilot areas.
- No outages occurred for the two device types, Station Breaker SCADA and MV CB Recloser SCADA during the selected period.

Comparison of ERT Accuracy for the Selected Device Types in Pilot and Non-Pilot Areas





Comparison of ERT Accuracy for the Selected Device Types in Pilot and Non-Pilot Areas

It is expected that the approach used for the ERT pilot will be used to deliver the ERT accuracy targets for Year 3. However, this will be confirmed once a larger set of outage data for the pilot areas is available for analysis.

2

Reliability and Resilience

2. Reliability and Resilience

Continuity

ESB Networks' strategy is aligned to government policy and climate action objectives in actively promoting the transition to a low-carbon economy by supporting our customers in increasingly electrified systems of heating and transport. This transition will require an ever more reliable electricity system, as homes and businesses become dependent on electricity as their main source of energy. ESB Networks need to be able to mitigate the impact of climate change on our infrastructure, while providing an ever more reliable and resilient system for all electricity customers.

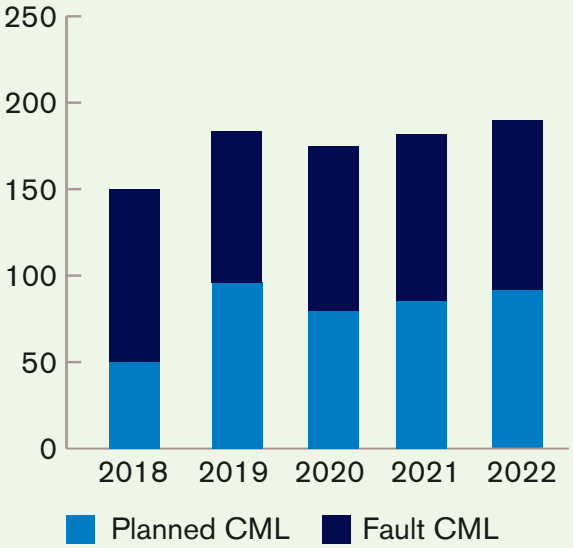
The focus of the PR5 continuity investment programmes is to minimise the impact of unplanned outages through network automation, wildlife mitigation, and prioritised investments for Worst Served Customers (WSC). These investment programmes aid better flexible operation of the system in times of unplanned outages such that customers experience minimised disruption.

Outages

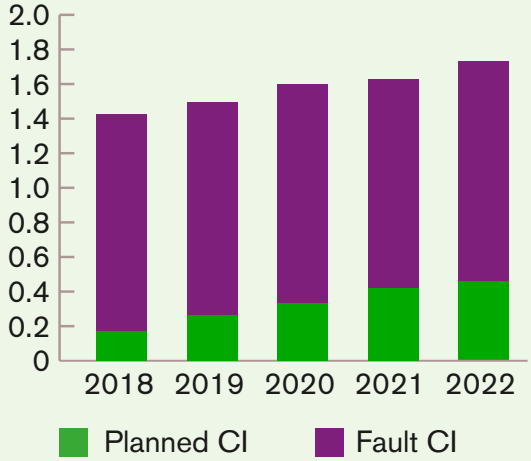
Customer Interruptions (CI) represents the number of interruptions greater than three minutes that an electricity customer has on average each year, and Customer Minutes Lost (CML) is the duration that customers on average spend without supply each year.

To benchmark our outage performance against other utilities, storm days (the effects of severe weather) are removed for unplanned CI and CML reporting. Therefore, the analysis in this section excludes storm day outages (CI and CML). The average Irish electricity customer was without power for 196 minutes in 2022. The average customer experienced an outage greater than three minutes duration 174 times per 100 customers, or 1.74 times per customer.

Annual Planned and Unplanned CML (excl. Storm Days)

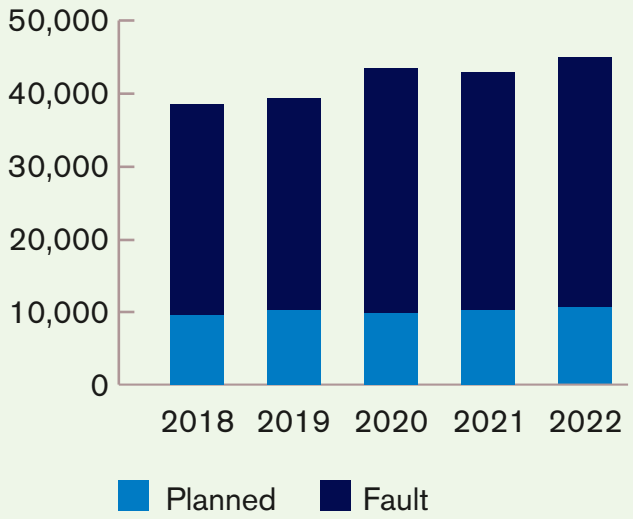


Annual Planned and Unplanned CI (excl. Storm Days)

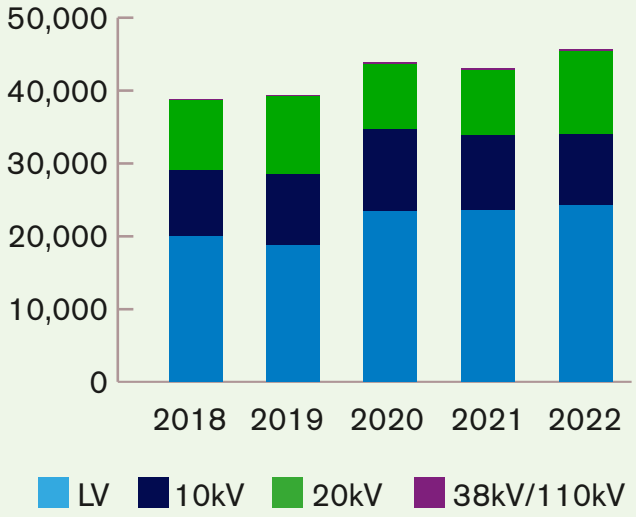


The highest volume of faults occurs at low voltage (LV), as typically an LV outage involves a single customer. The majority of our customers are connected at low voltage. Fewer faults occur at high voltage (HV) as there is resilience and redundancy built into the high voltage system. However, when HV faults do occur, they have a higher impact in terms of CI and CML as large volumes of customers are involved.

Total Number of Outages



Total Number of Outages by Voltage

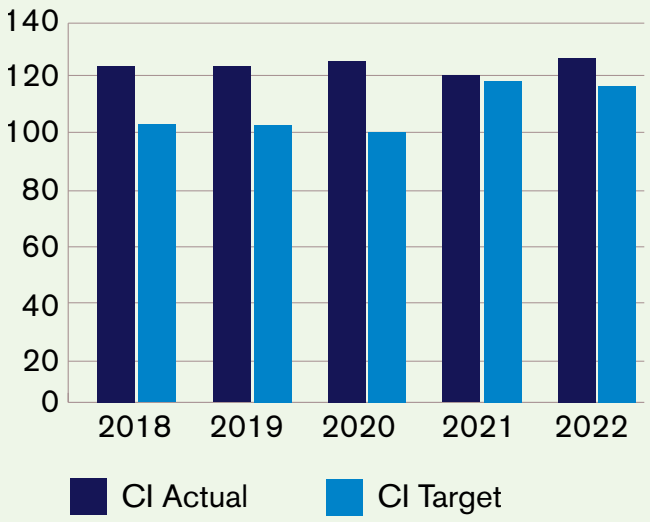


Unplanned Outage Performance

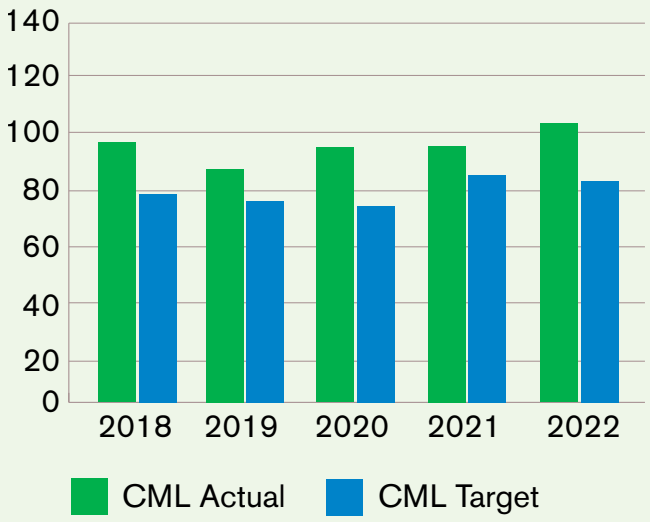
CRU sets incentivised targets for unplanned CML and CI (which exclude storm-related outages). In 2022, these targets were set at 82.9 CML and 116.9 CI. Our performance against these unplanned outage targets stood at 103.34 CML and 127.12 CI for 2022.

Unplanned (fault) outages inevitably occur on our network. The Irish electricity system has a high proportion of exposed overhead network relative to underground network; with a 6:1 ratio of km of overhead to underground network due to our dispersed rural population. Other European utilities have a significantly lower ratio; typically, >1:1. Reliability challenges include climate and environmental issues, third party interference, and low and grounded conductors.

Unplanned CI vs. CRU target

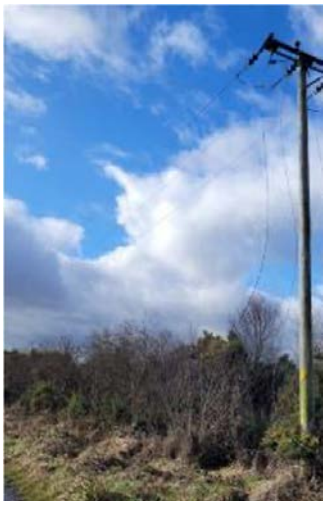


Unplanned CML vs. CRU target



Factors impacting 2022 Continuity Performance

- Due to the unique layout of our Network topography, where we have a significantly higher ratio of Overhead Lines to Underground Cables (OHL:UG) when compared to other European System Operators, timber continues to be a significant factor in continuity performance. During the Covid-19 pandemic we were unable to complete our timber cutting programmes, which has resulted in a backlog on our timber cutting which has increased the requirements for future years. This has been compounded by the increased vegetation growth in the interim period. There are also further issues in getting contractor resources due to the buoyant competitive employment market. To give our timber cutting programme an extra continuity focus we have prioritised the sections of network which feed Worst Served Customers or which are on the worst performing outlets. This ensures that this particular network is prioritised and cut as early as possible in the year. This was done to make the best use of the available timber cutting resource.
- There was increased localised storm activity in 2022, in particular lightning storms, which have increased in both volume and intensity. Research[1] states that lightning has increased by 43% due to climate change. This is borne out by the increased customers impacted by HV faults which resulted in a 42% increase from 2021 to 2022. In 2022, there was a further increase of 20% in weather events which had a high impact, but which were marginally below the threshold of a storm day.
- Two major storms (Storms Eunice and Franklin) hit the network in early 2022. This caused a knock-on effect in continuity post-storm with legacy timber and legacy storm damage causing interruptions. The only major storm in 2021 (Storm Barra) was in December and the post-effect of this would have been seen in the 2022 continuity data.
- When a member of the public reports an incident of a fallen or low wire, also known as a low and grounded conductor (LGC), to our NCCC, a risk assessment is carried out on receipt of such calls to determine if remote disconnection from our National Distribution Control Centre is warranted to ensure public safety. At the end of 2021, a revision to this policy was implemented which enhanced it to include Contact with Conductor (CWC). During 2022, we saw an increase in the number of LGC/CWC calls in to our NCCC resulting in an increase in the number of circuits being disconnected to ensure compliance with the policy and maintain public safety.



Third party damage causing grounded electricity line

Tree fall in mature forestry planation corridor

1 *Variation of lightning-ignited wildfire patterns under climate change | Nature Communications*

Measures being taken to improve continuity performance

- There was an ESB Networks reorganisation in 2022 to facilitate the ramp up of delivery to meet the ESB Networks Strategy, which will over time further improve reliability. To manage the scale of the undertaking there is a need for significant additional resources, including increased contractor usage which will grow over time. However, increasing contractors is currently challenging because of market conditions and utility competition.
- In particular, ESB Networks have setup a Resilient Network Section in 2023 to focus on the short term (reliability) and long term (resilience) of the electricity network. The focus of this team will be on a range of items affecting the reliability and resilience of the electricity network both now and into the future and consequently to minimise the impact to our customers. ESB Networks Strategy "Networks for Net Zero" has called out key strategic deliverables over the next seven years in order to meet our obligations to our customers and provide them with a pathway to Net Zero by 2040. The challenges facing ESB Networks (and many utility companies internationally) are:
  - Climate change and its effects on the electricity system including more frequent localised extreme weather events (flash flooding, lightning storms etc).
  - Climate change and its effects on physical asset degradation (salt corrosion appearing on inland steelwork).
  - Capacity challenge on the assets from our journey to Net Zero, which can have an impact on our maintenance programmes.
  - Constraints with contractor availability has led to backlogs in timber cutting which has impacted delivery on key continuity programmes. There is a review of our vegetation management strategy during 2023 which will give clarity on the mitigations required to ensure our customers are not adversely impacted into the future.
  - Making best use of ageing assets for our customers' future requirements.
- The process for work programme planning and assignment was restructured during 2022, which allows for the prioritisation of works that have the greatest continuity impact.
- As part of our overall continuity improvement program we have put a particular focus on our Worst Performing Outlets (WPO) on the MV network. We carry out continuity focused patrolling and remediation works on these outlets, and on the outlets completed we are seeing an average improvement of 65% in continuity performance. We intend to continue this WPO project for the duration of PR5.
- To facilitate the ramp of delivery of automation programmes, additional commissioners were trained in 2022. This programme, however, is being impeded by global supply issues which is a concern impacting every utility.
- Process improvements are ongoing to improve how potential LGCs/CWCs are managed to reduce the volume and their impact on network continuity.

Network Automation

There are various types of automation on the network used for protection and operations. Automated switching and protection devices known as 'reclosers' reduce the impact of transient faults on MV overhead network and enable Smart Grid options. SCADA (Supervisory Control and Data Acquisition) automated reclosers assist when fault hunting as they provide relay grade diagnostics and fault passage information to control room operators. They can be used as part of self-healing schemes or also as remotely operated sectionalising points for manual operation from the National Distribution Control Centre (NDCC). We are implementing the following PR5 automation programmes to improve network reliability and resilience:

Three Phase Reclosers

These devices reduce the impact of transient faults on MV overhead network and enable Smart Grid options. SCADA automated reclosers assist when fault hunting as they provide relay grade diagnostics and fault passage information to control room operators. They can be used as part of self-healing schemes or also as remotely operated sectionalising points for manual operation from the control room.

Single Phase Reclosers

Single phase Reclosers replace spur fuses. These devices benefit customers on long spurs to limit momentary reclosing interruptions to the customers supplied from that spur (60 to 200 customers typically), e.g., only the faulted spur customers experience momentary interruptions as opposed to customers on the entire feeder (typically 1,000 customers) as per advances in the available functionality of the technology.

This solution provides an enhanced customer experience as it minimises the number of customers impacted by transient overhead faults which account for more than 80% of all faults. This programme is aimed at single phase spurs greater than 10 km in length and with more than 20 transformers.

38kV Primary Substation Automation

At 38 kV when there is a line fault on average at least 5,000 customers are impacted. The majority of 38 kV outlets have circuit breakers, Automatic changeover of stations (ACO) and automatic open (OP) or automatic closing (CL) of breakers can be achieved by installing voltage sensing relays on these existing circuit breakers. This solution will provide for automatic supply restoration to suitable 38 kV stations thus improving reliability for customers.

