ESB NETWORKS

DMSO Blueprint and Roadmaps

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Contents

Glossary

AMI	Advanced Metering Infrastructure
BTM	Behind-the-meter
CAP	Climate Action Plan
CEP	Clean Energy for Europeans Package
CRU	Commission for Regulation of Utilities
DECC	Department of the Environment, Climate and Communications
DER	Distributed Energy Resource
DMSO	Distribution Markets System Operator
DSO	Distribution System Operator
DSU	Demand Side Unit
DUoS	Distribution Use of System
ENA	Energy Networks Association
EOI	Expression of Interest
ESB Networks	Electricity Supply Board Networks
EU	European Union
EV	Electric Vehicles
IDS	Individual Demand Sites
ITAGT	Is This A Good Time?
JSOP	Joint System Operator Programme
kW	Kilowatt
LEUs	Large Energy Users
LV	Low-Voltage
MEC	Maximum Export Capacity
MIC	Maximum Import Capacity
MPRN	Meter Point Reference Number
MVP	Minimum Viable Product
MV	Medium-Voltage
MW	Mega-Watts
NEDS	National Energy Demand Strategy
NN,LC	National Network, Local Connections
NSMP	National Smart Metering Programme
PR5	Price Review 5
PR6	Price Review 6
SCADA	Supervisory Control and Data Acquisition
TSO	Transmission System Operator
V2G	Vehicle-to-grid
XLEU	Extra Large Energy Users

Executive Summary

Legislative and regulatory policies at both national and EU levels are continuing to evolve to address climate change, and steady momentum is required on the distribution network to support this. This creates a clear and ongoing mandate for the distribution network to adapt and support a decarbonised energy future.

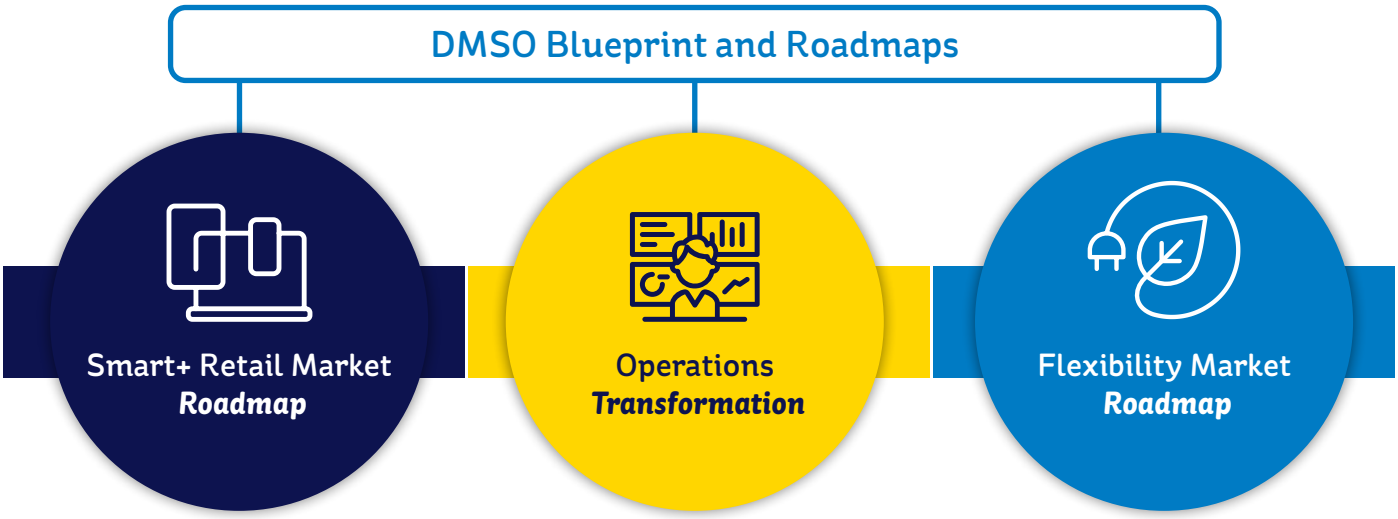
Over the Price Review (PR) 6 and PR7 periods, the Distribution Markets and System Operation (DMSO) function within ESB Networks is taking a leading role in this evolution by building capabilities, delivering new offerings and enhancing operating systems that meet the changing needs of customers and enable decarbonisation of the Irish economy and society.

This paper sets out the DMSO Blueprint, a long-term vision and guiding framework for how the distribution network will evolve over the coming decade. The work is structured around three interdependent pillars:

1. **Smart+ Retail Market Roadmap;**
2. **Flexibility Market Roadmap; and,**
3. **Operations Transformation.**

Each roadmap sets out key deliverables, priorities and a phased approach for delivery through 2035. Together they signal a shift from early transformation to structured delivery.

Figure 1: ESB Networks DMSO Blueprint Pillars



Smart+ Retail Market Roadmap

The priorities in this roadmap are informed by ESB Networks' view of the existing European and National drivers shaping change in the retail market. They have been informed by extensive engagement with both CRU and DECC and will be further informed by engagement with external industry stakeholders.

This roadmap sets out how ESB Networks will support the development of the future retail market. Key focus areas include:

- Continued rollout of smart meters under the National Smart Metering Programme.
- Delivery on CRU requirements via the Smart Meter Data Access Code.
- Support for enduring microgeneration, energy sharing and multiple supplier contracts.

These initiatives aim to unlock the full value of smart metering for customers, aligned with regulatory direction stakeholder input.

Flexibility Market Roadmap

The roadmap builds on previous pilots to shape the future of flexibility services across the distribution system, outlining how ESB Networks will apply these learnings to develop new offerings and accessible routes to market for customers. Further increasing customer awareness will be key to unlocking the full value of these services.

To enable this, key actions include:

- Increasing customer awareness and participation in flexibility services.
- Expanding network capacity through non-wire alternatives.
- Introducing new flexibility products to resolve congestion
- Improving transparency of flexibility market development.

These actions are aligned with ESB Networks' 2025-2029 Flexibility Multi-Year Plan and the CRU's National Energy Demand Strategy. The roadmap will be reviewed in 2026 following the Flexibility Needs Assessment.

Operations Transformation

Foundational to the success of both roadmaps is a programme of operational transformation. This includes:

- Building core system capabilities that facilitate active system management such as enhanced control room tools and processes.
- Ensuring the DMSO is equipped to manage an increasingly dynamic network.

ESB Networks welcomes feedback on our DMSO Blueprint and in particular, the roadmaps and key priorities for Smart+ Retail Market, and Flexibility Market transformation over the coming years. Should you wish to provide feedback, your response should be submitted to engagement@esbnetworks.ie Feedback will be considered in the context of implementation plans such as the Flexibility Multi-Year Plan and ongoing engagement through the relevant and existing industry fora.

1. Introduction and Background

1.1 Context

This paper presents the ESB Networks Distribution Markets and System Operation (DMSO) Blueprint which sets out how ESB Networks is undertaking the design, development and operation of the network of the future. It outlines how the DMSO will manage the distribution system efficiently, securely and effectively while also facilitating distribution markets – both retail and flexibility – to empower customers and incentivise shifts in how electricity is used. This also involves enabling a significant increase in connections of distributed energy assets, including renewable generation and low-carbon technologies (for example, electric vehicles and heat pumps), as well as expected significant growth in demand, driven by large and extra-large energy users such as data centres.

A series of proposals have been developed which illustrate the key priorities for delivery across both the flexibility and retail markets, describing how the ESB Networks DMSO will continue to evolve its role. These proposals, and sequencing of their delivery, have been shaped by legislative and regulatory requirements, including those set out in the EU's Electricity Market Directive; the Department of Environment, Climate and Communication's (DECC) Climate Action Plan; and the CRU's National Energy Demand Strategy.