Voltage Regulator Automation

Many voltage regulators are in remote locations on low population density rural outlets. By adding SCADA (Supervisory Control and Data Acquisition) control to these voltage regulators, the device can be remotely operated from the NDCC, thus reducing outage durations, and preventing spurious protection outages on long dispersed outlets during switching.

Remotely Controlled 38kV Switch

The automated device can be opened and closed remotely from NDCC In exposed locations with long circuit lengths, for example rural peninsulas, 38 kV manual switches will be replaced with remotely controlled 38 kV switches for more efficient fault isolation and supply restoration.

Urban MV Switch Automation

Urban MV switch automation is required to be able to quickly identify MV cable faults to minimise disruption to businesses and other critical supplies such as hospitals and urban customers. It will also provide fault location information to operators. Targeted remote control of ring main switches will be provided on the urban network with relay grade fault passage information.

38kv remotely controlled switch

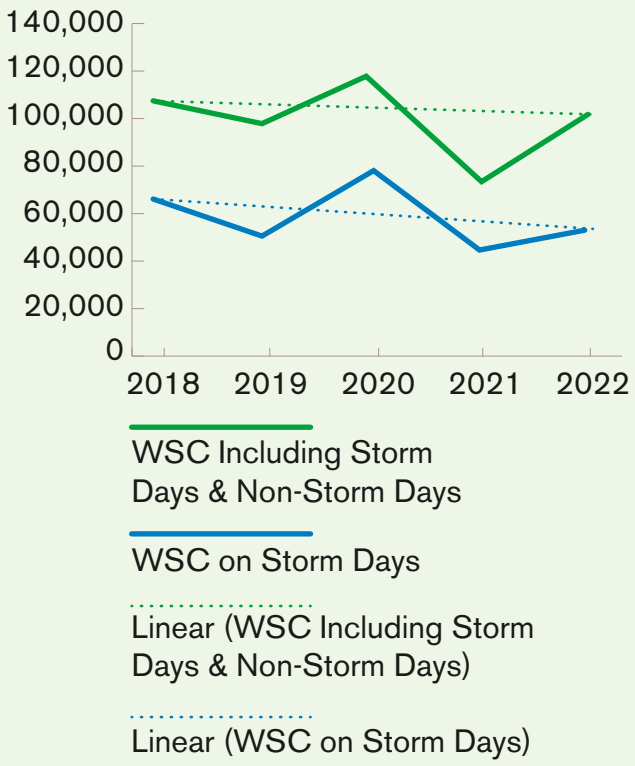
MV urban switch automation

Worst Served Customers

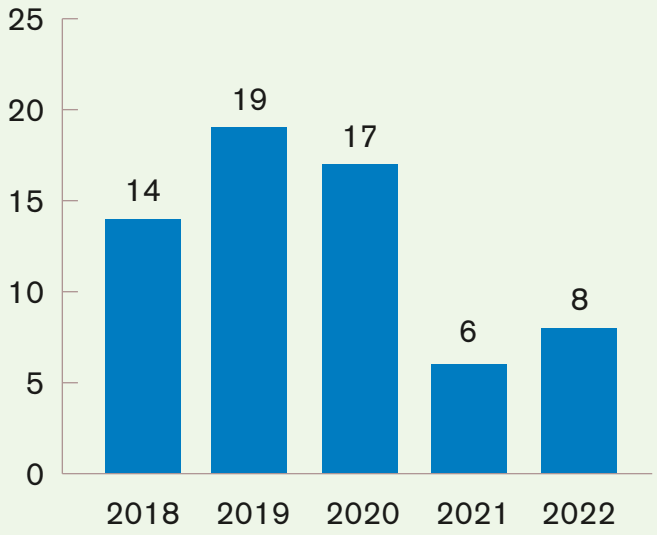
A worst served customer (WSC) is a customer that is supplied from rural overhead networks who experiences more than or equal to five interruptions in the previous 12 month period and more than or equal to 15 interruptions in the previous 3 years. The Worst Served Customer (WSC) incentive is based on customer interruptions (CI) per customer only. This incentive includes CI on both storm and non-storm days, (unlike the CI and CML incentive which exclude storm days).

The benefits of the PR4 investment programme continue to be realised in PR5 as evidenced by the reduction in PR5 WSC volume. Worst served customer is sensitive to weather events such as storms, as interruptions on storm days are included when calculating WSC population.

WSC Population Trend



Declared Storm Days per Year



In PR5 we are implementing an enhanced investment programme for WSCs to reduce the volume of outages these customers experience.

ESB Networks is committed to this programme, which is in line with our strategy to provide a reliable supply to all customers. Our commitment is demonstrated by the range of projects that will be undertaken across the country, examples of which are given in the table below.

WSC Interventions Summary

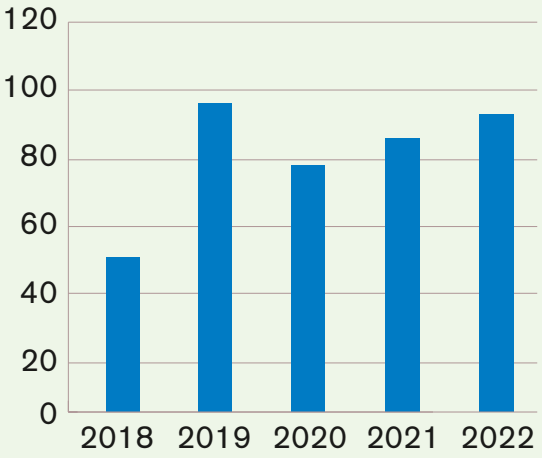
Intervention	Benefits
Single phase to three phase conversions	Less customers impacted by faults
Phase balancing	Prevents spurious tripping during switching and sectionalising for faults or planned work
Lightning arrestor installation	Reduces the impact of lightning in rocky, mountain locations and coastal locations prone to frequent lightning storms
Bird mitigation	Bird guards installed to prevent outages caused by bird strikes and swan deaths
Voltage regulator and IFT site automation	Installed in remote locations with worst served customers to prevent spurious outages during fault switching
Reducing span lengths, wider crossarms	Prevents nuisance frequent transient outages due to wires clashing together
WSC patrolling	Patrols to identify WSC interventions were completed

Planned Outage Performance

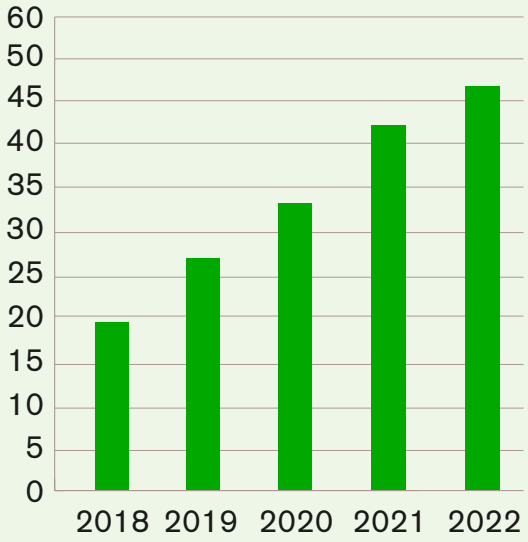
Every year ESB Networks also must carry out scheduled works such as planned work programmes and new connections, which result in planned outages to customers. The outage date and duration are notified to customers in advance. In 2022 new connections volume increased to 38,924 and 481,793 smart meters were installed. Planned CI are increasing more rapidly than planned CML due to increased outages on the LV network for these programmes.

For the remainder of PR5 there will be a ramp up of work to improve network reliably in line with agreed PR5 objectives.

Planned CML per Customer



Planned CI per 100 Customers



Resilient Network

ESB Networks' Resilient Network Strategy is underpinned by our Advanced Asset Management approach. By optimising and adapting our existing assets and by implementing innovations we are planning to deliver a network which meets climate challenges and provides a safer, more reliable and resilient network for our customers, with capacity to enable the transition to a clean electric future.

We are prioritising and delivering timely investments to maintain the health of our assets through targeted maintenance and asset replacement programmes. This is supported by an end-to-end asset management approach which is ISO 55001 accredited. This approach, as well as risk and data insights, helps us to manage our assets in a consistent way, to informs decisions, define interventions, and deliver targeted works to ensure we deliver a resilient Net Zero network.

HV Substations

The distribution system includes 563 high voltage (HV) stations. This is comprised of two 220 kV stations, 139 x 110 kV stations and 422 x 38 kV stations. To provide the best service to all of our customers, each substation's reliability is of utmost importance. Strategic maintenance/ replacement before deterioration or failure is key to providing uninterrupted supply to our customers and ensuring the integrity of the assets and that they remain safe for our staff and the public.

To allow effective delivery of the above programmes, there has been a particular focus on collaboration with our programme and construction teams to allow a more integrated Maintenance and Asset Replacement annual plan, whereby a range of different programmes are executed at the same time in a HV station. This approach, looks to maximise the level of work delivered, through an efficient use of resources and making maximum use of network outages. This approach was rolled out for Work Programme 2022 with scaled delivery into 2023 to meet wider strategic objectives of improving resilience, capacity, and operational flexibility.

In line with our PR5 submission focus on asset health and making data-driven decisions, there was a continued focus in 2022 on acquiring additional condition-based data for our assets. Building on work completed in 2021 on surveying our indoor rural stations, we have commenced reviewing outdoor concrete upright stations built in the mid-1950s and reviewed both their condition and capacity for upgrade. This provided an in-depth view of the asset health in these stations. A detailed risk profile is now being developed that will consider both asset health and criticality in determining how best to intervene with these stations over the remainder of PR5 and beyond.

In addition, a pilot was completed in 2022 to create digital collection and analysis of HV station inspection data, which is being considered for rollout in PR5

A particular focus has also centred on identifying key safety-critical programmes where there is a known plant defect/restriction that may impact staff or public safety, and ensuring all of these programmes are ready for delivery and effectively monitored.

In addition to our high-volume Maintenance and Asset Replacement programmes above, work is also well underway with addressing major asset replacement projects, typically involving the replacement of entire 38 kV Stations, many of which will deploy modular (containerised) solutions that allow for standardised 38 kV, Medium Voltage and Control Room solutions. These modules allow for faster, more consistent project delivery and commissioning timelines. Removal of these older stations will mitigate key safety and continuity issues associated with older, fault-prone legacy equipment.

Our PR5 goals also saw a particular focus on addressing more enduring risks presented to/by our assets, such as environmental and climate-related. To that end, an extensive environmental survey programme has been completed that is allowing a more targeted approach to implementing key environmental-related programmes, such as:

- Transformer Replacement
- In-Bund Oil Separators
- Bund Retrofitting

An increased focus has also been brought to bear on assessing stations that may have a higher flood risk in line with OPW data, to allow a more targeted approach to any longer-term flood mitigation measures for particular stations. Work is also underway in addressing stations where there is already a known flood risk via either primary measures (raising of equipment, drainage works) or secondary measures (e.g. bund retrofitting to mitigate consequences of any flood event).

Overhead Network

The overhead distribution electrical infrastructure in Ireland is made up of approximately 62,000 km of LV network, 84,000 km of MV network and 6,000 km of HV network. The fundamental components of this infrastructure are support structures (poles or steel towers), conductors, insulators, and electrical equipment for operational switching. The operating voltage will dictate the conductor and insulator type to be used and the support structures used are predominantly wooden poles.

Wooden poles account for over 98% of all overhead line support structures. network technicians climb these poles to operate and maintain the system, so the strength or "health" of these poles and the material and equipment supported is of the utmost importance.

2022 saw the continuation and expansion of the asset health project in overhead lines. Essential for these asset health data models is the data gathered both in terms of technical requirements and the ability to analyse and present the results. Collaboration between digital mobile tech experts and overhead line specialists has ensured mobile apps will soon become available across all voltages, facilitating targeted mitigation, asset health scoring, and planned future network renewal works, and will help to improve our network resilience.

There was a continued focus in 2022 on delivery of safety and continuity focused programmes such as:

› Public safety hazard patrols and rectification of identified hazards across all voltages.

› Continued delivery of the pole replacement programmes at MV.

› Ongoing refurbishment of the 38 kV overhead network.

› To further improve asset health, and thereby continuity, we have progressed our Triple Pole Switch (TPS) refurbishment programme.

Network resilience in overhead lines is directly related to the delivery of the asset replacement and maintenance programmes. These programmes are targeted and integrated (where possible) based on asset condition/load data. The database for our MV rural network is at quite an advanced stage of development and the process/programmes used to develop our MV rural database have been extended to our urban network at MV and LV in 2022. This management system allows us identify problems and plan to remove the asset before it fails – positively impacting on resilience.

Review of internal safety and fault monitoring databases resulted in targeted inspections on sections of overhead line with a view to reducing the likelihood of conductor failure.

Considerable progress in the future use of composite and concrete pole technology was made in 2022, with on-site trials completed. It is anticipated that these alternative technologies will provide improved resilience in areas exposed to harsh environmental conditions.

Timber cutting programmes have a significant impact on the resilience of our overhead network, and together with continued focus on delivery, there has been an improved audit programme and focus on quality of cut and compliance to standard.

Our worst performing outlets have been prioritised for targeted specialist technical patrols and follow-up remedial works programmes. This ensures resources are targeted and deployed to the locations most in need of investment.

Wildlife protection for overhead networks was also reviewed to minimise impact on wildlife and to improve network performance. Bird diverters on overhead conductors minimise outages and damage due to bird strikes and mitigation devices fitted to transformers also prevent customer outages.

Our focus will be on network resilience over the coming years on both the current challenges and the future challenges as defined in ESB Networks Strategy “Networks for Net Zero”. This will have an impact on how we manage, maintain, and plan for our future overhead networks.

Underground Network

There are approximately 180,000 low voltage (LV) minipillars on the distribution system. ESB Networks carry out public safety hazard patrols (PSPs) on approximately 42,000 minipillars per annum. We previously developed a new software application to capture minipillar data from such inspections. By the end of 2021, survey data for all registered minipillars was inputted into this system, meaning we now have full asset population patrol data. This enables ESB Networks to plan asset replacement and/or corrective maintenance on this significant asset base. This has resulted in the movement from paper-based patrol records to being more digital and data-driven in the lifecycle management of our LV minipillars.

There are approximately 23,000 Medium Voltage (MV) substations on the distribution system. ESB Networks also carry out PSPs on approximately 11,500 MV substations per annum. It was identified during our PR5 submission that further MV substation inspections were required to ensure the integrity of our substation structure and the MV and LV equipment inside the substation. We now have a 10 year MV substation inspection programme in place. In 2022, we successfully rolled out an inspection patrol app, business support guidelines on processing corrective orders, network technician/patroller training and put in place the necessary framework for MV unit substation shell and door replacements (a corrective item arising regularly during the patrols).

On our MV network we also continue to progress planned asset replacement programmes on our cast resin type MV unit substations. To replace these MV unit substations in urban environments is difficult, particularly where the space allowed for the existing substation is too small for our currently supplied standard MV unit substation. To ensure this important asset replacement programme progressed, ESB Networks secured several alternative MV unit substation types from our equipment suppliers. These slimline substation design types have been successfully deployed at sites where width, depth, and height space can be limited.

By the end of 2022, the cast resin type MV substation population was reduced down to approximately 1,250 units.