The proposed sequencing of priorities for Flexibility Market development has been strongly informed by external engagement via our Flexibility Multi Year Plan process. Similarly, the approach to Smart+ Retail Market priorities reflects direct collaboration with both the CRU and DECC.

ESB Networks' 'Networks for Net Zero' Strategy sets a vision to deliver the electricity network for Ireland's clean electric future. The DMSO transformation is ensuring a sustainable, low carbon future for Ireland. Over the PR6 and PR7 periods, the DMSO is building capabilities, providing new offerings and supporting operating systems that meet the changing needs of customers as well as enabling decarbonisation of the Irish economy and society.

The regulatory and legislative requirements that have shaped the Blueprint and Roadmaps, at both an EU and national level, include but are not limited to:

European Policy and Legislative Framework	• Clean Energy for Europeans Package (CEP) • Electricity Market Directive 2019/944 • Electricity Market Regulation 2019/943
National Policy and Legislative Framework	• Climate Action Plan 2023 and 2024 • National Energy Demand Strategy

Further detail on the European and National legislative and regulatory context is included in Appendix 1: Legislative and Regulatory Landscape.

The DMSO Blueprint and draft roadmaps have also been shaped by our understanding of evolving customer needs, informed by engagement across our customers and stakeholders, and by changes in the availability and application of technology. These insights have also guided our collaboration on Blueprint proposals and roadmaps with bodies including the CRU, DECC, EirGrid and others. Detail of this engagement is included in Appendix 2: Understanding Stakeholder and Customer Needs.

1.2 Overview of the DMSO Blueprint

In the context of the evolving legislative and regulatory policies at both national and EU levels, ESB Networks established the DMSO function in 2024. Established to facilitate the implementation of the initiatives stemming from the Clean Energy Package, Climate Action Plan, and National Energy Demand Strategy, the DMSO is a new organisational structure in ESB Networks that brings together the teams from the National Network, Local Connections Programme, National Smart Metering Programme, Network Operations and Retail Market Services.

The ESB Networks DMSO Blueprint outlines the areas of focus for the DMSO and sets out the key priorities for progressive change across Flexibility Markets, Smart+ Retail Market and Operations, over the next decade, from 2025 to 2035. The roadmaps build on this blueprint, outlining the sequencing of the deliverables with a carefully considered rationale guiding their order. The key priorities for both flexibility and retail markets reflect insights gained through ongoing engagement with external stakeholders.

Ultimately, the DMSO Blueprint aims to provide a long-term vision – underpinned by roadmaps – to 2035. It brings together regulatory direction, customer needs and ESB Networks' own ambitions for a net zero-ready distribution system by 2040, setting out a pathway that aligns with the evolving needs of society, industry and the environment.

Figure 2: ESB Networks DMSO Blueprint Vision

Figure 2 visualises the end state that we aim to achieve as a DMSO, as we implement the activities and initiatives captured on our roadmaps. The desired outcomes for 2030 of the ESB Networks DMSO vision, across three transformation pillars are:

Smart+ Retail Market *Roadmap*

1. **An enhanced meter estate to enable flexibility and energy efficient behaviours**
2. **Enabling increased customer choice as per European Market Directives**

Operations *Transformation*

3. **Targeted outage identification and resolution through full advanced metering infrastructure (AMI) integration.**
4. **Proactive management of the distribution network leveraging a suite of flexible resources to manage demand and alleviate constraints.**
5. **Improved system reliability and stability using advanced applications in the control room.**

Flexibility Market *Roadmap*

6. **Flexibility market coordination, in collaboration with the TSO.**
7. **Creation of a liquid flexibility market that fosters day ahead, intraday and peer to peer trading.**
8. **500MW of contracted demand flexibility energised.**
9. **Delivering flexibility through flexible connections.**

The ESB Networks DMSO Blueprint and roadmaps explain how, over the course of PR6 and beyond, ESB Networks will deliver the vision in line with CRU direction with input from all market participants.

Here is a guide for what you can expect from each chapter following on from this introduction:

- **Chapter 2** outlines how we plan to meet the evolving needs of our customers, covering the proposals and roadmaps for each pillar of transformation; Smart+ Retail market; Operations; and Flexibility Market, as well as the key focus areas and priorities to tackle to achieve the DMSO vision.
- **Chapter 3** outlines the next steps in the development of the DMSO Blueprint and Roadmaps.
- **The appendix** contains further contextual documentation you may wish to refer to for a deeper understanding of the rationale for the blueprint and roadmaps.

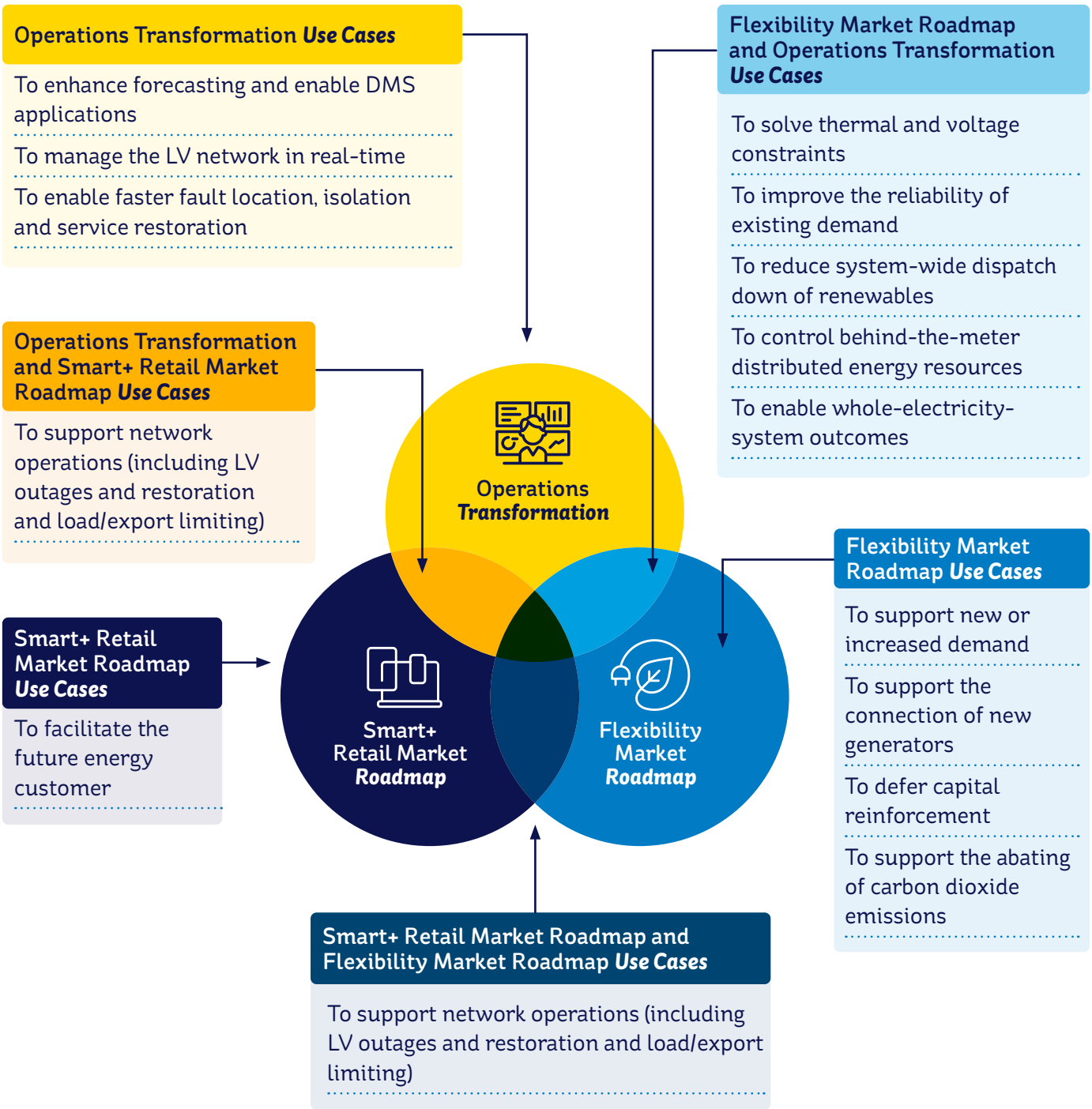
2 Areas of Transformation

ESB Networks will meet the evolving needs of customers through three pillars; Smart+ Retail Market Roadmap; Operations Transformation; and Flexibility Market Roadmap. The details of each pillar, including the focus areas, priorities and current draft implementation roadmaps are outlined below. Through implementation of these three pillars, ESB Networks is:

- **Facilitating customer choice and harnessing the capabilities of smart meters;**
- **Creating the conditions to enable flexibility at scale;**
- **Continuing to operate a safe, secure, and reliable distribution system.**

Overarching use cases that demonstrate the value of the initiatives for delivery and benefits to be realised across the three core pillars are shown in the diagram below. As converging functional areas, the three core pillars are interlinked, with clear interdependencies. Smart capabilities may be utilised for improved network operations and to enable participation in emerging flexibility markets and persisting challenges for network operations can be addressed by leveraging flexibility. An overview of these use cases in shown in Figure 2 overleaf.

Figure 3: Overview of use cases



2.1 Smart+ Retail Market Roadmap

The smart metering and retail market landscape is evolving in response to legislative and regulatory requirements at both EU and national levels. This section outlines the key areas of focus for Smart+ Retail Market Roadmap, identifying the key priorities as currently viewed by ESB Networks. These priorities are informed by ESB Networks' view of the existing European, national and regulatory drivers for change in the retail market. As a result, they've been adopted into the Smart+ Retail Market draft roadmap.

In addition, the key priorities have also been informed by engagement with both CRU and DECC and will be further refined to reflect the views of external stakeholders.

2.1.1 Areas of Focus

This section lists some of the other key areas of focus that will need to be considered for delivery in addition to the anticipated priorities: These areas include:

Energy Storage – Integration of Energy Storage solutions for distribution connected customers into the overall Market Design should be considered to support the anticipated scaling of commercial energy storage.

Flexible MIC & MECs – The market design is expected to cater for customers who will be serviced through the use of maximum import and export capacities that are flexible.

DUoS Tariff Reform – As set out in the NEDS, CRU are considering reviewing the existing DUoS tariff structures. Changes to existing DUoS Tariff structures could have wide ranging impacts to the Retail Market Design and systems.

Retail Market/Wholesale Market Changes – there are a number of known Wholesale Market changes that impact the retail market. It will need to be agreed how these impacts are best managed through integrated solutions.

Future of manual meter reading – ESB Networks need to consider strategies to support customers where remote meter reading via the public communications network is not always possible.

These initiatives align with the broader plans under PR6 and support the long-term ambition to optimise the benefits of smart metering for all customers.

2.1.2 Priorities

The current key priorities are informed by ESB Networks' view of the existing European, national and regulatory drivers for change in the retail market. In addition, the priorities reflect ESB Networks ambition to unlock the full benefits of smart metering for customers enabling more informed energy use, enhanced flexibility, and greater participation in the energy transition. These key priorities have also been shaped by engagement to date with both CRU and DECC.

Currently, the key priorities which ESB Networks is proposing will be the focus for the Smart+ Retail Market draft roadmap in the coming years are as follows:

- **NSMP Close-Out** – ESB Networks will continue to progress existing regulatory commitments pertaining to the delivery of the Phased Approach for the National Smart Metering Programme, including but not limited to, the commencement of deployment of three-phase smart meters for larger sites, the enablement of near real-time data in the home and the completion of the smart meter rollout as per action 1.9 of the CRU NEDS decision1[1].
- **Smart Meter Data Access Code Enablement** – A key priority for ESB Networks remains delivery of our requirements set out in the CRU's Smart Meter Data Access Code [2], ensuring customers' interests, and their respective smart meter data, are protected and secure, while, also enabling the appropriate data sharing to leverage the benefit of smart metering once the required legislation is in place.
- **Enduring microgen** – Building on initial measures, ESB Networks will continue to work with CRU and industry stakeholders to develop an appropriate design and timelines for implementation to give effect to CRU's 'Clean Export Guarantee' decision paper [3]. The aim of this is to further advance options available for active consumers in the retail market, such as enabling customers to choose separate electricity suppliers for import and export.
- **Energy Sharing** – Coupled with prioritising work on an enduring microgeneration solution, ESB Networks will work closely with CRU and industry on design and implementation of a solution in the retail market for Energy Sharing. Delivery of a solution for Energy Sharing could facilitate eligible customers directly accessing renewable energy via an energy sharing entity or directly from a family member, relative, neighbour, etc.
- **Multi Supply Contracts** – an important requirement under the updated Electricity Market Directive is the ability for customers to select more than one electricity supply contract at the same time. ESB Networks will work closely with CRU and industry on design and implementation of a solution in the retail market enabling greater levels of customer choice.
- **Enabling IT Changes and Upgrades** – The central retail market systems are a key foundation to an efficient retail market operation. These key systems will need to be upgraded and enhanced in order to facilitate the expected transformative changes whilst maintaining the excellent reliable operations.

1. *NEDS_Decision_Paper_and_Annex.pdf*
2. *CRU202516_-_Decision_on_the_Smart_Meter_Data_Access_Code.pdf*
3. *Clean_Export_Guarantee-Enduring_Arrangements_to_Remunerate_Customers_for_Microgenerati.pdf*

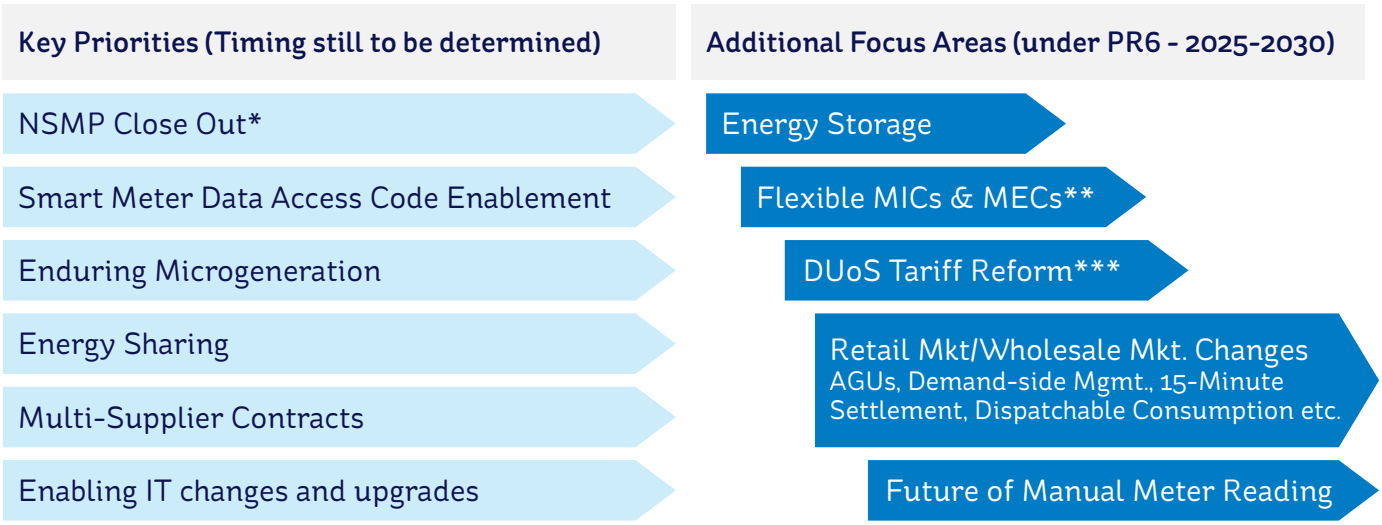
2.1.3 Roadmap

The delivery of the priority items is highly complex. Discussions and timing expectations will need to be aligned and confirmed in collaboration with stakeholders. Multiple interdependencies exist for these priority items such as legislative readiness, technical readiness and market readiness.