Metering Assets

Meter Asset Management sets the standard for meter installation, maintenance, and replacement of electricity meters across the residential and commercial network. ESB Networks own and maintain 2.4 million customer meters. In 2022, 481,793 smart meters were installed as part of the Smart Meter Project.

ESB Networks also carried out the replacements of low voltage (LV) meters, with 14,502 day/night meters exchanged. At medium voltage (MV) 370 meters were exchanged and at high voltage (HV) sites two meters were exchanged. Other key achievements in 2022 included the completion of 1,516 major meter tests and the installation of 850 Pay as You Go meters. In addition, Meter Assets delivered a MV metering solution for the modular electric vehicle substation trial which included power quality metering.

Network Reinforcement

Continued network reinforcement is of vital importance to the distribution system. ESB Networks have delivered and will continue to deliver large HV projects that facilitate economic growth, provide new connections, and improve security of supply for customers.

Important projects to improve resilience, increase capacity, and strengthen the network were completed in 2022. One 110 kV transformer was replaced, increasing capacity by 1.5 MVA, with 8 new 38 kV transformers installed, further increasing capacity by 48 MVA. This brings the total net additional transformer capacity added to the network to 49.5 MVA in 2022.

Net Increase in 110 kV and 38 kV Transformer capacity

Year	2018	2019	2020	2021	2022
110 kV (MVA)	177.5	303.5	63.0	220.0	1.5
38.0 kV (MVA)	750	34.0	27.8	5.0	48.0
Total (MVA)	**252.5**	**337.5**	**90.8**	**225.0**	**49.5**

Development of Load Indices

ESB Networks committed to develop a Load Indices (LI) approach, to manage and track changes in the peak loading at its High Voltage (HV) substations and to use this as another tool to prioritise reinforcement activities as part of PR5. The LI approach has now been developed and embedded into business as usual.

LIs are a network output measure to indicate substation and network utilisation, to manage and track changes in the peak loading at HV substations and to demonstrate the effectiveness of distribution reinforcement activities. This LI approach is now being used by ESB Networks, and the process applies to major HV network substations (i.e., 110 kV/38 kV, 110 kV/MV and 38 kV/MV)

As part of a technical consultancy to implement the LI approach, ESB Networks sought specialist support from EA Technology to recommend an LI framework for collating information on the utilisation of relevant electricity distribution network assets (specifically HV substation transformers) and for tracking changes in their utilisation over time. EA Technology examined the use of LI frameworks internationally, such as those established by the electricity regulator in Great Britain, and recommended an LI banding which reflected the specific characteristics of the electricity distribution system and planning practices in Ireland.

ESB Networks also carried out research on LIs and engaged with two UK Distribution Network Operators to understand their LI collation approach and the practicalities of its implementation. Relevant documents to Load Indices published on the ESB Networks website include 'Load Indices Guide' and 'Non-wires alternatives to Network Development'.

Load Indices Definition

The LI measures the loading level of station HV transformers against the firm capacity of those assets, using loading levels (percentage of firm capacity) and duration (hours/year) metrics. A scale of 1 to 5 is used, with 5 representing a heavily loaded asset and 1 a lower loaded asset. Whilst LIs are typically calculated on an annual basis, the tracking of LI changes over time can also provide a useful overview of asset loading status. For example, a rising LI indicates growing load and higher loading of assets. The outcomes can be used to provide an overview of network performance and be used to assist in prioritisation of investments or targeting of specific projects for delivery.

The definition of the different categories of LIs applicable to ESB Networks are in accordance with the table below.

LI ranking	Definition
LI1	Significant spare capacity
LI2	Adequate spare capacity
LI3	Highly utilised
LI4	Fully utilised, mitigation requires consideration
LI5	Fully utilised, mitigation required

We have set out the results for Load Indices over the past five years.

Number of substations in each category

LI rank	2017	2018	2019	2020	2021
LI1	333	340	325	277	336
LI2	103	89	102	123	100
LI3	39	33	26	37	25
LI4	25	34	46	62	47
LI5	65	73	69	68	59

The reporting of the Load Indices to the regulator has been implemented in ESB Networks since 2020, although the methodology was developed in 2018. During the technical consultancy with EA Technology a rapid assessment was carried out which provided LI results for 2016/2017 and 2017/2018 and a full comprehensive assessment was completed from 2018/19 onwards.

The table above indicates how projects planned in substations during a PR period can assist with increasing the capacity of a station. The LI report can be uses as an internal metric to manage and track changes in the peak loading of our stations. A high or rising level of Load Index would indicate the network may be heavily loaded whereas a low or falling Load Index would suggest that better asset management is occurring, or that extra capacity has been added to reinforce the network.

Looking at 2021, the table above indicates that due to planned works the number of substations categorised as LI5 have reduced when compared to 2020, this is due to uprating existing assets to create extra capacity to reinforce the network. The need to reinforce substations by increasing capacity can be driven by demand connections and renewable connections.

Next Steps to Further Enhance Load Indices During PR5

- ESBN will review the Load Indices methodology with the view to enhance the methodology of reporting on transformer loading.
- Results from the LI Report and outputs will be used to inform business plans and prioritise reinforcement projects.
- Review the LI process to assess if and where automation could be introduced into the process.

New Material Introduction

Traditionally ESB Networks have purchased most of our equipment and materials on medium term supplier frameworks, giving us stability in the materials and equipment being installed on the electricity network and consistency for our construction and operation teams. To meet the required pace of expansion of our network and maintain service levels, ESB Networks now have a wider range of asset development/acquisition approaches and more rapid introduction of new and innovative technologies. To expedite and manage this process safely and efficiently, we established a New Material Introduction process to bring new material from the research/investigation phase through to Business as Usual; the new process engages the key stakeholders at the correct time to expedite the introduction of new and innovative materials onto our electricity network.

Development of Asset Health Indices

ESB Networks are committed to developing a data driven approach to asset management and are developing asset health indices for its DSO assets during PR5 (2021-2025). To ensure best practice, the asset health indices models will be developed using a Common Network Asset Indices Methodology (CNAIM) ensuring alignment with other DSOs internationally, in particular those in the UK. The programme of work to create them is progressing well and models are being developed for all asset classes. These will provide insight into the health of our individual assets and support our prioritisation of asset replacement work programmes in these areas. As well as developing the models, ESB Networks is going to engage external consultancy support to validate the approach being used by ESB Networks and to provide recommendations to improve it where appropriate.

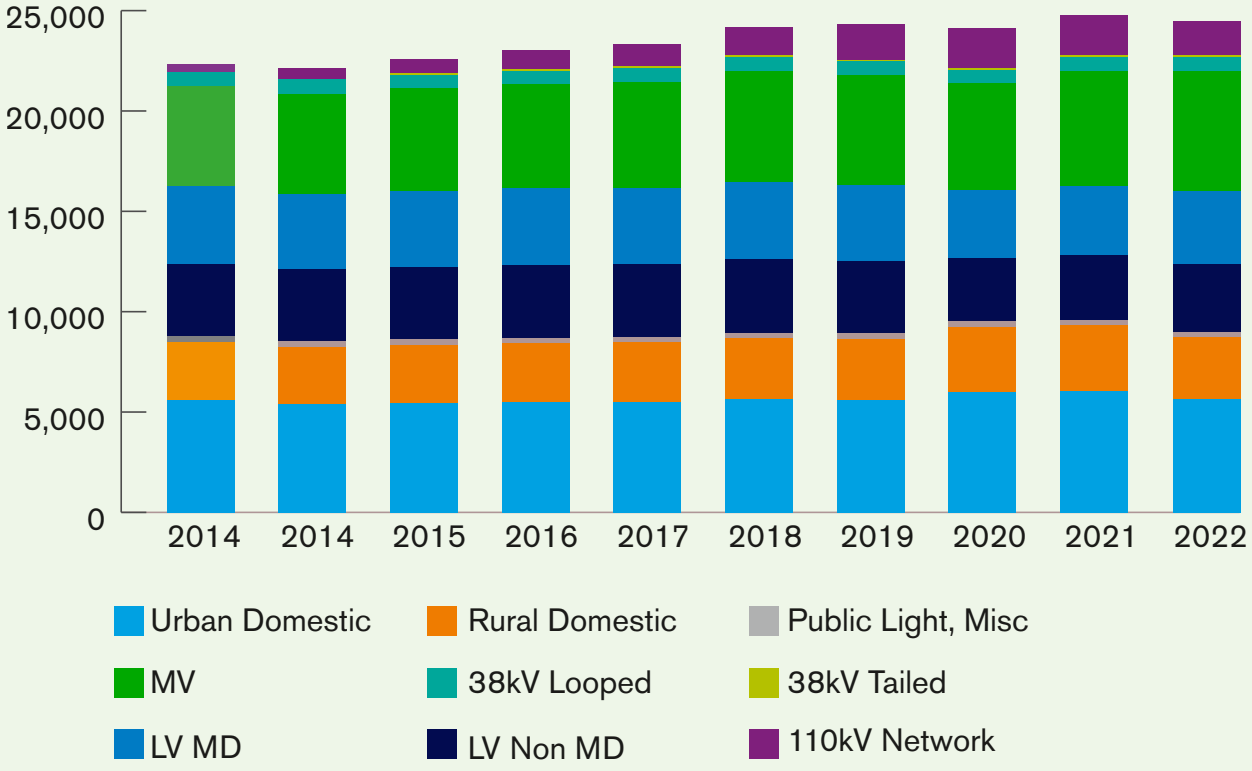
3

New Connections and Growth

3. New Connections and Growth

Efficient and economic connections are vital for our customers. We consistently strive to reduce the time from request to connection. Our focus is to enhance customer relationships through the design of a better experience, turning Common Field Service Challenges into Customer Engagement Opportunities, increasing efficiencies to reduce the time from application to connection, and the proactive provision of timely information to our customers.

Electricity Consumption (GWh)



New Demand Connections

In 2022, we completed 38,924 new demand connections, comprised of 8,488 single domestic dwellings, 15,541 housing scheme connections, 9,785 apartments, 3,142 businesses, and 1,968 unmetered connections. This was an overall increase of 32% on the volume of completed connections in 2021.

There was an overall increase of 36% in the combined total of apartments, housing schemes and single domestic connections nationally in 2022. Apartments were up 74% in 2022 and there was a 39% increase in the volume of housing schemes connected.

Completed Connections	2021	2022	% Difference 2022 v 2021
Apartments	5,619	9,785	74%
Housing Schemes	11,167	15,541	39%
Single Domestic	8,082	8,489	5%
Business	2,870	3,142	9%
Business Unmetered	1,814	1,968	8%
Total	**29,552**	**38,925**	**32%**

Terminations and De-energisations	2018	2019	2020	2021	2022
Connection points terminated[1]	13,215	14,303	18,092	16,399	15,293
Connection points de-energised[2]	5,054	5,267	1,645	1,069	3,026

1 *Terminated: This includes connection points in vacant premises that have been terminated following previous de-energisation and de-registration, it also includes MPRN's associated with housing scheme quotations that have not progressed.*
2 *De-energised: for non-payment only.*

Connected Renewables and Energy Storage

ESB Networks' mission is to play a leading role in Ireland's transition to a low-carbon economy and to provide secure, sustainable, reliable electricity in an affordable manner for all customers. With the government's Climate Action Plan having ambitious targets for increased penetration of renewable energy by 2030, ESB Networks have continued our key role of connecting renewable generation to our network to help decarbonise electricity.

2022 was a record year for the Renewables team of ESB Networks, having connected more renewables to the network than ever before: 688 MW of wind, solar and CHP were connected. At the end of 2022, ESB Networks had enabled the connection of 5,378 MW of renewable energy: 4,621 MW of wind energy generation and 361 MW of grid-scale solar. 2,529 MW are connected at Distribution (DSO) level and 2,849 MW connected at Transmission (TSO) level (see tables below). In addition, ESB Networks conducted scoping, design, and construction works associated with the pipeline of customer projects for connections throughout 2022 and 2023. Many of these customer projects are participants in RESS 1 & RESS 2, the Government Renewable Energy Support Scheme.

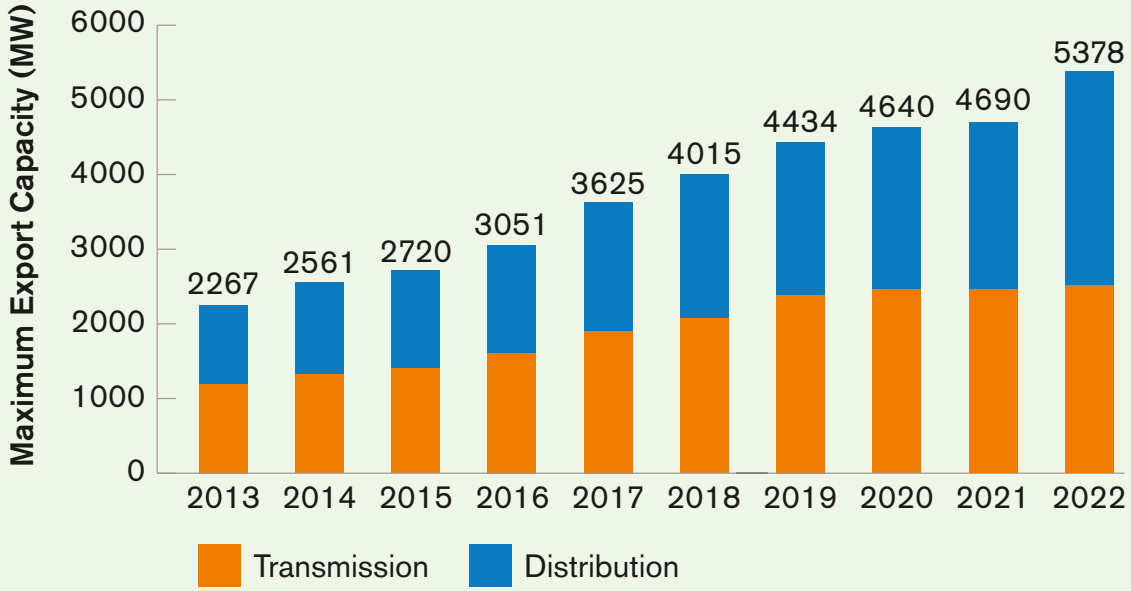
Utility Scale renewable energy (MEC) connected to the electricity distribution system in 2022

	DSO MEC (MW)	DSO number of projects
Wind	34.48	4
Solar	51.51	8
Other	0.11	1
Total renewable	86.11	13
Energy storage	46	2

2022 Year End – Total RES and Energy Storage Connected to the Distribution System

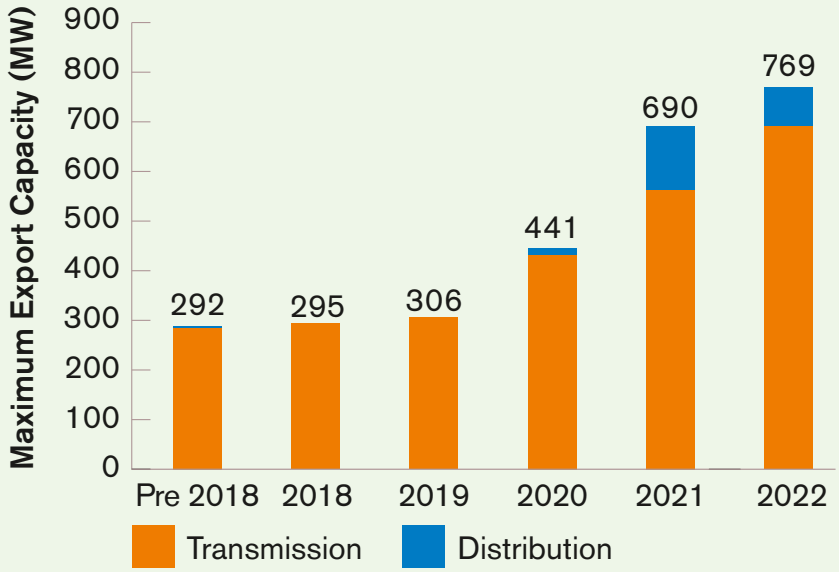
	DSO MEC (MW)
Wind	2293
Hybrid	22
Solar	52
Other	162
Total Renewable Energy Source (RES)	2529
Energy Storage	74.7

Renewable energy (MEC) connected to the electricity system (2013- 2022)
Total Connected Renewables



ESB Networks connected four large energy storage projects for TSO and DSO customers in 2022 totaling 79 MW, resulting in a total energy (battery and pumped hydro) storage capacity of 769 MW on the network by the end of 2022 (see graph below). Two of these are distribution system connections and two are transmission system connections. Energy storage provides system support services to the electricity system operators to enable increased penetration of renewable energy on the grid.