The publication of this draft roadmap is expected to complement existing Retail Market Governance processes in addition to ESB Networks' obligations under license condition 35. Proposed High Level plans are expected to be brought through Retail Market Governance as part of an approval process.

The roadmap below illustrates the prioritisation of key policy items and shows how the subsequent items in the plan have been considered in terms of their high level sequencing. Additional detail on each of the products/initiatives, alongside the relevant regulatory/legislative driver is included in Appendix 3: Smart+ Retail Market Roadmap Supplementary Material.

Figure 4: Smart+ Retail Market Roadmap



* National Smart Meter Programme
** Maximum Import Capacity/Maximum Export Capacity
*** Distribution Use of System

2.2 Flexibility Market Roadmap

2.2.1 Areas of Focus

The Distribution System Operator (DSO) is responsible for **establishing flexibility products and services** to provide increased flexibility through the distribution system. ESB Networks will continue to build upon previous pilots of flexibility products, using learnings to develop new flexibility offerings and routes to market for customers.

As flexibility market liquidity builds, new systems will be needed to provide flexibility and manage dispatch and scheduled services. ESB Networks is progressing **new flexibility market management systems** to provide an independent and trusted critical operational service that is fully integrated across multiple systems. Systems will be scalable and configurable to help address any challenges arising, including increased numbers of contracts, new products and market rules.

With the proliferation of low-carbon technologies at a domestic level, it is critical that **customers understand the benefits and are aware of the opportunities** to harness the inherent flexibility of these technologies. ESB Networks is working to equip customers with the **right tools and information** to engage with their local energy system and create the right conditions and incentives to enable them to participate in flexibility initiatives and **demand reduction events** (such as the "Is This A Good Time?" campaign).

As customers adapt to the use of smart meters and begin to understand how flexibility operates at the household level, there will be growth in the use of dedicated measurement devices, that are linked to or embedded in an appliance to provide demand response or flexibility services on the market. ESB Networks will support this shift by building on the National Smart Metering Programme to maximise the potential of smart meters as an enabling technology and will **introduce standard 'flexibility readiness' requirements**, to create the conditions through which consumers and commercial operators can readily provide flexibility services.

With increased volumes of microgeneration and small-scale generation connected to the distribution system, **day-ahead flexibility** can be utilised to manage overloading of the local MV and LV networks. This maximises the renewables that can be connected, without the need for capital reinforcement. **Intraday markets** are particularly important for the integration of variable renewable energy sources in the electricity system at the least cost, as they enable participants to make adjustments closer to rea-time. Since variable renewable energy generators are only able to accurately estimate their production close to the delivery time, it is crucial for them to maximise trading opportunities via access to a market as close as possible to the time of delivery of the electricity. ESB Networks will facilitate day-ahead, **intraday products and service**. While this is the vision moving forward, ESB Networks will, on an ongoing basis, consider the need and customer appetite for this as it will be heavily dependent on market liquidity.

Historically, instruction sets, which put limits on connected customers' participation in transmission-level markets to protect against unsafe or insecure conditions, have been issued annually, based on technical studies of worst-case conditions. This has meant that demand sites are often prohibited from participating in the market for up to six months of the year due to conditions arising relatively infrequently. ESBN introduced Pilot 2 Dynamic Instructions Sets in 2023. This allowed for Individual Demand Sites (IDS) to provide demand down services on days from April – September whereby ESBN determined based on forecasted generation and load that it would be safe to do so. ESBN enhanced this in 2024 by sending day ahead hourly profile for each IDS to unlock capacity. Further improvements were made to this pilot which is operational again in 2025. ESB Networks will conduct a phased national roll-out of real-time operational state-informed dynamic instruction sets and develop **dynamic instruction sets** for solar and hydro generation.

During the PR6 period, it is essential that **TSO/DSO collaboration** continues to support the delivery of European and national decarbonisation targets and the specific actions required under the Climate Action Plan. The Joint System Operator Programme (JSOP) facilitates this collaboration. One of the key objectives of JSOP is the development of a' whole-of-system' approach to system operation between the TSO and DSO. This approach will focus on optimising the system as a whole, rather than focusing on the transmission and distribution systems in isolation. Reflecting the importance of this 'whole-of-system' approach, ESB Networks and EirGrid agreed the high-level design of the future DSO-TSO operating model in PR5, with the detailed implementation to be progressed through PR6. Priority actions and tasks will be included in a specific DSO/TSO multi-year plan.

2.2.2 Priorities

Aligned to ESB Network's 2025 Flexibility Multi Year Plan and incentivised milestones for flexibility market development, ESB Network's high-level priorities for flexibility market transformation are:

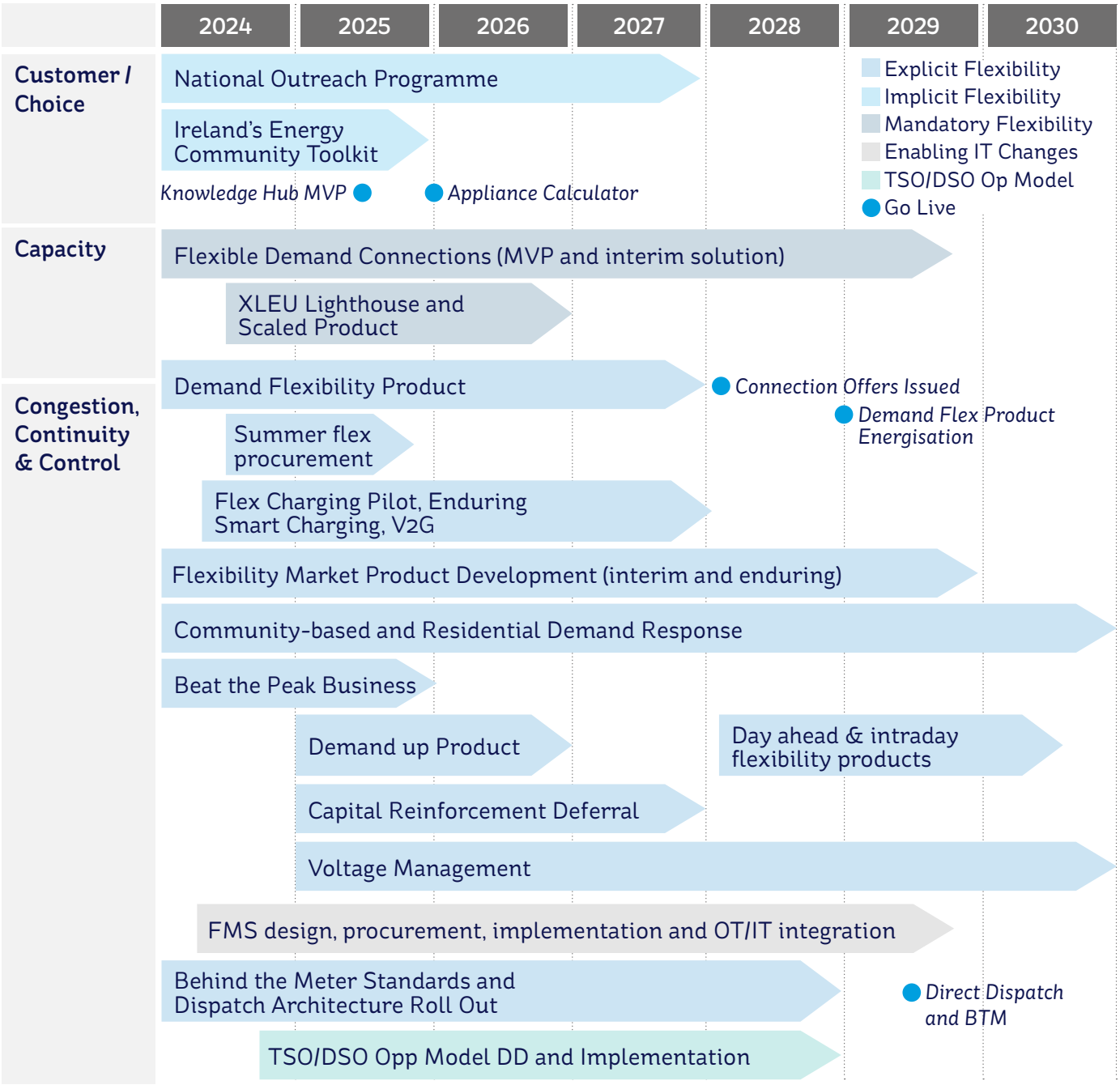
1. Improving network capacity by facilitating and accelerating the introduction of flexibility and demand response, (i.e., non-wire alternatives to improve network capacity). This, for example, includes: improving customer awareness of, and routes to market for, flexibility participation; piloting behind-the-meter architecture to create the conditions for participation, developing systems for flexibility market management, and procuring flexibility services.
2. Establishing new flexibility products and services. This includes new market-based products to incentivise flexible demand to relieve network congestion. The DMSO is enabling the development of new connection options for flexible demand, storage or generation. The DMSO is also progressing the establishment of new services to complement market-based products (e.g., providing education or awareness benefits).
3. Increasing the transparency of market development and market activities to ensure that markets are operated in a fair and non-discriminatory way and provide a line of sight for future opportunities to both participate and to influence ongoing market design and development. This includes developing behind-the-meter standards, supporting market stimulation and liquidity by publishing information on where flexibility services may be procured, undertaking measures at the distribution level to optimise whole-of-system management, engaging with the TSO and other sector stakeholders, and reporting on DMSO progress on initiatives.

A full list of ESB Network's specific actions under the Flexibility Multi Year Plan are included in Appendix 1.

2.2.3 Roadmap

This section outlines how the areas of focus – and priorities – are incorporated into **a Flexibility Market Roadmap**. Building on the direction and progress described above, the flexibility market roadmap sets out how ESB Networks will continue to expand its Flexibility Market capabilities to (i) facilitate customer awareness and choice; (ii) create additional network capacity; and (iii) resolve network congestion and deliver enhanced network control. The roadmap for how ESB Networks will achieve this overarching vision for Flexibility Market transformation is as follows. Additional detail on each of the products/initiatives, alongside the relevant regulatory/legislative driver is included in Appendix 4: Flexibility Market Roadmap Supplementary Material.

Figure 5: Flexibility Market Roadmap



2.3 Operations Transformation

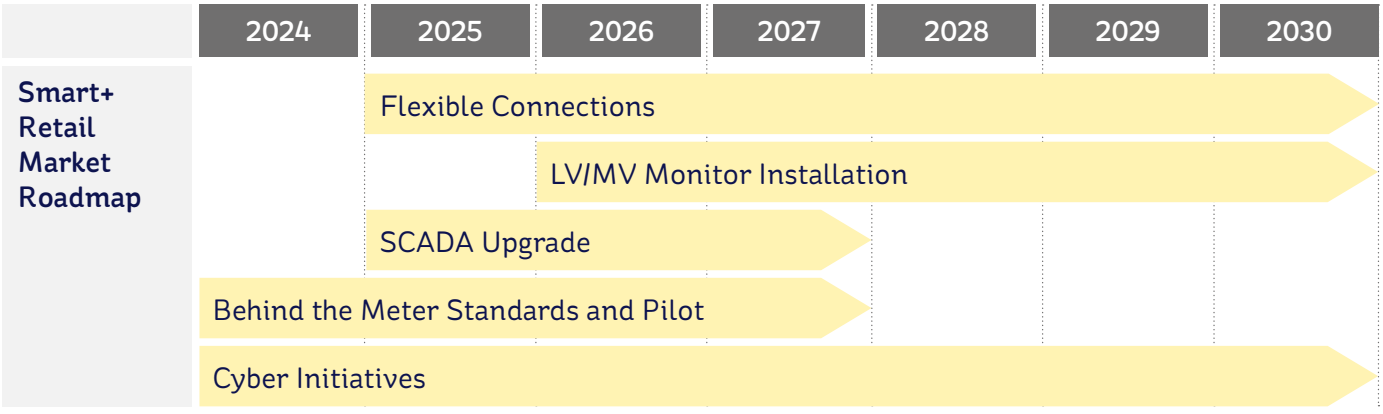
Underpinning the introduction of new products that form Smart+ Retail Market, and Flexibility Market Roadmaps is a functional layer of core capabilities to be established or enhanced at an operational level. These capabilities focus on equipping the DMSO with the skills, processes and systems needed to adapt to evolving market dynamics, regulatory requirements and decarbonisation goals. Detail on a selection of the core capabilities to be introduced or enhanced as part of DMSO Operations Transformation is included in Appendix 5: Operations .

2.3.1 Roadmap

New and enhanced capabilities will require upgrades to core systems and utilisation of new operating technology and information technology. The Operations Transformation roadmap captures the key transformations that are enabling these capabilities. This includes investments to improve visibility of the network, enhance network management and control systems, introduce standards for behind-the-meter technologies expected to connect in greater volumes, and enhance cyber resilience. In addition, as flexible connections form an important aspect of Flexibility Market Roadmap, operational capabilities to offer flexible demand connection agreements will also be introduced. Additional detail on each of the items contained in the roadmap can be found in Appendix 5: Operations .

Figure 5 below captures some of key initiatives on the Operations Transformation. A more comprehensive roadmap has been developed but due to reasons of cyber security and confidentiality, we are publishing a summary rather than full details of this particular roadmap. The activities on this roadmap are an enabler for active management of the system and leveraging the benefits of flexibility.

Figure 6: Operations Transformation Roadmap



3 Next Steps

ESB Networks has set out in its draft roadmaps the key priority work areas spanning the DMSO function – Flexibility Market Roadmap, Smart+ Retail Market Roadmap, and Operations Transformation. ESB Networks acknowledges that, for some priorities, a considerable body of work remains outstanding in terms of developing and agreeing overall timelines for delivery, in particular for the Smart+ Retail Market Roadmap, and we remain committed to engaging further with CRU and industry to develop and agree these timelines.

ESB Networks welcomes feedback on our DMSO Blueprint and in particular, the roadmaps and key priorities for Smart+ Retail Market, and Flexibility Market transformation over the coming years. Should you wish to provide feedback, your response should be submitted to engagement@esbnetworks.ie

Feedback will be considered in the context of implementation plans such as the Flexibility Multi-Year Plan and ongoing engagement through the relevant and existing industry fora and governance processes.

Appendix 1: Legislative and Regulatory Landscape

This appendix provides detail on the overarching regulatory and legislative requirements that have guided the DMSO Blueprint and roadmaps.

European Union

In 2018 and 2019, the EU adopted the Clean Energy for all Europeans Package (CEP). This consists of eight legislative acts to facilitate a transition towards cleaner energy, including the Electricity Market Directive 2019/944 and Electricity Market Regulation 2019/943. The Electricity Market Directive (EU) 2019/944 includes articles defining the role of the DSO in relation to the introduction of flexibility services, including:

- The development of flexible products and services necessary for the efficient, reliable, and secure operation of the distribution system. [EU2019/944, Article 31]
- Member states' provision of the necessary regulatory framework to allow and provide incentives to distribution system operators to procure flexibility services. [EU2019/944, Article 32]
- The procurement of products and services necessary for the efficient, reliable, and secure operation of the distribution system and establishment of technical specifications for same. [EU2019/944, Article 31, Article 32]
- Ensuring the effective participation of all qualified market participants, including energy from renewable sources, demand response, energy storage facilities, and market participants engaged in aggregation. [EU2019/944, Article 31]

The European Parliament's approval of electricity market reform legislation placed further emphasis on the need to make EU electricity markets more stable, affordable, and sustainable[1].