Energy Storage (MEC) connected to the electricity system
Connected Energy Storage



Enduring Connection Policy (ECP-2.2)

ESB Networks successfully completed the processing of over 50% of the Enduring Connection Policy 2.2 (ECP-2.2) generator applications in 2022, with the remaining scheduled to be completed by April 2023. The Lean process was introduced for ECP-2.2 where projects were first scoped before offers were issued. This increased the period for issuing offers but reduces the overall timeframe to connect customers. The accuracy of the customer offer was enhanced, giving customers more accurate costs, and avoiding potential modifications and re-work post offer acceptance.

The application window first opened for the ECP-2.2 batch in September 2021, and applicants included a mix of wind, solar, hybrid, and OCGT projects. ESB Networks processed a total of 86 applications throughout 2022, leading to 51 offers issued in 2022 and early 2023. We also carried out extensive customer engagement across the period, with over 90 customer meetings taking place to agree the customer connection methods. As part of the ECP process, customers had the option to proceed with their full MEC and the associated network reinforcements, reduce MEC in order to avoid uprate works, where possible, or withdraw from the process for a partial application fee refund.

The option to re-optimise available capacity proved very successful in allowing projects to remain in the process which otherwise might have been withdrawn or requested to modify in the future. The ECP-2.2 applications were processed in time for the upcoming RESS 3 auction qualification process due to take place in May and June 2023, and included a mix of wind, solar, hybrid and OCGT applications. The aim will be for these projects to proceed with a RESS 3 contract or Corporate Power Purchase Agreement (CPPA) and start contributing to the CAP23 renewable electricity targets of 80% by 2030.

For ECP-2.2, the Stage 1 customer engagement took place between February 2022 and March 2022 in advance of the application fee balance requirement. Customer calls were scheduled for approximately 14 nodes, where significant uprates were identified. Further to the Stage 1 customer engagement, 21 ECP-2.2 applications were withdrawn.

The Stage 2 customer engagement took place between June 2022 and February 2023, following the technical assessment of the applicant's connection method by the RES & Customer Flexibility team.

These meetings consisted of:

- **Outlining the connection method at a high level**
- **Estimating costs associated with connection**
- **Discussing whether the possibility of MEC reduction to avoid certain uprates was available**
- **Offering the option to withdraw ECP-2.2 applications and receive a 75% application fee refund.**

There were 65 Stage 2 customer engagement meetings, with some applications requiring more than one meeting. In total, 13 applications availed of the option to withdraw their application post-Stage 2 customer engagement. For the customers who indicated that they wanted to proceed with their application, the connection offer documentation was prepared and issued to each customer.

ECP- 2.2 Connection Offers Profile

Technology	Connection Offers	MW
Wind	11	114
Solar	37	353
Hybrid	2	10
OCGT	1	2
Total	51	479

In preparation for the opening of the ECP-2.3 application window in September 2022, ESB Networks hosted a webinar in July 2022, followed by a two day customer clinic event in August 2022. The event was open to all ECP-2 categories and provided customers with the opportunity to discuss their prospective ECP-2.3 project with ESB Networks. It gave customers a very early-stage indication of the works that may be required at a particular node. 14 meetings took place over the two days covering 26 projects.

Microgeneration

ESB Networks is committed to facilitating increasing levels of Microgeneration connections to the distribution network. Customers who wish to install Microgeneration and export excess electricity onto the electricity network are referred to as prosumers. As the DSO, ESB Networks have an important role to play in facilitating this transformation. We aim to support our customers along each stage of the process as they adopt small-scale low-carbon technologies and make the transition towards being active participants in the energy system. With the support of Robotic Process Automation (RPA) tools our teams are processing over 300 applications per week with no backlog or delays. In total 17,624 applications were successfully processed in 2022, which was an increase of 229% from the previous year. By the end of 2022, ESB Networks has facilitated over 45,409 Microgeneration connection applications to the electricity network providing approximately 170 MW of green energy. These connections are in addition to the renewable energy figures shown above.

Customers should inform ESB Networks in advance of installing Microgeneration through completion of a NC6 form. For further information, please see the Microgeneration section of the ESB Networks website: www.esbnetworks.ie/new-connections/generator-connections-group/micro-generators-

Mini-Generation

In December 2021, ESB Networks announced the launch of its new simplified Mini-Generation application process for larger customers generating up to 50 kW (e.g., farms, business properties, community buildings, etc). This equates to, for example, between 18 and 150 typical solar panels. (See: Mini-Generation on esbnetworks.ie for more details).

The new Mini-Generation process was initially launched on a pilot basis in line with Ireland's 2030 Climate Action Plan. Feedback and learnings from the pilot will be used to inform the enduring process. The new streamlined process ensures that it is even simpler for our customers who generate their own renewable electricity to export their excess electricity to the local network and therefore play a more active part in connecting Ireland to a clean electric future. Shortly after the launch by ESB Networks of the Mini-Generation pilot, the Irish Government also introduced the Microgeneration Support Scheme (MSS) and Clean Export Guarantee (CEG) which enables these customers to be remunerated for exporting their excess electricity.

Key points from Mini-Generation connections pilot

- **Streamlined process for customers exporting up to 50 kW**
- **21 MW of renewable generation**
- **Dedicated webpage and support team**
- **Connection offers issued to over 350 applicants in 2022, enabling them to complete their installations (over 40 fully installed and registered by the end of 2022)**
- **Pilot extended and still accepting applications**
- **Review underway aimed at transition to an enduring solution in 2023**

Finally, as part of this streamlined connections application process, we will prioritise customers who apply for an MEC in the smart meter rollout, removing the requirement for them to install a non-smart import/export meter, reducing costs and unnecessary waste.

For further information, please see the Mini-Generation section of the ESB Networks website: www.esbnetworks.ie/new-connections/generator-connections-group/mini-generation

Small Scale Generation

On 30th September 2022 ESB Networks launched its new simplified Small Scale Generation (SSG) application process for larger sites generating up to 200 kW. The new process was initially launched on a pilot basis in line with Ireland's 2030 Climate Action Plan. Feedback and learnings from the pilot will be used to inform the enduring process.

The new streamlined process will make it easier for our customers to export their excess electricity to the local network. It is expected that the Irish Government will introduce a SSG Support Scheme in 2023 to enable these customers to be remunerated for exporting their excess electricity.

Key points from the Small Scale Generation connections pilot

- **Streamlined process for customers exporting up to 200 kW**
- **100 application pilot with 60 applications received in 2022 and now in process with connection offers due to commence issuing in early 2023**
- **15 MW of renewable generation expected to be enabled**
- **Dedicated webpage and support team**
- **Ongoing review including extensive interaction with stakeholders**
- **Review underway aimed at transition to an enduring solution in 2023**

For further information, please see the Small Scale Generation section of the ESB Networks website: Small Scale Generation (esbnetworks.ie).

National Network, Local Connections Programme

The core objective of the National Network, Local Connections Programme (NN, LCP) is to bring together changes in how we are generating electricity, and how we are using it, enabling all electricity customers and communities to play an active role in climate action, by using or storing renewable electricity when it is available to them locally.

Phase Two plans

Phase Two of the NN, LCP was launched in 2022 following regulatory approval from the Commission for Regulation of Utilities (CRU), with design activities progressing alongside the development, testing, and deployment of the first demand side flexibility pilot, which was planned and delivered in Q4 2022.

Engagement

NN, LCP's engagement with our stakeholders also evolved in 2022 with the establishment of our NN, LCP Advisory Council to ensure that our stakeholders have early and ongoing opportunity to shape the direction of the programme. Expressions of interest were sought from interested parties to join our Advisory Council which now has an established membership and terms of reference governing the group. The NN, LCP Advisory Council convened three meetings in June, September, and December 2022.

Energy crisis and acceleration of measures

Following the onset of the European energy crisis brought about by the Russian invasion of Ukraine, there was a heightened risk that the supply of power may not be able to keep pace with demand, particularly during the winter months of 2022. Following extensive engagement with both CRU and the Department of Environment, Climate and Communications, the NN, LCP was tasked with accelerating a number of measures with the goal of minimising the risk of energy disruption to our customers, particularly during periods of peak demand.

Following engagement with our stakeholders in Q3 2022, the NN, LCP launched 'Beat the Peak' in Q4 2022, which is an umbrella initiative comprised of eight targeted measures to help customers take control of their electricity use and reduce electricity demand at times of peak events. The introduction of the 'Beat the Peak' suite of initiatives continues to play an important role in the government's 'Reduce Your Use' campaign.

Power system studies were a key activity in defining the technical parameters of flexibility products going to market in 2022 and 2023. The methodologies and analytical processes developed are foundational to the work which we will progress with in 2023. The programme will continue to introduce flexibility through collaborative pilot rollouts of new products which will be adapted and scaled over time.

Distribution Losses

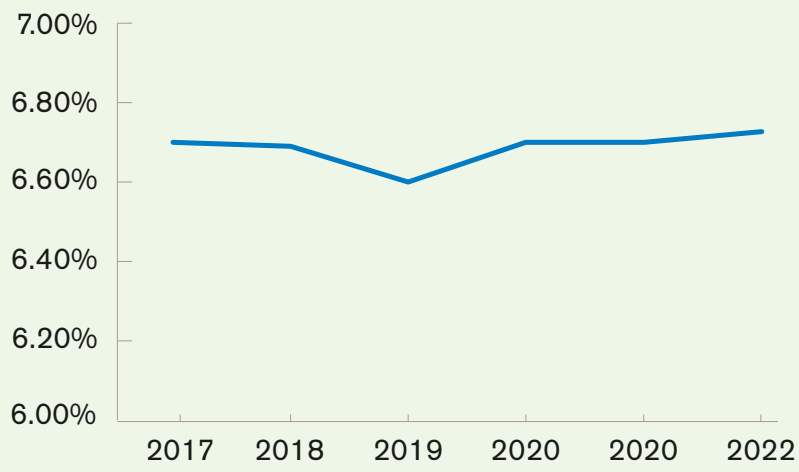
Electricity losses are inherent losses within an electrical system. In 2022, approximately 6.74% of the energy that was put into the distribution system was accounted for as losses, similar to the -6.7% seen in 2021.

Losses are comprised of 'technical' and 'non-technical' losses. Technical losses are heat losses arising from the passage of electricity through lines, cables, and transformers. Technical losses depend on the volume of electricity flowing in the system and the characteristics of the lines, cables, and transformers. Non-technical losses on the other hand are electricity units which are unaccounted for, for example as a result of theft arising from unauthorised connections.

Factors that affect the % of electricity lost include:

- **The proportion of electricity that is distributed at the various voltage levels**
  - Electricity distributed to customers connected at higher voltages incurs less system losses than electricity connected at lower voltages.
- **Utilisation of assets**
  - If the loading of transformers, lines and cables increases, losses will also increase. As networks are naturally reinforced, this will normally result in a reduction in losses.

Distribution Losses



- **Operating voltage of lines and cables**
  - The higher the operating voltage of lines and cables, the lower the losses for a given electricity throughput.
- **Generator connection**
  - As more generation is connected to the distribution network there is an impact on losses. There are additional losses on the connecting lines and cables to wind farms and other large generation sites. Some losses may be avoided due to supply of electricity locally displacing electricity supplied via the transmission system, particularly for generation connected at low voltage, e.g., photovoltaic generation.
- **Unauthorised connections/metering tampering etc.**
  - The propensity for unauthorised connections and meter tampering in the customer base and the effectiveness of measures to reduce it.

4 Environment

4. Environment

ESB Networks are dedicated to conducting our business in a way that prioritises our environmental and sustainability performance and reflects our commitment to responsible management of these impacts. We strive to prevent pollution and safeguard the natural environment to the best of our ability.

To learn more about our approach, please refer to ESB Networks' Policy Statement on the Environment.

ESB Networks' Net Zero Strategy aims to reduce carbon emissions through the adoption of renewable energy, electric vehicles, and smart technologies, while also promoting sustainable practices across its operations.

During 2022, ESB Networks achieved the following.

- **We continued to respond to fluid-filled cable leakage in line with protocols agreed with local authorities, and reduced our overall leakage to achieve our target.**
- **We maintained external certification of our Environmental Management System (EMS) to the international standard ISO 14001, following a full recertification audit.**
- **Through 2022, ESB Networks have been advancing plans with regard to advocating a 'nature positive' approach to our operations and projects. ESB Networks have continued to progress with our review of biodiversity during the year.**

Energy Usage – Buildings and Fleet

Compared to 2021, electricity usage in buildings was down 6.8%. However, the carbon intensity of electricity increased per kWh, meaning a higher overall carbon emission associated with our buildings. In 2022, office occupancy increased, but was still affected by measures to address the Covid-19 pandemic

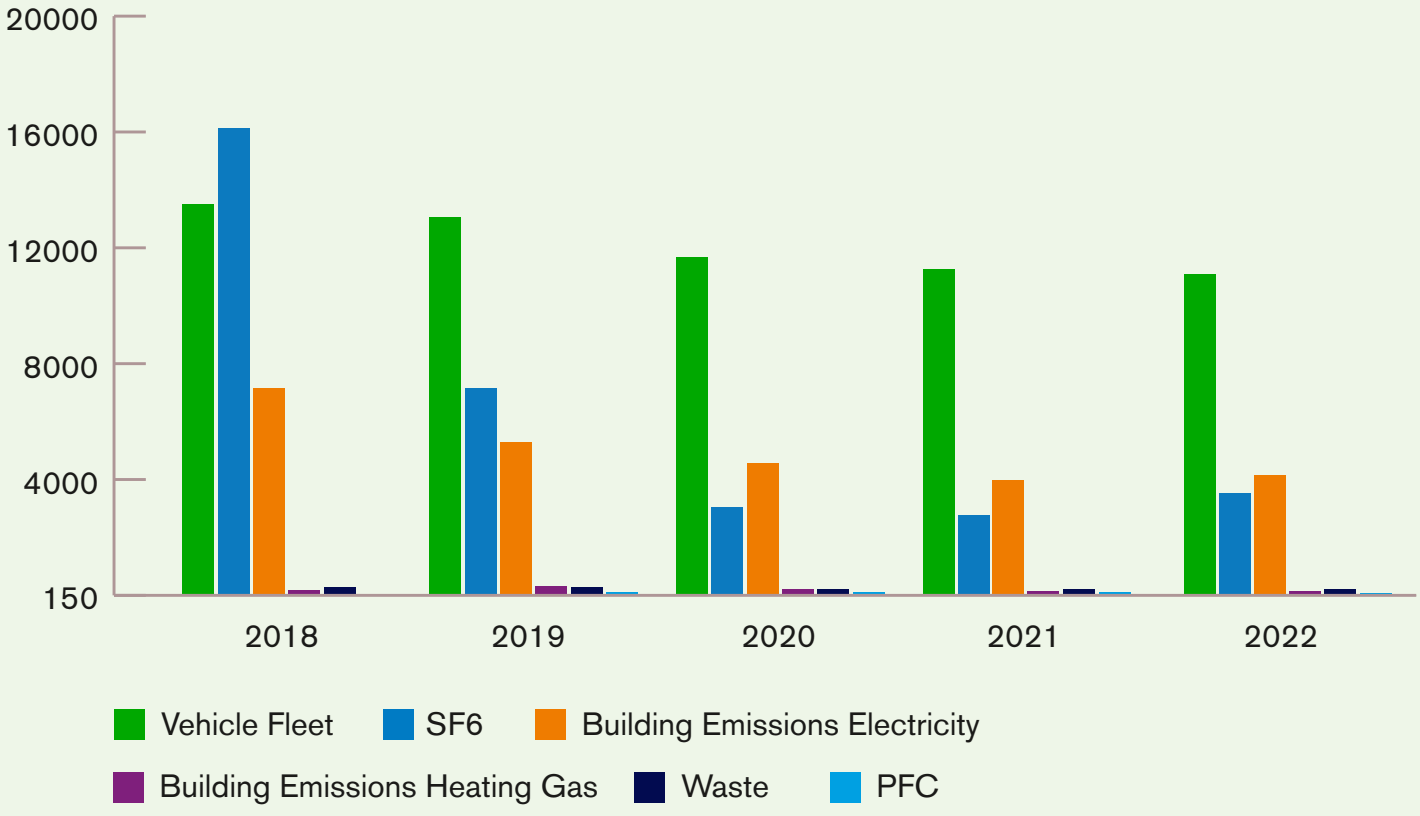
Vehicle fleet fuel consumption was lower by 2.2% in 2022 than 2021. This reduction is attributable to newer and more efficient vehicles being brought onto the fleet, and an expansion of our electric vehicle fleet. In 2022, there were several pilots around introducing more electric vehicles to the fleet. These involved bespoke vehicle fit-outs to maximise space, home charging trials, and fast charger trials at ESB Networks Depots.

Overall CO2 Emissions

Description	2018	2019	2020	2021	2022	2022v 2021 Tonnes CO2 (%)
Vehicle Fleet	13,526	13,088	11,700	11,309	11,057	-2.2%
SF6	16,130	7,225	3,145	2,880	3,790	31.6%
Building Emissions - Electricity	7,240	5,380	4,647	4,062	4,452	9.6%
Building Emissions - Heating Gas	166	292	180	136	105	-22.7
Waste	254	256	206	182	182	0%
PFC2	38	38	2.9	3.4	3.3	-3%
Rounded Total	**37,354**	**26,279**	**19,881**	**18,572**	**19,484**	**4.9%**

Note: Overall CO2 equivalent figures compiled using relevant DEFRA and SEAI CO2 conversion factors

CO2 Emissions



PFC is perfluorocarbon gas emitted as part of the fluid-filled cables leakage detection process.

SF6 Gas Management

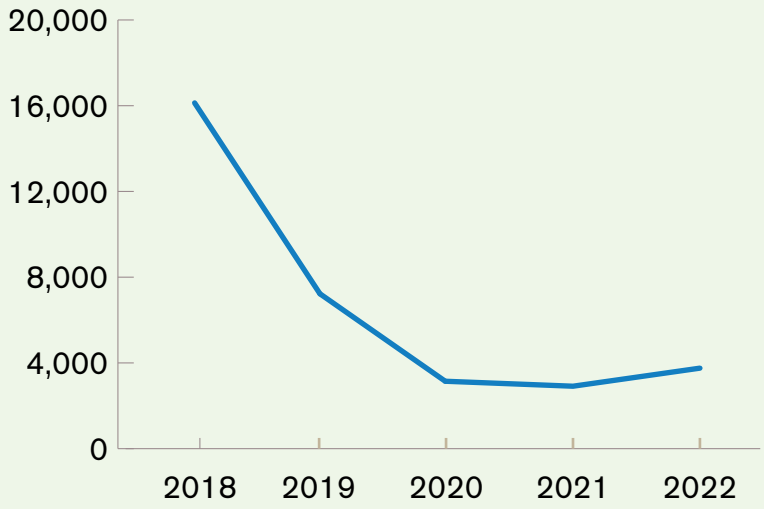
Sulphur hexafluoride (SF6) is used in a significant portion of ESB Networks' high voltage switchgear assets on the transmission and distribution networks.

It is used because of its very high electrical insulating properties, which facilitate efficient and safe operation of the switchgear. Emissions rates for SF6 gas are reported to the Environmental Protection Agency (EPA) on an annual basis in line with Regulation (EC) No 166/2006.

In 2022, 166.23 kg of SF6 was emitted due to equipment faults on distribution and transmission switchgear. Overall emissions from both distribution and transmission switchgear represented 0.08% of the total installed inventory of SF6. The comparable 2021 leak quantity was 126.3 kg, representing 0.06% of inventory. These leakage rates compare favourably with other European utilities.

As we replace and repair our older switchgear, we can see an overall downward trajectory of SF6 emissions which is shown in the following graph:

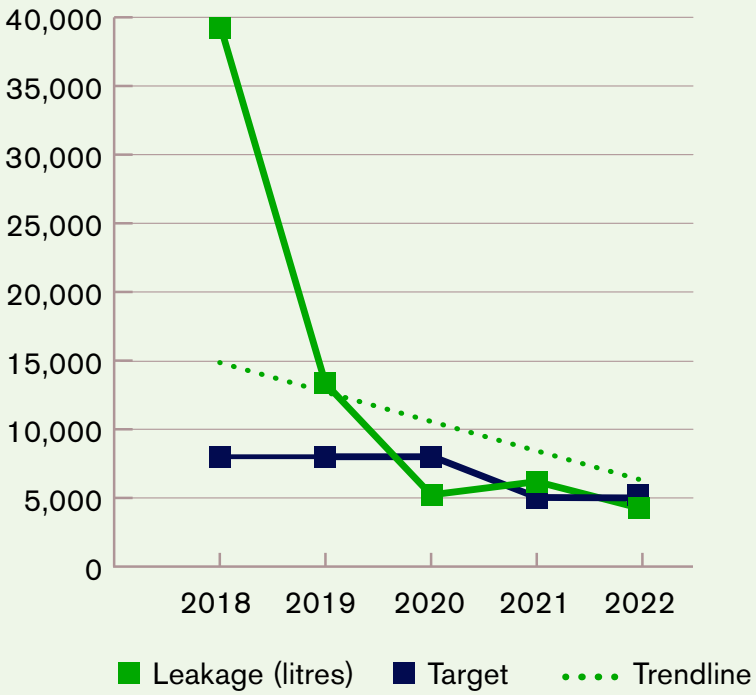
SF6 Gas - Tonnes CO2 Equivalent



Fluid-Filled Cables

ESB Networks respons to each leak and continuously works to reduce our annual leakage by improving upon leak identification and repair times, and by progressing our Fluid-Filled Cable (FFC) replacement programme.

Fluid Filled Cables Leakage Trends



Cables replaced in 2022

Two distribution circuits had local authority-notifiable leaks in 2022, with one distribution cable leak repaired. You will find details on our repairs on our website.

ESB Networks' company standard, "Management of Fluid- Filled Cables", set a maximum cable leakage volume of 5,000 litres per annum. During 2022, 4,917 litres of cable insulating fluid leaked from ESB Networks' high voltage cable network. This is a decrease of 1,364 litres on the 2021 fluid leakage figure of 6,281 litres.

Waste Management

ESB Networks are dedicated to sustainability and views effective waste management as a crucial environmental objective in line with our strategy. During 2022, we put in place a new wood pole waste management contract and carried out improvements to waste management at depots, stores, HV stations, and sites across the country.

Additionally, ESB Networks maintain Memorandums of Understanding with Dublin City Council, South Dublin City Council, and Dun Laoghaire-Rathdown County Council to address illegal dumping of waste, litter, and graffiti at unoccupied ESB Networks facilities.

Environmental Management System

Since 2010, ESB Networks have been using an Environmental Management System (EMS) that has been certified to the ISO 14001 standard, enabling the company to identify, evaluate, prioritise, and manage environmental risks associated with our operations. The EMS covers all of ESB Networks' activities and services related to managing the electricity network on behalf of ESB Networks, and the EMS maintained its ISO 14001 certification after a full recertification audit at the end of 2022.

Managing the Environment During Construction

We strive to enhance our project planning and consent procedures while prioritizing timely and cost-effective project delivery that benefits both the environment and our customers.

During the planning phase, our expert technical teams collaborate to devise site-specific construction techniques that preserve delicate ecosystems while still providing reliable connections to our customers. To ensure compliance with planning consent regulations, our external contractors receive comprehensive construction packs that outline all of the necessary requirements. Document review processes are critical to supporting project delivery, including the creation of construction environment management plans, traffic management plans, and waste management plans.

Our team of specialists, including project ecologists, ecological clerks of works, and project archaeologists, monitor construction activities to ensure adherence to environmental and planning permission requirements.

In 2022, ESB Networks shared information with Waste Enforcement Regional Lead Authorities (WERLA) regarding our construction projects that could generate construction and demolition wastes. WERLA is responsible for managing construction and demolition waste on a national level.

Biodiversity

ESB Networks understand the significance of biodiversity in the Irish environment and strives to manage our activities sustainably with respect to biodiversity. The company recognises the need to identify and address potential impacts on biodiversity by avoiding or minimising them and, where feasible, enhancing biodiversity.

We engage regularly on various matters related to biodiversity, such as Appropriate Assessment screening, invasive species response and management, and the implementation of appropriate mitigation measures.

As a prominent partner in the second All-Ireland Pollinator Plan for 2021-2025, ESB Networks are committed to adopting more pollinator-friendly landscape management practices that are compatible with safety, business operations, and property management requirements within our property portfolio.

5 Safety

5. Safety

Our purpose in ESB Networks has always been to connect and distribute electricity - safely, securely and affordably.

The safety health, and wellbeing of our staff and contractors, as well as the communities and customers we serve, continues to be a core strategic priority and area of focus. Our safety strategy sets out our strategic intent and commitment to how we keep our network safe, and how we raise awareness about the importance of safety, health, and wellbeing among our staff and contractors, as well as the dangers of coming into contact with, or close proximity to, our electricity networks and equipment for the general public. We continued to make improvements across the key areas of compliance, engagement and communications, safety culture transformation, road safety, and public safety, while all the time ensuring the provision of essential services to the communities we serve.

External Validation of Safety Management System

In keeping with our aim to continuously improve and develop our capability and performance levels in safety, health, and wellbeing, ESB Networks successfully retained its certification to the international ISO 45001 Occupational Health and Safety Management System standard. The National Standards Authority of Ireland (NSAI) recognised the continued effort and commitment that is required to continuously drive safety improvements.

Safe and Sound – Safety Culture Transformation Programme

During 2022, through our internal Safe & Sound programme we continued with our commitment to creating and embedding a positive, proactive, and engaging workplace safety culture where safety, health, and wellbeing are at the centre of everything we do. Safe & Sound is an employee-centred safety culture transformation programme based on changing attitudes and perceptions to safety, health, and wellbeing. The objective of the programme is to build and embed a world class values-based safety culture that is sustainable over time, where people speak up, challenge unsafe practices, and take responsibility for their own safety and the safety of others. During 2022, 31 leadership teams comprising approximately 325 safety leaders across the business, continued to meet monthly to drive and embed the Safe & Sound philosophy at a local level and take on challenges as they arose.

Throughout 2022, the theme of Human Factors was introduced to the business in the form of informative monthly sessions and with the inclusion of short videos and information in our all-staff monthly safety communications. Human Factors focuses on the interaction between our job, our environment, and indeed each other. It looks at those factors that influence us in our safety behaviours. During the year, we focussed on creating a greater understanding of why human errors and mistakes happen, how these contribute to incidents, and empowering people to take steps to increase attention and focus at work.

Road Safety

We know that road safety is very relevant to each one of us; whether we are driving for work or driving in our own personal time, walking, cycling, or motorcycling, the most important thing is that we all get to our destination safe and sound. As we emerged from the recent pandemic, the internal Road Safety Bureau (RSB) re-engaged with our staff on the full implementation of the Road Safety Strategy 2021–2025.

Highlights included:

- A new driver training programme for apprentices was developed, with 211 apprentices completing this training in 2022.
- In September the RSB held its first in-person Road Safety Cross Industry Forum with our government partners (Road Safety Authority and Health & Safety Authority) and key stakeholders from across various business sectors.
- RSB developed a Daily Vehicle Safety Check app which is currently in pilot in parts of ESB Networks.
- The RSB provided monthly KPI road safety reports to the managers/supervisors and to our staff on the monthly safety brief.

The Road Safety Bureau continues to strive for further road safety improvements in line with our Road Safety Strategy through the development of new training programmes, updating existing processes/systems, and delivering new and innovative platforms to promote road safety across ESB Networks. We will continue to engage with our staff/stakeholders and partners to ensure the business is informed with road safety documentation produced by the Road Safety Bureau.

Public Education and Awareness

Our customers are at the heart of everything we do, and we continue to strive to ensure their safety and the safety of those who work on, or may come in close contact with, the electricity network. Increasing awareness of electrical safety risks is essential, and education and awareness programmes in this regard continue to be a strategic objective of our public safety activities.

In 2022, we continued to implement our Public Safety Strategy 2021-2025, which is anchored in the core purpose of our business and continues to be a core strategic priority and area of focus for ESB Networks.

The campaign messaging of 'Are You Sure It's Safe?' and 'Stay Safe, Stay Clear' public safety advertising marketing campaigns help encourage the public to stop and think of the danger when they are close to the electricity network. This campaign has continued to resonate with our key at risk groups since its creation in 2016 and maintained awareness levels at 85-95%. To maintain engagement, the campaign had been revamped and re-launched the 'Are You Sure It's Safe?' advert in Q4 2021.

In 2022, our latest safety advert ran across TV, video-on-demand, radio, digital audio, social media, display marketing, and paid search. It includes four key risk scenarios: builders using scaffolding near overhead wires; people using drones near overhead wires; people hanging flags and bunting on electricity poles; and a generic fallen wires message, as these risk scenarios remain a risk to the public. Awareness figures for the campaign remain high, with more than half of Irish adults able to recall our safety ad (58%). This is notably higher than the TV norm as well as the utility norm. 73% of adults 'like' the ad and feel like it stands out, with 84% understanding the key dangers communicated in the advert and recognising the relevance to them.

ESB Networks' social media channels continued to target key at-risk audiences, with always-on safety messaging targeting our key 'at risk' sectors (farming, construction, general public, schools), and achieved a combined result of 12.9 million paid impressions, an increase of 130% from 2021, and achieved a reach of 7.1 million.

ESB Networks promotes educational resources on safety in both primary and secondary schools nationally. The 'Stay Safe, Stay Clear' primary school competition calls for primary school children to create posters with electricity safety poster tips. We also engage with secondary schools through our partnership with the Irish Farmers Journal which calls on agricultural science students to partake in a safety competition outlining ideas on how to be more conscious of safety when on the farm. This is promoted through the Irish Farmers Journal.