Since development of this foundational legislative structure, the European Commission has further accelerated its decarbonisation plans. In July 2021, the European Commission adopted a package of legislative proposals called 'Fit for 55' to outline how the EU's Goal to reduce emissions by at least 55% by 2030 and for the EU to be climate neutral by 2050.

Reforms to the EU's electricity market design since May 2024 have further emphasised the need to enhance consumer rights and promote renewable energy integration. Examples of the reforms introduced include:

- Enhancing consumer rights to participate in the energy market, including generating, consuming, storing, and sharing energy.
- Enabling multi-supplier contracts to allow consumers to have more control over their energy sources and costs.
- Ensuring protection for vulnerable customers against disconnections.
- Facilitating flexible connections for network users with limited or no network capacity.
- Introducing peak-shaving products, enabling additional demand response.

1. *21 May, 2024 – including and amending Directive 2024/1711 and amending Regulation 2024/1747*

- Utilising dedicated measurement devices – in the absence of functional smart meters – facilitating all customers to respond to dynamic pricing.
- Promoting the uptake of Power Purchase Agreements, providing for long-term renewable electricity for customers at stable prices.

As these EU Directives are transposed into Irish Law, ESB Networks will respond to all legislative changes as part of the ongoing development of the Blueprint and Roadmaps and the balancing of the priorities therein.

National

In 2019, Ireland published the first Climate Action Plan which sets Ireland's Strategy to achieve its 2030 climate and energy targets and this has been updated to reflect the evolving requirements. The Climate Action and Low Carbon Development (Amendment) Act 2021 put Ireland on a legally binding course to transition to net zero no later than 2050 and to a 51% reduction in emissions by the end of 2030. Close collaboration between government, industry, customers and the broader stakeholder network is essential to deliver the targets set.

The Climate Action Plan 2023 (CAP23), introduced several flexibility-focused mechanisms for the first time. The Climate Action Plan 2024 (CAP24) builds on these initiatives, including the introduction of incentives to drive low-carbon consumption and increase flexibility in demand. The importance of implementing a Demand Side Strategy to facilitate zero-carbon demand is highlighted, including:

- Incorporation of Demand side flexibility targets of 15-20% and 20-30% demand side flexibility in 2025 and 2030, respectively.
- Delivery of a demand side strategy which is aligned with the EU Strategy and energy efficiency requirements, while facilitating zero-carbon demand, low-carbon electricity consumption, and electrification targets. Within this strategy, the DSO should roll out a local flexibility market which incentivises LEUs to increase their flexibility.
- Provision of a route to market for medium- and long-duration storage facilitates to enable flexible demand.
- Support for domestic customers, businesses, and communities to participate in demand flexibility services and assess potential in homes and communities for smart energy and technology integration through skills training and smart energy pilot schemes.
- Establishment of a national programme for consumer education and behavioural initiatives surrounding demand flexibility.

The CRU published its National Energy Demand Strategy (NEDS) Decision Paper in July 2024. NEDS proposes a range of initiatives, covering:

Smart Services "Area 1"	• Encourage greater flexibility among domestic and smaller business customers. • Increase the availability and uptake of time of use and dynamic tariffs, and the uptake of microgeneration. • Develop paths to market for aggregation and demand response actors.
Demand Flexibility and Response "Area 2"	• Increase the potential for demand response from users, including LEUs and storage, when it is beneficial. • Reduce costs or carbon emissions by, for example, providing efficient market signals and mechanisms. • Create the right conditions for investment in developing sources of flexibility.
New Demand Connections "Area 3"	• Provide a pathway for new LEU connections to the electricity and gas systems. • Ensure large demand connections are low-to-zero carbon, and/or bring significant flexibility with them when they connect. • Consider the strategy for long-term LEU connections that reduces downside risk.

Appendix 2: Understanding Stakeholder and Customer Needs

Customer empowerment is a key feature of the electricity market of the future. As such, the views and insights of our customers and the broader stakeholder group across the ecosystem are essential to the design, development and implementation of a stable, secure and sustainable energy system. Therefore, we have consulted extensively across the various industry actors, with a particular focus on customer requirements. This appendix sets out the explicit engagement and co-creation of the DMSO Blueprint and Roadmaps with stakeholders, as well as the research undertaken with customers to shape our understanding of their evolving needs.

Stakeholder Engagement to date

In preparing the Blueprint and draft roadmaps, ESB Networks has considered the range of European, national and regulatory requirements impacting both flexibility and retail markets. ESB Networks' thinking has also been heavily informed by considerable external engagement (in particular on the flexibility roadmap) and also direct engagement with key external stakeholders such as CRU and DECC.

Flexibility Market Roadmap engagement:
Under the Price Review Five (PR5) requirements[1], ESB Networks is required to submit to CRU in September each year a detailed multi-year plan covering the following three years and the two years after that at a high-level. ESB Networks, and more specifically, our National Network, Local Connections programme (NN, LC) has followed this process as per our PR5 requirements and each year engaged external stakeholders on the development of our multi-year plan for flexibility. External engagement to date has therefore heavily informed the proposed flexibility roadmap within the DMSO Blueprint.

In tandem with our flexibility multi-year plan process, the NN, LC also engages closely with our key stakeholders via our Advisory Council group established in 2022. Therefore, we consider the flexibility roadmap a mature suite of key priorities in light of the extensive engagement conducted to date. Nonetheless, it is important for ESB Networks to continue to engage and seek industry views on these key priorities.

Smart+ Retail Market Roadmap engagement:
As part of our Flexibility Multi-Year Plan submitted to CRU in late 2023, it was acknowledged that work needed to commence on the development of a retail markets strategy and a strategy for future smart meter requirements. Throughout 2024, a draft Smart+ Retail Market roadmap was developed internally by ESB Networks. This draft roadmap was heavily informed by the European, national and regulatory requirements driving change in this space.

1 *CRU20154-PR5-Regulatory-Framework-Incentives-and-Reporting-1.pdf*

Following development of draft roadmap for Smart+ Retail Market, ESB Networks initiated engagement with both CRU and DECC in late 2024. The purpose of these engagements was to brief both CRU and DECC on the key priorities as understood by ESB Networks and to discuss potential methods of delivery for key priorities, in particular requirements arising from the Electricity Market Directive such as energy sharing and multiple supply contracts at a single connection point.

Engagement with both CRU and DECC continued in Q1, 2025 and the key priorities as set out in the Smart+ Retail Market draft roadmap, reflects the input from both CRU and DECC to date.

Further engagement:
ESB Networks is now seeking industry input on those key priorities with a view to informing further the development of the Smart+ Retail Market roadmap. It is currently anticipated that ESB Networks will need to further refine the draft roadmaps reflecting industry views before finalising the roadmaps and agreeing same with CRU.

Customer Considerations

To ensure that commitment to customer empowerment remains central to the DMSO Blueprint for stable, secure, sustainable energy, we have categorised our customers into three groups. The Blueprint has been shaped by our understanding of the evolving needs of those three customer groups.

Low Voltage Customers: Low voltage customers are adapting to a future in which they will have more control and flexibility at the household level. Technology changes are driving better engagement with these customers, enabling accurate and near real-time feedback, and in turn, allowing customers to make informed decisions on their energy consumption or generation.

Medium- and High-Voltage Customers: Ireland's economy is forecast to grow at a rate of between 2.3% and 3% per annum over the coming decade. A significant portion of the demand increase will arise from economic growth that will require connection at the distribution level, including small- and medium-sized businesses. Data centres, which are a growing sector of the economy, are expected to have a significant impact on electricity demand in the system.