We issued several press releases on topics covering transporting of high loads, winter safety, Christmas safety, and working near electricity wires, which resulted in opportunities to engage with large audiences through both national and local radio.

Sector Specific Initiatives

Farm safety

Through our partnership with the Irish Farmers Journal, we ran eight adverts/articles which were issued to both their online and offline readers (+235,000 from the farming audiences). Our informative videos during Farm Safety Week 2022 along with ESB Networks own social media channels reached over 600,000 individuals.

Our 'Safe Family Farms' partnership with the Irish Farmers Journal continued into its eighth year, with further additions to the library of general farm safety videos, as well as the regular safety pages and full-page public safety advertorials to raise awareness of electrical safety on farms. We delivered safety talks to the Teagasc colleges and to University College Dublin's Agriculture and Food Science School as part of the 'Champions for Change' initiative, in association with the HSA and FBD Insurance.

Construction Safety

Our partnership with the Construction Industry Federation (CIF) resulted in a strong focus on electricity for Construction Safety Week, with electricity recognised and promoted as one of the five key construction risks via a webinar discussion titled – 'Safe Control of Hazardous Energies'. This panel discussion was chaired by our partners in the Joint Utility Safety Forum with contributors from other CIF member bodies.

Local Authorities and Emergency Services

A number of electrical awareness sessions with the Local Authority Safety Officers Group and various local authority areas took place during 2022 with approximately 850 staff engaging in the sessions.

As part of our commitment to engaging with the emergency services sector, we delivered awareness training to approximately 30 newly appointed fire service incident commanders at national training events in Sligo and Bray.

Our Public Safety Team in conjunction with our National Training Centre, hosted representatives from An Garda Siochana Health and Safety Policy Unit and members of the fire service, and delivered a session on electrical appreciation to these key 'at risk' stakeholders.

ESB Networks participated in the An Garda Siochana-led Metal Theft Forum, which met during the year to share information and coordinate responses to break-ins and metal theft. This impacted ESB Networks in terms of interference and theft of critical electricity equipment, with significant implications for public safety. 2022 saw a decrease in the number of break-in and metal theft incidents. Three events were recorded in 2022 compared to five in 2021.These break-ins and metal theft incidents pose a serious risk to life, and we continued to monitor any emerging trends carefully. Our staff continued to provide an excellent emergency response service in all situations, including major storms, emergency calls from the public, and from the other emergency services.

Networks Work Programmes and Critical Safety Processes

The delivery of our public safety work programmes (including cyclical hazard patrols, maintenance of overhead and underground networks, and timber cutting) continued to be prioritised to ensure public safety. The delivery of these programmes is monitored and reviewed regularly to ensure delivery within agreed cycles. Our incident recording system recorded and actioned all public safety incidents, and provided important information that led to focused public safety initiatives and campaigns.

The internal staff monthly safety communication, which is circulated to all staff in ESB Networks, provided information on significant public safety incidents to emphasise the importance of public safety, and to recognise the contribution of staff and contractors in keeping the public safe, as well as to continually reinforce the prioritisation of public safety actions.

We continued to implement critical public safety interventions by serving 'Notifications to Stop Work' where ESB Networks staff became aware of unsafe work near electricity networks. During 2022, we served 122 Notifications to Stop Work to third parties, up from 91 in 2021. Of these 122 notices, 74 were passed on to the Health and Safety Authority (HSA) Workplace Contact Unit for further follow-up with the parties involved.

As part of our emergency response, where we are notified of low or fallen electricity wires, we continued to implement the remote disconnection of the electricity network, where appropriate, to safeguard the public. The 'Dial Before You Dig' service provided maps of the overhead and electricity networks to construction companies to support compliance with HSA Codes of Practice in relation to electricity. .

Number of dangerous occurrences/third-party damage

	2018	2019	2020	2021	2022
3rd Party plant damages (excluding underground cable dig-ins)	1,103	2,637	2,620	2,707	2,780
3rd Party plant damages caused by underground cable dig-ins	1,131	1,035	778	756	616
Non 3rd party – MV and 38kV notifiable fault incidents (line drops and reduced clearances)	277	263	132	404	344
Non 3rd party – LV notifiable fault incidents (line drops and reduced clearances)	1,270	948	1,012	384	383

2022 saw a reduction in the most serious notifiable fault incidents. The numbers of MV and 38 kV line drops and reduced clearances in 2022 dropped by 15% compared to 2021. The numbers of third party cable strikes also fell by 19% compared to 2021. LV line drops remained the same as 2021. The high numbers of plant damage caused by third parties remained at very similar levels each year since 2019.

6 Delivering on Price

6. Delivering on Price

Every five years (known as a 'Price Review' period), the CRU determines the revenue price control, which sets out the amount of Distribution Use of System (DUoS) revenues that ESB Networks can recover through tariffs from the DUoS customers. These revenues are utilised for safely operating, maintaining, and improving the distribution network.

The Price Review is a robust process where all capital and operating costs are assessed and benchmarked against peer utility companies. This ensures that costs are efficiently and effectively managed, so that the customer receives the maximum value for money.

In December 2020, the CRU published its final determination for Price Review 5 (PR5), setting the allowed revenue for ESB Networks for the five-year period (2021 to 2025), starting in January 2021.

The CRU's key strategic objectives for PR5 are:

1. **facilitating a secure, low carbon future;**
2. **transforming the role of the DSO;**
3. **increasing efficiency and protecting customers; and**
4. **resolving local security of supply (in the Dublin area).**

The final determination provides allowances for capital and operating expenditure, totalling €5.9bn (in 2019 prices), over the five-year period 2021 to 2025, to allow ESB Networks to provide the infrastructure needed to meet the Irish government's Climate Action Plan and the EU's Clean Energy Package.

The determination also includes a very significant investment (€0.88bn) in Ireland's smart metering programme, which aims to roll out 500,000 smart meters per year between 2021 and 2024.

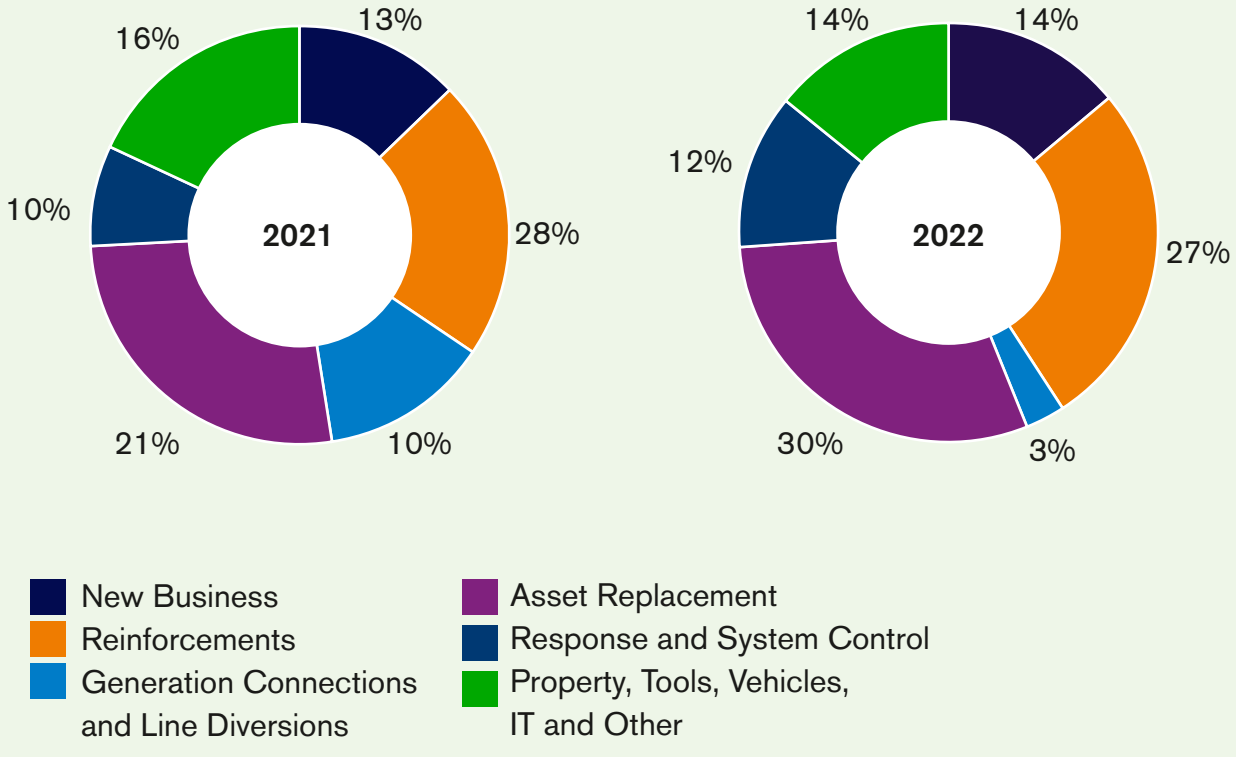
The Price Review process facilitates annual adjustments to these revenues using the K-factor mechanism for reasons such as updated forecasts, inflation, incentive out-turns, additional unforeseen items (e.g., storms), and updates due to potential under- or over-recovery of revenue. If there is an over-recovery, meaning that the revenue recovered from customers was more than required, this is deducted from the following year's revenue allowance. Likewise, if there is an under-recovery, this is added to the next year's revenue allowance via the K-factor. The CRU approved 2022 calendar year DSO revenues of €872.7m.

DUoS tariffs are the proportion of a unit of electricity which pays for distribution system development and operation. These tariffs are updated in October each year, based on changes in demand, inflation, and other decisions made by the CRU. The CRU publishes an Average Unit Price (AUP) every year. The CRU's AUP is calculated by dividing the total allowed revenue by the total forecast units of electricity (measured in kWh).

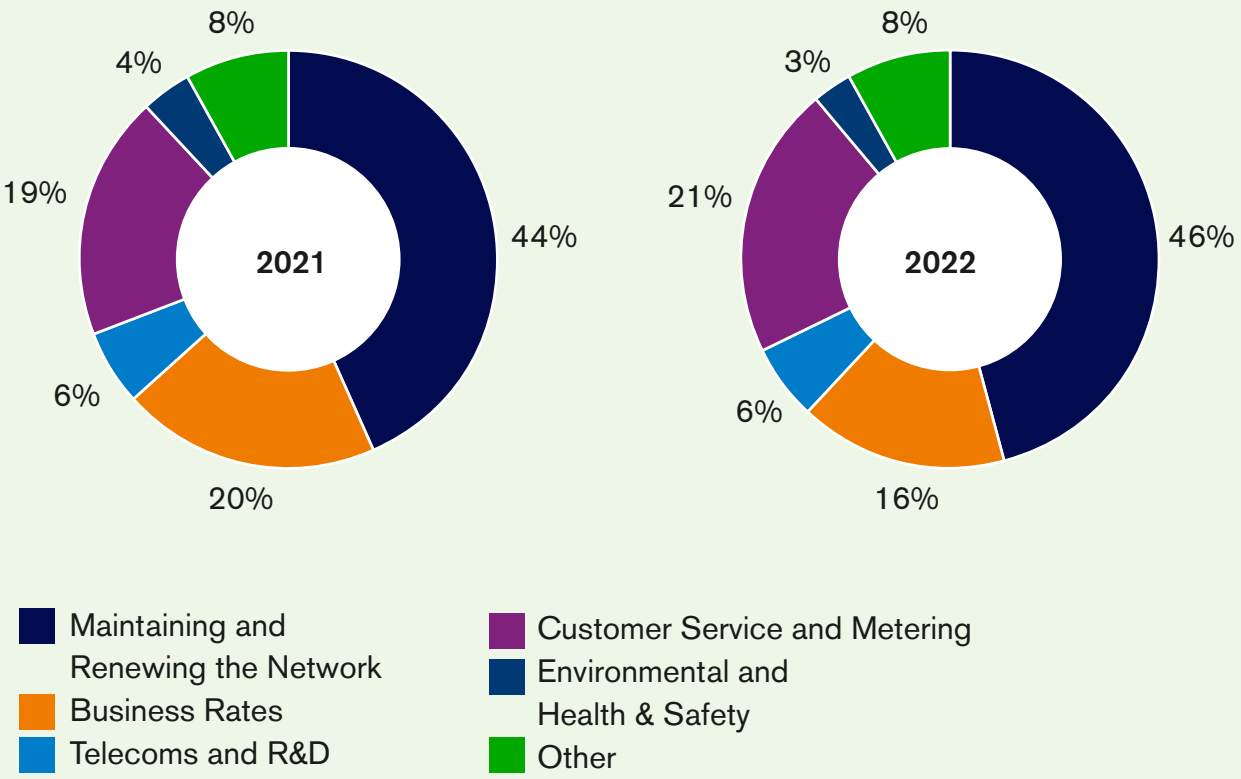
While the actual tariff allocation is more complex, the AUP gives a high-level indication of network tariff movement between tariff periods (i.e., a 12-month period, starting each October). The AUP for the 1st October 2021 to 30th September 2022 period (the first nine months of 2022) was 3.45 c/kWh, which was an 8.1% decrease relative to the AUP of 3.75 c/kWh for the October 2020 to September 2021 period. The AUP for the 1st October 2022 to 30th September 2023 period (including the final three months of 2022) was 3.81 c/ kWh. This represents an 10.5% increase relative to the AUP for the first nine months of 2022.

More on the allowed revenues and tariffs for 2022 is available in the CRU's decision paper, 'Electricity Distribution Network Allowed Revenue 2022, Distribution Tariffs 2021/2022 and Distribution Loss Adjustment Factors'

Capital Expenditure



Operating Expenditure



Capital expenditure figures for 2022 are stated net of customer contributions and exclude investments in smart metering.

Incentives Outturn

The CRU set out the incentives arrangements for ESB Networks under the PR5 decision. This document sets out areas in which ESB Networks are either rewarded or penalised based on our performance. The following table shows ESB Networks' performance against these incentives for 2022.