Economic growth will be accompanied by increasing electrification of industrial and commercial customer heat load. CAP23 mandates that all buildings will need to switch to heat pumps or district heating by 2050, as the gas grid will no longer supply existing homes or commercial premises. When combined with the relevant automation and control technologies, industrial and commercial heat pumps may be able to provide flexibility to the distribution system in a similar way to that outlined for domestic customers.

In addition to the electrification of heat, there are several technologies that are currently being adopted, or are likely to be adopted, by industrial and commercial customers, and are therefore considered as part of the Blueprint, including building controls, thermal energy storage and back-up generation.

Generation Customers: The Climate Action Plan aims to increase the proportion of demand met by renewables-generated electricity to 80% by 2030. This overall target will be realised via the delivery of specific targets for onshore wind, offshore wind, and solar generation.

Customer requirements for improved flexibility in their energy usage is consistent across all customer categories. The most appropriate approach to meeting those flexibility requirements varies by customer category.

As Ireland moves toward net zero by 2050, we will see continued growth in the volume of renewables generation connecting to the grid. Wind generation will increasingly be located further away from demand centres and this will increase congestion on the electricity system. Flexibility from generators will be needed and is likely to be delivered via network connections, with increasing volumes of generators either connected via non-firm connections or hybrid connections. Through these new connection types, ESB Networks will be able to access flexible volumes from generators.

Appendix 3: Smart+ Retail Market Roadmap Supplementary Material

The table below describes the products/initiatives listed in the roadmap, alongside the relevant regulatory/legislative driver.

Product/ Initiative	Description	Regulatory/Legislative driver
NSMP Close Out	3-Phase WC Meter deployment, MCC03 -Cohort 2 Replacement, Keypad meter replacement	NEDS Action 1.9 Completion of smart meter rollout
Smart Meter Data Access Code Enablement	The Smart Meter Data Access Code is a set of rules and regulations, developed by the CRU, which will determine how smart meter data can be accessed by Market Participants and other third-parties. The main objective of the Smart Meter Data Access Code is to ensure customer interests, and their respective smart meter data are protected and secure. Permission Management and its tracking is an important aspect of this initiative also.	GDPR Regulations and CRU
Enduring Microgen	The interim Microgeneration solution has been in place since June 2022, however, this is operating outside of the Central Market Systems in ESBN currently. Following this successful implementation to facilitate payment to customers who are exporting their excess energy to the grid, there is a need to build the enduring market solution to integrate the microgeneration solution with the existing CMS. Additionally, a CRU consultation (Ref. CRU 2023-112 which ESBN has responded to) proposes a number of changes for an enduring solution which will require extensive work to the existing market systems, market designs and processes.	CRU's 'Clean Export Guarantee' decision paper

Product/ Initiative	Description	Regulatory/Legislative driver
Energy Sharing	The current concept of Energy Sharing is to provide customers with the ability to sign up to an energy sharing entity, and when there is excess energy within the energy sharing entity for a given half hour period, then that excess energy is used to reduce the quantity of kWh attributable to each member's retail supplier. The policy and rules regarding how energy sharing will work in Ireland are still currently unclear/undefined with many questions to be answered, but it is expected that an Energy Sharing solution is to be implemented according to the EU Directives.	EU amended Electricity Market Directive (EU/2024/1711)
Multi-Supplier Contracts	Multi-Supplier Contracts is the concept that each (large) appliance will be able to have a separate meter and supply contract with an Energy Supplier, i.e., an EV charger and a home heat pump may be metered separately and have separate contracts with various Energy Suppliers. This concept will move ESBN away from the fundamental Retail Market principle of 'one residence, one MPRN, one Supplier contract'. The policy and rules regarding how multi-supplier contracts will work in Ireland are still currently unclear/undefined with many questions to be answered, but it is expected that a multi-supply contract solution is to be implemented according to the EU Directives.	EU amended Electricity Market Directive (EU/2024/1711)
Enabling IT changes & upgrades	Implementing the IT foundations for all future Retail Market and Smart+ items. For example, the proposed SAP upgrade to the Central Market Systems to SAP S/4 HANA is likely to be an intensive upgrade requiring detailed planning across many different teams in ESB.	IT-Enabling Technologies
Energy Storage	There is a requirement to meet our 'Net Zero by 2040' target by introducing a greater volume of energy/battery storage onto our network. Numerous changes to existing systems and processes will need to be implemented to cater for this increase in energy storage, as well as correctly handling the associated data with each energy storage unit connected to the network.	Interim Metering Responsibilities for DSO Connected Battery Storage (MCR1214)

Product/ Initiative	Description	Regulatory/Legislative driver
Flexible MICs and MECs	There is a requirement from ESBN customers for increasingly large MIC/ MECs. There is also an increasing number of requests looking for connection to the network. In some cases, ESBN may be unable to guarantee the MIC/MEC as requested by the customer for various reasons. If ESBN is not in a position to offer a customer a firm MIC/MEC, this concept, if implemented, will allow ESBN to offer a non-firm MIC/ MEC that will require flexibility from the customer.	EU amended Electricity Market Directive (EU/2024/1711)
DUoS Tariff Reform	DUoS tariffs are paid to ESB Networks as RoI's DSO for the 'Distribution Use of System'. This is a fee that ESBN charges Electricity Suppliers for use of the Electricity Distribution System. There are currently 21 designated DGs (DUoS Groups) in the RoI market, but a review of this existing tariff structure is required to ensure it is fit for purpose for all future needs.	CRU Review
Retail Market / Wholesale Market Changes	There may be changes to the Wholesale Market processes which can/may impact the Retail Market, which we will need to be able to cater for.	N/A
Future of Manual Meter Reading	As Smart Meters currently replace the existing cohort of customer's legacy meters, the need for contracted meter readers will diminish but will never fully reach zero. There will be a cohort of customers who will, by default, opt out of the installation of Smart Meters. Separately, there will also be a cohort of customers with a smart meter installed but will only achieve a comms CTF value of 1 with no remote reading possible. How we manage these customers in the long-term future will need to be reviewed.	ESB Networks Review

Appendix 4: Flexibility Market Roadmap Supplementary Material

Detail of Flexibility Multi Year Plan actions for 2025 are as follows:

Objective	Actions
Non-Wire Alternatives	• Pilot end-to-end behind the meter architecture • Tender for locational summer flexibility to assist with outage management • Review further potential options for DSO demand flexibility products • Procurement of a flexibility market system • Plan to optimise electric vehicle (EV) fleet charging • Initiative to deliver network capacity in a localised area via a non-wire solution • Route to market for community-based flexibility participation • Initiatives to build awareness, education and engagement with demand-side flexibility for customers
New Products and Services	• Launch procurement process for demand flexibility product • Commence operations on Extra Large Energy Users (XLEU) product (subject to the determination of appropriate Large Energy Users to participate) • Issue offers for MVP (minimum viable product) time connections (for demand) to responds of expression of interest (EOI) • Develop an MVP and issue first offers for a flexible demand connections • Explore demand up flexibility products • Beat the Peak business • Complete learnings from FlexCharging EV Initiative • Develop a new EV initiative • Facilitate distribution customers to participate in TSO markets • Commence implementation of required capabilities for visibility, controllability and forecasting of distributed energy resources (DER)
Transparency and Reporting	• Publish a technical assessment of how the available smart EV charging and V2G (vehicle-to-grid) capacity can be maximised through network operations. • Engage across relevant parties to develop propositions for smart charging services, including an exploratory investigation of V2G services. Establish working group to explore barriers and enablers. Publish programme of work. • Publish Multi-Year Flexibility Needs Statements (Network Scenario Headroom Report) • TSO/DSO Coordination: particular focus on the joint operating model • Standard market regulatory reporting

The table below describes the products/initiatives listed in the roadmap, alongside the relevant regulatory/legislative driver.