	2021 DSO Incentive Outturn			2022 DSO Incentive Outturn		
Incentive	**Target**	**Actual**	**Payment/ Penalty (€m)**	**Target**	**Actual**	**Payment/ Penalty (€m)**
Customer Minutes Lost (CML)	85	95.99	-5.5	82.9	103.34	-€10.0m
Customer Interruptions (CI)	119	120.41	€-0.7m	116.9	127.12	€-5.11m
Customer Satisfaction	90	85.90%	€-3.3m	90	83.58%	€-5.35m
Customer Satisfaction Survey	81%	82.88%	€1.4m	81.50%	81.82	€0.32m
Smart Metering Delivery	372,614 (adjusted target agreed with CRU)	382,188	€0.20m	458,255 (adjusted target agreed with CRU)	481,793	€0.24m
Smart Metering Functionality	In place by end of Q3 2021	Completed	€0.60m	New functionality in place by Q4 2022	Partially completed with some deferred	€0.20m
Smart Metering Customer Satisfaction	>80% customer satisfaction	97%-98% net satisfied	€0.40m	>80% Customer Satisfaction	95% net satisfied	€0.36m
Stakeholder Engagement	10	7.54	€0.60m	10	7.63	€0.57m
Delivering New Connections	All offers issued by 28th Feb 2022	Completed	€2.1m	Process ECP offers 30 days before batch deadline	Completed	€1.6m
Worst Served Customer	N/A	N/A	N/A	5,400	1,239 (for 2021 work[1])	N/A
Outage Information	Balanced Scorecard	80%	€0.81m	Balanced Scorecard	100%	€1m
Flexibility	Balanced Scorecard	100%	€3.0m	Balanced Scorecard	98%	€2.95m
Visibility	Balanced Scorecard	98%	€2.96m	Balanced Scorecard	39%	€1.17m
Joint DSO/TSO Coordination	Balanced Scorecard	59%	€1.24m	Balanced Scorecard	71%	€2.13m
Independent Role of the DSO	Balanced Scorecard	82%	€1.41m (with €2.8m to be deferred to next year for assessment)	Balanced Scorecard	85%	€0.85m
Total			**€11.22m**			**-€9.70m**

1 *To measure the effectiveness of WSC interventions, a one-year time lag is necessary.*

7 Social Obligation and Engagement

7. Social Obligation and Engagement

Traineeship Programme for People with Disabilities

Each year, ESB Networks support traineeship placements for people with disabilities. ESB Networks are a leading employer of people with disabilities in partnership with AHEAD, who also provide training for line managers, mentors, disability awareness, and assistive technology awareness. The Traineeship Programme for people with disabilities was significantly different from other years, in that all trainees were successfully onboarded, supported, and worked remotely. The Traineeship Programme is a six month programme which provides training and experience of working in a modern business environment. It provides opportunities for personal and professional development and is of benefit to participants in applying for future employment opportunities.

Electric Aid

Established in 1987, ElectricAid is an independent, standalone social justice fund set up and run by volunteers from ESB and EirGrid. ElectricAid is supported by 2,041 employees (both currently serving and retired employees), and donations are matched by ESB on a 2:3 ratio to a ceiling of €275,000 annually.

As a registered charity with its own constitution, it is administered and directed by an elected volunteer committee, which includes staff from ESB Networks. ElectricAid contributes to the development of people at home and abroad through co-funding of projects that aim for long-term sustainable improvement and relief of poverty and, where relevant, supports emergency appeals.

Since its foundation, ElectricAid has provided funding for small development projects in Ireland, as well as projects in 91 different countries and territories across Europe and the developing world. Projects are monitored over the course of their lifetime and have been shown to have huge impacts on the lives of the most marginalised people worldwide.

In 2023, ElectricAid funded 85 projects in 36 countries through a total funding of €955,536. Each project directly addressed one or more of the United Nations Sustainable Development Goals. A copy of the 2023 ElectricAid annual report as well as project reports and newsletters are available from the ElectricAid website (www.electricaid.ie).

Charitable volunteering

Employees in ESB Networks volunteer in many ways, from giving time to the running of the Energy for Generations (EFG) fund and ElectricAid, the staff charity, to getting involved in initiatives that is funded by the company, to organising fundraising events. In addition, when ESB Networks employees volunteer over 20 hours of their time or fundraise at least €250, they can apply to the EFG for a grant of €250 to that organisation, increased to €500 for support of refugees. In 2022, 17 ESB Networks staff participated in this scheme.

School Volunteering

In 2022, 16 ESB Networks Staff took part in Time to Read and Time to Count programmes.

The aim of Time to Read is to improve literacy rates with 2nd Class children by increasing the enjoyment of reading, improving confidence, and encouraging self-discovery among children during the 20 week programme.

Inclusion and Diversity at ESB Networks 2022

Inclusion and diversity are important to us in ESB Networks, and we work to foster an environment that enables everyone to bring their whole self to work, every day. ESB Networks has a clearly defined Inclusion and Diversity Strategy, supported by a comprehensive implementation plan to build an increasingly diverse workforce, in a strong values based and inclusive culture.

ESB Networks foster an inclusive working environment by increasing inclusive leadership capabilities for all people managers and supporting a range of programmes to mark occasions such as International Women's Day, Autism Inclusive Workplace, International Men's Day, Diwali, BeMe@ESB Ally Awareness Programme, Pride, and International Day of Persons With Disabilities. Each programme of events was delivered either hybrid or virtually, enabling broader, increased participation across the business.

Pride

Each year, BeMe@ESB, ESB's LGBT+ Employees and Allies Network, deliver a programme increasing awareness of the experiences and challenges of the LGBT+ community and the key role that allies play to create LGBT+ workplaces.

Stakeholder Engagement

At ESB Networks, we define our stakeholders as the individuals, communities or organisations that affect (or could be affected by) our activities, products or services, and associated performance. Given our central role in the electricity industry in connecting over 2.4 million homes, farms, communities, and businesses around the country, we have a very broad range of stakeholders. Since considerable changes are taking place within the energy sector at an unprecedented scale, we are fully aware that who we engage with and how is constantly changing.

Our Stakeholder Segmentation Wheel is a working example of how we are looking to improve the granularity of our stakeholder mapping through further subgrouping/segmentation. This will enable us to be even more purpose-driven in how we conduct our engagement activities and help to ensure that we are driving inclusive engagement by not leaving any stakeholder group behind.

Why We Engage

For ESB Networks, engaging with our customers and stakeholders is crucial to how we shape the future of our business and the electricity network. It helps us develop new initiatives which benefit the communities and industries we serve, as well as improving and enhancing existing ones. It shapes our business planning and strategic priorities and informs the decision-making process. Engagement with wider industry accelerates innovation within the business and the energy sector through shared learnings and ideas.

Engagement with our external stakeholders is integral to our day-to-day operations and is at the heart of everything we do at ESB Networks. In January 2022, we published our Stakeholder Engagement Strategy and Plan for 2022, setting out our proposed engagement approach, priorities, and planned activities for 2022, and providing our stakeholders with pathways to engage with us throughout the year.

SERVICES
To enable customers and stakeholders to shape our existing and upcoming services.

ACCOUNTABILITY ON DELIVERY
For our customers and stakeholders to hold us to account on our promises and to drive continuous improvement.

FUTURE PLANNING
For our customers and stakeholders to support us in delivering in the long term.

Improving our Engagement

Each year we also publish for consultation an annual performance report describing how we have delivered against our engagement plans for the previous year. Our performance is then assessed by an independent panel of stakeholders selected by the Commission for the Regulation of Utilities (CRU), against which there is an incentive worth up to €1m per annum (under the current fifth Price Review period, PR5). We are pleased that we yielded our highest score to date for stakeholder engagement of 7.63 out of 10 in the 2022 incentive assessment, reflecting our strong stakeholder engagement activities over the course of the year.

We are committed to continuously improving our approach to engagement to deliver meaningful outcomes for all our customers, stakeholders, and our business. We are pleased that this year has seen a significant improvement in engagement activity, with a welcome return to face-to-face engagement opportunities in addition to our virtual platforms. We have improved our engagement strategy and approach through independent benchmarking and analysis, and have listened to key stakeholder feedback to help improve our engagement activities as described in ESB Networks Stakeholder Engagement Report 2022.

We are also at a critical point in the fight against climate change. Our recently published Networks for Net Zero Strategy sets out our role and what is required to deliver the electricity network for Ireland's clean electric future. This strategy is based on our core role of delivering the very ambitious targets as set out in the government's Climate Action Plan 2023, while continuing to maintain a safe and reliable network. The publication of our business strategy provides us with a huge opportunity for further engagement, as progress can only be achieved through continued extensive collaboration with all our stakeholders on our strategy and plans, responsive to the needs of government, the Commission for the Regulation of Utilities, and customers, at a time of huge change in our industry.

8

Innovation

8. Innovation

Innovation in ESB Networks is a key enabler to deliver on our Price Review 5 (PR5) objectives, Climate Action Plan targets, and our Networks for Net Zero Strategy to deliver the electricity network for Ireland's clean electric future by 2040.

ESB Networks are clear that the challenge of enabling a low-carbon Ireland powered by renewable electricity on our journey to Net Zero requires extensive and collaborative innovation. Collaborating with our stakeholders and communities we have continued to deliver on our innovation programme throughout 2022. We published our detailed innovation consultation Innovation to Deliver the Electricity Network for a Clean Electric Future, which provides in-depth commentary on ESB Networks' 2022 innovation portfolio of projects and activities within our Innovation Strategy Framework.

Through our smart working approach, we continued to use digital channels and tools to engage with our stakeholders and disseminate learnings across our project and activities in 2022. This included engagements such as our in-person innovation forum, innovation stakeholder panel, webinars, bilateral meetings, industry events, conferences, and publications..

ESB Networks' innovation initiatives are extensive and encompass partnerships with numerous organisations, as highlighted by the performance indicators below.

- **Improving network resilience through the delivery of our Inspection of Overhead Lines Using Drones and Image Processing Analytics Project which delivered a new Unmanned Aerial Vehicle Framework.**
- **Enabling faster connection of renewables through our Modular MV Embedded Generation Interface Protection project which transitioned into Business as Usual in 2022.**
- **Enabling faster connection of large EV charging infrastructure through the delivery of our Modular EV Substation Project progressing the first trial installation.**
- **Supporting communities and enabling the electrification of heat and transport through the REACT and Dingle Electrification Projects.**

Performance Highlights for 2022

Key improvements, achievements, and engagements that were delivered on in 2022 included:

- Successfully delivered and completed our award-winning Dingle Project in collaboration with our community partners and ambassadors. The project has had significant impact on the local community's decarbonisation goals and the Dingle 2030 decarbonisation plan.
- Through 2022 we actively engaged and collaborated with a wide range of stakeholders and partners through our projects and regular meetings with representative bodies and organisations:
  - 39 academic and research organisations
  - 60 industry, vendor and start-up companies
  - 45 state agencies, community organisations and representative groups
  - 35 utilities and suppliers.
- Established and welcomed the new members to the second cohort of our innovation stakeholder panel.
- Welcomed the engagement and feedback of more than 90 attendees at our first in-person Innovation Forum since 2019.
- Hosted our spring innovation webinar where we welcomed more than 60 stakeholders per webinar and published the recordings on our website.
- Hosted and engaged with stakeholders with more than 50 bilateral meetings and workshops.
- Assessed 110 innovation ideas across various sources. Our innovation project portfolio has:
  - 22 projects in delivery across our innovation pillars: Future Customer, Climate Action, and Network Resilience.
  - An innovation split of 30% breakthrough and 70% incremental across our portfolio of innovation projects.
  - Potential lifecycle savings and benefits to our customers of €35m.
- Recognised as five star innovation organisation under the European Framework for Quality Management innovation lens.
- We successfully completed nine innovation projects, disseminating and transitioning the learnings with our stakeholders and transitioning relevant projects into BAU.
- Continued to propose and approve innovation projects ensuring the embedding of innovation throughout the organisation with eight new projects being initiated in 2022.
- Initiated and joined new projects with national and international third-party collaborators under the Next Generation Energy Systems (NexSys) programme and the International Community for Local Smart Grids (ICLSG) project.

Dingle Electrification Project

The Dingle Electrification Project's technical trials were concluded in 2022 with detailed analysis of project data undertaken to surface insights and learnings. Project reports were produced and are available on ESB Networks' website

The project learnings and outcomes have been extensively disseminated with stakeholders, industry, policy makers, and government departments. In 2022 ESB Networks held over 25 dissemination and engagement events sharing the benefits and outcomes of the project nationally and internationally. These included in-person site visits with our ambassadors, public and community events, webinars, podcasts, radio, media, and news outlets, as well as the publication of a number of close-out reports. For more information on the Dingle Electrification Project, please visit our website: ESB Networks' Dingle Project. www.esbnetworks.ie/who-we-are/innovation/esb-networks'-dingle-project

Key outputs and outcomes from the project and our partners delivered include:

- 100+ network devices installed and trialled to enhance network reliability.
- Installed and tested Ireland's first residential-scale vehicle-to-grid EV chargers.
- 35 Community participants including five ambassadors trialled 25 solar PVs, 15 EVs, five ASHPs, and five residential batteries.
- EV ambassadors drove over 363,529 electric kilometres with 25% of participants completing >30,000 km in the year and 59,300 kWh home charging.
- Over 90% of the participants on the Dingle Project EV Trial have purchased or ordered their own EV, demonstrating their own confidence in electric vehicles, when coupled with home EV charging, as an effective mobility solution for people living in rural communities.
- 25 Solar PV installation generated 80,138 kWh clean energy as of 31st January 2022, eliminating a carbon equivalent of 24,550 CO2.
- Reduced average emissions of ambassadors' homes from 9.2 tonnes to 4.7 tonnes CO2, equating to the amount of carbon 215 trees would capture per year.
- 40+ Dingle community information events.
- Implemented a system that demonstrates residential-scale low-carbon technologies can be scheduled to minimise impact on the local network.
- MaREI's research work with ESB Networks' ambassadors and EV trials and the wider Corca Dhuibhne 2030 initiative, has led to it receiving the SFI Engaged Research of the Year Award 2022, celebrating the contribution of this research to Irish society.

Innovation KPIs 2022

ESB Networks' innovation efforts are broad-ranging and involve collaboration with a diverse variety of organisations. In order to provide our internal strategic board and stakeholders with information about the extent of our innovation efforts, a set of internal KPIs has been developed. The KPIs for 2022 are:

110
Innovation ideas

€37M
Potential lifecycle savings

22
Active projects

500
Staff engaged with innovation

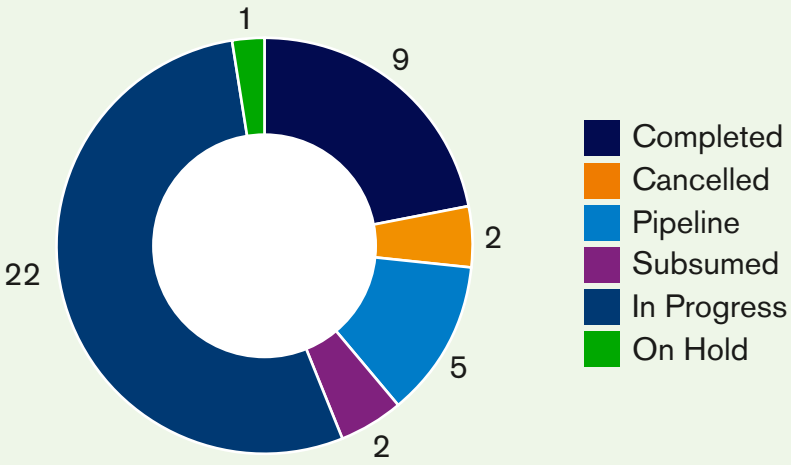
80
External company collaborations

60
Staff working on innovation projects

Project Details for 2022

In 2022, our innovation project portfolio had 22 projects in progress, with nine projects completed and eight new projects being identified and initiated.

Innovation Project Portfolio Breakdown 2022



The nine projects completed in 2022:

- Dingle Project
- Exploration of ASHP for Ireland's residential heating needs
- 300 kVA pole mount transformer
- New core and aggregation IP network
- Real time state estimation on Irish distribution network
- Leveraging enhanced LV monitoring to optimise targeted network reinforcement
- Nodal controller
- Tesselo – LiveEO vegetation survey system
- Weather forecasting and network damage prediction

The eight new projects identified and initiated in 2022:

- International Communities for Local Smart Grids (ICLG)
- E-Fleet: decarbonising and electrification of our fleet
- Charge fleet: resilient charging solutions for electrification of our fleet and transport
- Data analytics to optimise efficient operations of the distribution network
- Optimise E-heat: optimal efficient operations of the distribution network
- Optimal voltage allocation for the MV/LV distribution networks
- Simerse AI synthetic analysis of 110 kV composite Insulators
- Grid vision AI for condition assessment of tower corrosion

9 Connectivity and Digitalisation

9. Connectivity and Digitalisation

National Smart Metering Programme (NSMP)

During 2022, ESB Networks continued the replacement of over 2.4 million electricity meters in homes, farms, and businesses with next generation smart meters to support the transition to a low-carbon electricity network. The programme is a key enabler of the Irish government's Climate Action Plan, specifically regarding Microgeneration and the electrification of heat and transport.