Product/ Initiative	Description	Regulatory/Legislative driver
The National Outreach Programme	Educating customers and driving awareness to enable customers to engage with their local energy system.	NEDS Area 1A: Smart Services – Retail, Products and Incentives
Ireland's Electricity Community Toolkit	Resources created to support customers in engaging with Flexible demand.	NEDS Area 1A: Smart Services – Retail, Products and Incentives
Flexible Demand Connections	Flexible connections for network users with limited or no network capacity.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development and Area 3: New Demand Connections
XLEU Offering	Customers reduce their existing demand on the distribution system at time of high demand by switching to onsite generation through biomethane.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development
Demand Flexibility Product	Delivering demand reduction, by virtue of demand shifting or injecting power onto the distribution network for several hours (when needed to assist with congestion management).	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development
Locational Summer Product	Procuring flexibility to relieve grid pressure during maintenance periods.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development
Smart Charging / V2G	Using smart charging, vehicle-to-grid (V2G) technology and demand response programmes to enhance grid flexibility and reduce distribution network congestion. By charging during off-peak hours and discharging energy back to the grid during peak times, EVs could help balance the load and prevent congestion.	NEDS Area 1A: Smart Services – Retail, Products and Incentives; Area 2B: Demand Flexibility and Response – Procurement and Product Development and Area 2C: Demand Flexibility & Response – Technology, Platforms and Systems
Flexibility Market Product Development	Exploring and developing market products which can be used to address network congestion and by doing so, stimulate market liquidity.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development
Residential Demand Response	Products to enable residential customer participation in flexibility markets, including the 'Is This a Good Time' initiative.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development
Beat the Peak Business	A demand response scheme where eligible commercial electricity users can get paid to reduce their electricity demand between 4:30pm – 7pm, during the service window on business days.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development

Product/ Initiative	Description	Regulatory/Legislative driver
Demand up product	Product to increase customer demand at times when renewable generators might otherwise be constrained.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development
Day ahead and intraday flexibility products	Introduction of platform for day ahead and intraday trading of flexibility.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development
Capital Reinforcement deferral	Using flexible demand to allow ESB Networks to optimise the use of the system, giving the potential to defer capital reinforcement.	N/A
Voltage Management	Conservation Voltage Reduction (CVR) is a means of reducing demand by reducing system voltage to the lower range of the voltage standard.	N/A
Flexibility management systems	The digital platforms and control systems that enable dynamic coordination of electricity demand and supply play a crucial role in balancing supply and demand, reducing reliance on any fossil fuel back-up power and enhancing grid stability.	NEDS Area 2A: Demand Flexibility and Response – Market Frameworks
Behind the Meter Standards	Shaping interconnection standards, architecture and recommended practices.	NEDS Area 2B: Demand Flexibility and Response – Procurement and Product Development and Area 1D: Smart Services – Standards and Interoperability

Appendix 5: Operations Transformation Supplementary Material

This appendix provides detail on a selection of the new and enhanced capabilities that will be developed as part of operations transformation.

Developing New Operations Capabilities

The table below details both high level areas in which capability will be developed to facilitate DMSO transformation, and the specific capabilities that will be either enhanced or introduced, alongside a description. Many of these capabilities already exist as part of ESB Networks responsibility to safely and reliably operate the distribution system.

High Level Capability	New / Enhanced Capability	Description
Manage Operational Planning	Manage Resilience	A capability to develop scenarios that ready the system for extreme events, planning for how an impaired distribution system could be managed in such a way as to absorb the impact, sustain critical system operations, and contain or limit the disruption; this includes developing contingency plans to limit the extent, severity and duration of system degradation.
	Forecast System Conditions	A capability to forecast – and mitigate – system conditions - which include events that trigger alarms within the control centre or alerts - that signal issues on the distribution system, including potential breaches/violations of pre-determined limits; this assists operational planning and real-time operations in maintaining optimal system performance
	Determine System State	A capability to calculate the steady state operating conditions of the distribution system, including bus voltages, active and reactive power flows, and line losses. This capability includes the ability to, as required, estimate the actual operating state of the distribution system by accounting for the possibility of erroneous and/or missing data; this includes using statistical methods to remove measurement errors and interpolate missing data

High Level Capability	New / Enhanced Capability	Description
Manage System State	Monitor HV, MV and LV System	A capability to monitor the high voltage, medium voltage and low voltage systems in real time, triaging and prioritising alarm-generated alerts and notifications – as they arise – that signal issues on the distribution system
	Operate (Within) Thermal Limits	A capability to operate the distribution system within predefined, acceptable thermal limits, managing the physical limits to the amount of power that can flow through the distribution system's electrical wires, equipment and components (to prevent/mitigate overheating and overloading). This capability includes the ability to resolve/mitigate thermal constraints, when the amount of electricity that flows from one location to another exceeds the capacity of the circuits connecting the two locations.
	Operate (Within) Voltage Limits	A capability to operate the distribution system within predefined, acceptable voltage limits; this includes implementing the necessary measures to keep voltage levels. This capability includes the ability to resolve – or mitigate – voltage constraints (this may include where applicable the use of reactive power management).
Manage System Defence and Restoration	Manage Storms	A capability to forecast and monitor weather conditions for approaching storms and assess the potential impact of these storms on the distribution system. This capability includes the ability to triage and prioritise repair and restoration activities – addressing downed or damaged power lines, fallen live wires, fires and power outages – in storm-affected areas.

High Level Capability	New / Enhanced Capability	Description
Coordinate Whole-Electricity System Operations	Coordinate Operational Planning	A capability to coordinate – working with the TSO – the management of whole-electricity-system operational planning; this includes developing forecasts – to inform the estimation of future system state and operating conditions – and, subsequently, setting ahead-of-time limits to maintain optimal system performance. This capability includes the ability to jointly develop scenarios that ready the broader electricity system for extreme events, simulating the likely upstream/ downstream impacts and, accordingly, planning for such events materialising.
	Coordinate System State	A capability to coordinate – working with the TSO – whole-electricity-system operations, actively managing bi-directional flows across the transmission-distribution boundary under normal conditions; this includes managing any upstream/ downstream impacts from (i) operating within thermal, voltage and short-circuit limits, and (ii) managing loss minimisation. This capability includes the ability to coordinate the response to system conditions that necessitate the switching of load – without interruption – to alternative transformers, feeders and/or bulk supply points.
	Coordinate System Defence and Restoration	A capability to coordinate – working with the TSO – the management of a whole-electricity-system defence and restoration plan in response to major disruptions on the system, e.g. extreme weather events, a system emergency condition and/or an imminent shortfall of MW capacity. This capability includes the ability to, jointly, implement the necessary measures – e.g. load shedding – to mitigate/minimise the impact and, as required, restore load following a system blackout.
	Coordinate Unit Scheduling, Dispatch and Re-Dispatch	A capability to coordinate – working with the TSO – the scheduling, dispatch and re-dispatch of distribution-connected units to deliver whole-electricity-system outcomes, actively managing bi-directional flows across the transmission distribution boundary.

The table below provides detail on the five elements listed in the roadmap.

Roadmap Element	Description
Flexible Demand Connections	Issuing flexible demand connection agreements, with the necessary operational processes in place to facilitate this.
LV/MV Monitor Installation	Installation of LV and MV monitoring devices to give ESB Networks an active, real-time view of the LV and MV networks.
SCADA Upgrade	Enhancing operational technology capabilities including the supervisory control and data acquisition (SCADA) system to deliver tools which will support new operational functions in our control room.
Behind-the-Meter Standards and Pilot	Development of a standardised behind-the-meter interconnection architecture and associated standards that will enable distributed energy resources to safely connect to the network.
Cyber Initiatives	Continuing to ensure resilient operation of the network given increased risks as a result of exponentially more devices are connected for network monitoring, grid edge activities, distributed energy resources, and the digital enablement of flexibility services.

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