The following has been delivered in support of these objectives:

- The programme continued to safely install smart meters in almost every county in Ireland. By the end of December 2022, a total of 1,103,089 smart meters had been installed, with installations continuing to date. This includes 33,517 smart meters for Microgeneration customers.
- ESB Networks are committed to ensuring that the NSMP is delivered in compliance with all applicable data privacy laws and that all customer personal data is safe and secure. We have ongoing engagement with the Commission for Regulation of Utilities (CRU), Department of Environment, Climate and Communications (DECC), and the Data Protection Commission (DPC). During 2022 ESB Networks reviewed our published set of comprehensive Data Protection Assessments (DPIAs) which outline how ESB Networks manage and protect customer data. A revised DPIA is available on our website at Data Protection Impact Assessments (esbnetworks.ie)
- In November 2022 ESB Networks delivered our Customer Portal. The My Energy Consumption option offers customers insight into the half-hourly interval usage on their smart meter. It gives the customer graphs of both their import and export data. A Harmonised Downloadable File in .csv format can be downloaded by a customer showing all their usage from the date their smart meter has been activated. At the end of 2022 almost 200,000 meters had been activated. By the end of Q1 2023 the majority of smart meters had been activated.
- ESB Networks delivered the V13.00.00 retail market release required to support the delivery of smart services by suppliers in February 2021. By the end of 2022, 119,000 customers have availed of half-hourly interval data and 20,000 customers have availed of day/night/peak smart standard tariffs.
- ESB Networks commenced remote meter reading of smart meters with approximately 4.4m remote readings by the end of 2022. This has resulted in a significant reduction in estimated bills and improved billing accuracy for customers with smart meters.
- ESB Networks have led industry forums and working groups ensuring alignment with supplier system and process development, and provided ongoing support for supplier queries during 2022.

- ESB Networks continue to lead the implementation of the agreed industry-wide Strategic Framework for Communications and Consumer Engagement, designed to support the meter deployment programme. This has included updates to programme collateral including more information on standard smart tariffs and Data Privacy.
- Based on customer feedback, the smart meter upgrade section on the ESB Networks website has been updated to include expanded FAQs, additional information on smart meter benefits, and a 'How to Read your Smart Meter' video which covers both smart meter types.
- ESB Networks have undertaken a public information campaign across local radio, press, and social media channels; developed branding for the public to easily identify the contractors associated with the ESB Networks programme; created media assets and stakeholder packs; engaged with local radio stations; and delivered briefings to national and local stakeholders.
- Consumer surveys conducted during 2022 demonstrate that customer awareness is rising, and that sentiment towards the programme is positive. This is further supported by the 95% customer satisfaction rating of the exchange process. The global supply chain shortage of microchips in 2022 resulted in a shortage of smart meters over 23 weeks in 2022. Despite this, ESB Networks achieved over 481,793 smart meter installations. The programme plans to replace over 440,000 meters during 2023 including day/night and three phase meters.

Smart Grid

The transmission and distribution electricity networks rely on resilient, highly available telecommunications to centrally control and operate the grid. This connectivity is provided by an extensive private telecoms network within ESB Networks, covering a range of technologies including fibre, microwave, satellite, and polling radio, as well as operational technology networking systems.

The telecommunication network continues to be developed and extended, to support the growth of the electricity system and the control centres operating them. Telecommunication infrastructure to support the connectivity and control of new renewable energy generation to the electrical system was also developed and implemented.

A technology strategy has been developed, setting out the architecture for the development of the operational telecoms network to meet the future requirements and needs of ESB Networks including SmartGrid. The purpose of the work is to effectively plan the development of the telecommunications networks over the next 10 years. The strategy calls for transition to packet networks completely, adoption of high-capacity fibre connectivity, and a new high-resilience core network architecture, required for increased dependency on operational telecommunications as part of greater SmartGrid adoption.

Significant progress was also made in the procurement for a new wireless radio network based on long term evolution (LTE) mobile cellular networks and is now nearing completion. ComReg have supported the work to develop an Irish SmartGrid and awarded a 15-year licence for spectrum in the 410–414 MHz band paired with 420–424 MHz, which this radio network will be built on. Network rollout is to commence in 2023 and will be completed within three years. Initial works are ongoing to enable the full deployment of the network, including backhaul upgrades, power upgrades, and high-site enabling works.

TIBCO Hub Relocation Project

Prior to September 2021, ESB Networks and NIE Networks shared a joint TIBCO software-based solution to provide market message (MM) functionality to facilitate the electricity retail market for both the ROI and NI markets. This solution consisted of a central TIBCO hub communicating with EMMAs (electricity market message application) hosted by each market participant located in ROI and NI. The solution allowed for the exchange of MMs between ESB Networks/NIE Networks and the respective market participants. These MMs consisted of, for example, 'Change of Supplier' requests and the provision of meter point data as required by a functioning retail electricity market. To date, this solution aids in the sending and receiving of approximately 30 million MMs annually which helps to ensure every customer receives an accurate and timely electricity bill from their electricity supplier.

A 'System Separation' project was initiated by the Northern Ireland Utility Regulator (UR) in 2020 and resulted in the creation of separate TIBCO Hubs for the NI and ROI retail electricity markets in September 2021. The subsequent phase of this programme of work was referred to as the 'TIBCO Hub Relocation Project'. It consisted of the commissioning and testing of a newly built RoI TIBCO Hub, built in ESB's datacentre infrastructure to the latest ESB IT & Cybersecurity policies and standards, as well as the decommissioning of the remaining infrastructure in NI.

There were numerous reasons for ESB Networks to undertake this project. They included: to provide a single, stable market messaging solution for the RoI retail electricity market to ensure our CRU-regulated service levels are maintained; our compliance with GDPR regulations to process customer's data contained in MMs within the EU; and to enhance the previous solution with high availability and disaster recovery capabilities for a service running on a 24/7, 365 days a year basis to the required resource levels.

With the TIBCO hub being of fundamental importance to the successful operation of the retail electricity market in ROI, it was critical that the cutover to the new hub was as seamless as possible. Final cutover to the new RoI TIBCO hub took place in early 2023 without incident, which is an indication of the detailed planning and coordination which took place in preparation of the cutover weekend between ESB Networks, NIE Networks, and all RoI Market Participants.

Interim Retail Market Microgeneration

CRU published a decision paper in relation to the 'Remuneration of Renewable Self-Consumers for Exported Electricity: Interim Clean Export Guarantee' in February 2022. This set out the requirements of an interim solution, which would allow for those producing their own electricity and exporting it to the grid, via Microgeneration, to be paid by their supplier.

To ensure a suitable data provision and settlement solution was in place, ESB Networks introduced the Interim Retail Market Microgeneration (IRMM) Solution. The project to introduce the IRMM solution was undertaken by a range of areas across ESB Networks, with the systems going live on 28th June 2022. This allowed for the data provision and settlement of customers' exported electricity, in line with action 105 (e) of Climate Action Plan 2021 to complete the implementation of interim Microgeneration system and market change solution.

Following go live, a period of hypercare was undertaken to ensure the smooth transition to Business as Usual and to answer any queries from market participants. Furthermore, hypercare provided a platform for discussion, rapid actioning, and resolution of system issues and defects identified during the hypercare period.

ESB Networks continue to engage with stakeholders including industry, CRU, and electricity suppliers to ensure the continued smooth operation of the settlement solution.

Electricity Costs Emergency Benefit Schemes

Due the exceptional increase in global energy prices, the Department of Environment, Climate and Communications (DECC) received approval from cabinet in December 2021 for a scheme to credit all domestic electricity customers with an emergency benefit payment. CRU together with electricity suppliers and ESB Networks had key roles to play in the delivery of the scheme. ESB Networks engaged extensively with CRU and suppliers through the established Industry Governance Group (IGG) forum to develop and agree a market process that facilitated the operation of the scheme.

The legislation obliged both ESB Networks and electricity suppliers to operate and administer the scheme. ESB Networks put in place a project team to make the necessary arrangements to comply with our obligations as set out in the legislation, the CRU Electricity Costs Emergency Benefit Scheme Guidance Document, and the approved Market Change Request.

The processes put in place by ESB Networks and suppliers resulted in over 2 million domestic electricity customers receiving €377m for winter 2021-22 electricity bills. As part of a range of Budget 2023 measures, the government subsequently announced an additional scheme to make three further emergency benefit payments to all domestic electricity customers to help with winter 2022-23 electricity bills. ESB Networks engaged again with CRU and suppliers to implement the necessary processes which resulted over 2 million domestic electricity customers receiving up to €1.2bn from the Government to help address the rising costs of energy for winter 2022-23.

SFTS Automated Solution

The Secure File Transfer Service (SFTS) is a service provided by ESB Networks to market participants to facilitate secure exchanging of files to support key retail market processes. Due to the increasing volume of files and the dependency on the SFTS, ESB Networks received enquiries from market participants regarding the possibility of automating the SFTS solution. ESB Networks explored possible options and selected a solution that facilitated automation with minimal disruption to the existing SFTS which was delivered in April 2022. The timing of the delivery of this project was important as it supported the issue of export data files for the Interim Retail Market Microgeneration solution at the end of June 2022.

10 Service Level Agreements

10. Service Level Agreements (SLA)

The service level agreement (SLA) report in the following table contains the complete set of results for 2022. The report provides a description of each SLA and the measure against which its level of performance is reported. The actual performance is measured as the percentage of transactions that were completed within the agreed SLA timeline and the percentage completed within twice the SLA timeline during 2022.

Description	No.	Standard Approval Timelines (SLA)	Within SLA Timeline	Within twice SLA Timeline
Change of Supplier (NQH)	1A	Validate within 5 days	99.98%	NA
	1B	Using customer read supplied by the customer– Complete within 3 days	99.96%	100%
	1B	Using a special read organised between the customer and ESB Networks– Complete within 10 days	99.63%	100%
	1B	Using one of ESB Networks scheduled reads – Complete within 3 days	98.88%	100%
Change of Supplier (QH)	2A	Validate within 5 days	99.83%	100%
	2B	Complete within 3 days	97.96%	100%
Change of Supplier Cancellation	3A	Validate supplier cancellation within 5 days	99.96%	100%
	3B	Complete supplier cancellation within 5 days	99.78%	100%
New Connection and registration with supplier (NQH)	5A	Prepare Quote – Within 7 working days where no site visit required. Within 15 working days where site visit required	94.00%	100%
	5B	Complete connection – Within 10 working days of receipt of Safe Electric certificate.	98.00%	100%
	5C	Data Processing – Issue details to Supplier within 10 days	99.52%	99.54%
New Connection and registration with supplier (QH)	6A	Prepare Quote – Within 7 working days where no site visit required. Within 15 working days where site visit required	94.00%	100%
	6B	Complete Connection –Within 10 working days of receipt of Safe Electric certificate.	98.00%	100%
	6C	Data Processing – Issue details to Supplier within 10 days	68.00%	88.00%

Description	No.	Standard Approval Timelines (SLA)	Within SLA Timeline	Within twice SLA Timeline
Change to meter point characteristics	8A	Prepare quote – Within 7 working days where no site visit required. Within 15 working days where site visit required	94.00%	100%
	8B	Complete change – Within 10 working days of receipt of Safe Electric certificate.	98.00%	100%
	8C	Process Change – Issue details to Supplier within 10 days	97.10%	98.12%
De-energisation of meter point	9A	De-energise of meter point within 5 days	93.13%	100%
	9B	Issue Meter details to Supplier within 10 days	99.36%	99.83%
Re-energisation of meter point	10A	Re-energise meter point within 5 days	98.19%	100%
	10B	Issue Meter details to Supplier within 10 days	98.84%	99.59%
Change of meter configuration	11A	Reconfigure meter within 5 days after the receipt and validation of Supplier request	94.64%	100%
	11B	Process data within 10 days	99.19%	99.62%
Meter problems and reports of damage	12A	Repair or replace faulty meter within 5 days	45.10%	49.91%
	12B	When a faulty meter is repaired or replaced – process meter data within 5 days	98.43%	98.96%
NQH Meter Reading	14A	Scheduled Read – Distribution of Reads to Suppliers within 7 workdays	99.52%	99.94%
	14A	2 Scheduled reading visits per annum	98.61%	NA
	14A	4 Scheduled reading visits per annum	91.51%	NA
	14A	Actual reads for scheduled meter reading visit	84.51%	NA
	14A	Actual reads for scheduled MD meter reads	92.00%	NA
	14A	One actual read per annum	96.91%	NA
	14B	No Consecutive Block Estimations	97.72%	NA
	14B	No Consecutive MD Block Estimations	100%	NA
	14C	Out of Cycle Customer Read – Readings processed within 3 workdays	98.32%	99.56%

Description	No.	Standard Approval Timelines (SLA)	Within SLA Timeline	Within twice SLA Timeline
QH Data Collection	15A	D+4 QH data- Send to SEM-O / Suppliers in 1 workday	95.00%	100%
	15B	QH Actual Data. Send to suppliers within 4 and 10 days**	96.73%	97.21%
Request for Special Read	18A	Site visit by 7 days	63.09%	73.61%
	18B	Issue of Meter details within 3 Days	56.80%	63.14%
Data Aggregation	16	Issue of aggregated data to SEM-O/ TSO/Suppliers and Generators within 5 workdays	95.00%	NA
Change of SSAC	20	Complete process in 3 workdays	95.00%	NA
De-registration	21	Auto Completion within 5 workdays	100%	NA
		Manual Completion within 10 workdays	95.00%	NA
Change Customer Details	24	Complete within 5 days	99.97%	100%
Change Legal Entity	25	Complete within 5 days	99.67%	100%

11 Register of Assets

11. Register of Assets

The following is a register of all relevant Distribution System assets on the system at the end of 2022.

Register of Distribution System Assets at end of 2022

Asset	Units	Volume
220kV		
220kV Substations	No.	2
220/110kV Transformer Capacity	MVA	2,500
110kV		
110kV Overhead Lines	Km	388
110kV Underground Cable	Km	238
110kV Substations	No.	128
110kV Switching Substations	No.	11
110/38kV Transformer Capacity	MVA	7,081
110kV/MV Transformer Capacity	MVA	1,558
38kV		
38kV Overhead Lines	Km	5,637
38kV Underground Cable	Km	1,286
38kV Substations	No.	422
38kV Transformer Capacity	MVA	5,390
MV		
20kV 3-ph Overhead Lines	Km	15,517
20kV 1-ph Overhead Lines	Km	31,996
10kV 3-ph Overhead Lines	Km	13,273
10kV 1-ph Overhead Lines	Km	23,883
20kV Underground Cable	Km	1,960
10kV Underground Cable	Km	8,670
3-ph Pole mounted Transformers	No.	22,568
1-ph Pole mounted Transformers	No.	226,580
MV Ground Mounted Substations	No.	23,343
LV		
LV 3-ph Overhead Lines	Km	4,747
LV 1-ph Overhead Lines	Km	56,995
LV Underground Cable	Km	15,351
Mini-Pillars	No.	180,493

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