


Innovation and Research Strategy

2026



Delivering a cleaner
energy future



“Innovation and research will be critical in developing solutions that maximise the benefits of renewable and sustainable energy.”

Foreword

On behalf of SONI, I am delighted to publish this Innovation and Research Strategy.

The power system will require unprecedented change over the coming years; the Climate Change Act (Northern Ireland) 2022 commits Northern Ireland economy to:

- Ensuring emissions reductions of 48% from 1990/1995 level by 2030 and net zero carbon by 2050.
- Ensuring at least 80% of electricity consumption is from renewable sources by 2030.

Enabling transformational change in our energy system will require a fundamental transition for the electricity sector. Innovation and research will be critical in developing solutions that maximise the benefits of renewable and sustainable energy. We need to create clarity on how we will enable innovation across the next decade to meet the immediate challenges we are facing.

Collaborative relationships will be vital on our journey to net zero by 2050. They will inform how we change, plan, build and operate our power system to help us achieve Northern Ireland’s collective renewable and climate change targets. They will also enhance our capabilities, knowledge and processes.

This Innovation and Research Strategy is the first standalone SONI strategy aimed at enhancing our capability in this area. It is designed to help us become even more innovative by putting in place the necessary structures, frameworks and processes, to help drive innovation, which is at the core of what we do.

Collaboration with our partners has been fundamental in delivering on our current innovation programmes and will be vital as we strive to innovate further with our strategic programmes of work. Additionally, this latest revision of the Innovation and Research Strategy looks to further enhance these effective partnerships, as well as to build new relationships where required.

Many of these programmes are aimed at delivering on the Shaping Our Electricity Future Roadmap, which we deliver in partnership with EirGrid, and their implementation will be critical to its success. The proposed strategic innovation programmes are SONI's view of the important areas of innovation to be investigated. This strategy will ensure we can deliver effective solutions to a wide range of technical, economic and social challenges that have been identified by the Shaping Our Electricity Future Roadmap.

As part of our strategy, we are seeking to establish a technology enablement team who will be responsible for an annual innovation reporting process. Over the next year we will seek to consult on our multi-year innovation programmes. This reporting will include both programmes covered by the regulatory price control as well as proposed new strategic programmes, which will require appropriate regulatory support and funding.

SONI's new Price Control will be pivotal in unlocking innovation, which will play a central theme. It is an opportunity for Northern Ireland to establish itself as a global leader in clean energy, driving economic growth and delivering a just transition.

We need to understand what options and solutions are best for Northern Ireland, to ensure we are on the right path to deliver a reliable and cleaner energy future.

We are committed to reviewing and updating this strategy on an ongoing basis to ensure it enables the solutions required for Northern Ireland's collective renewable and climate change targets.



Gerard Carlin

Director of Networks and Innovation
SONI Ltd



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Importance of Innovation and Research

SONI plays a critical role in enabling power system changes

SONI is responsible for the planning and operation of a safe, secure, reliable, economic, and efficient electricity transmission system to ensure power can flow from where it is generated to where it is needed. Alongside our counterparts in EirGrid, we operate, implement changes and enhance the wholesale electricity market on the island of Ireland.

SONI plays a critical role in Northern Ireland, in enabling power system changes needed to integrate renewables and other emerging technologies that are essential for achieving our climate targets. We are a world leading Transmission System Operator (TSO) in variable renewable electricity integration. Through the successful progress of strategic innovation programmes such as DS3, we have developed solutions that allow us to currently operate the system with up to 75% renewable generation at any given moment, primarily from wind generation. Our collective ambition is to achieve whole economy net zero carbon emissions, resulting in the need for a transformed energy system. The key to this transformational journey is our ability to innovate and address ever more complex system, market, and infrastructure challenges.

The Northern Ireland Executive has set ambitious targets for the expansion of renewable electricity. In June 2022, the Climate Change Act (Northern Ireland) 2022 came into force. This legislation commits Northern Ireland to achieving emissions reductions of 48% from 1990/1995 levels and net zero carbon emissions by 2050. Part of this legislation updated the requirements of the Energy Strategy in setting a new target of achieving at least 80% of electricity consumption from renewable sources by 2030.



This significant electricity system transition will need to be delivered while retaining the essential reliability, resilience, and affordability of the Northern Ireland electricity system. We also need to consider the impacts of ageing infrastructure, the retirement and displacement of fossil fuel generators, an increase in renewable electricity supply, new technologies and storage, a rise in demand from large energy users and distribution connected customers, the social impacts of electricity infrastructure and a change in consumer preferences, behaviours, and expectations for their electricity supply.

The journey to net zero carbon will see many transformational changes. Demand patterns are expected to radically alter as transport and heating sectors are electrified. Taken together with demand growth from large industrial energy users, this will result in a significant increase in system demand. A significant portion of the generation that will be developed over the coming years, both large and small scale, will be powered by wind and solar energy. These sources are inherently weather dependent leading to periods

of both surplus and scarcity, resulting in a future where large quantities of surplus zero carbon energy needs to be stored, flexibly utilised, or exported from the island. This decarbonised future will cause unprecedented change in how we plan, develop and operate the island's electricity grids.

Over the coming decade new technologies such as vehicle-to-grid, smart tariffs, and lower cost renewables will give customers of all sizes greater choice of how they meet their energy usage. We expect that soon all segments of society, through the emergence of the energy citizen, will be able to increase their understanding and participation in energy markets. In the future we anticipate a more complex power system ecosystem, which from a system operation perspective will present unprecedented challenges. We need increased stakeholder engagement and collaboration with our existing and new partners. We need all parts of the power system ecosystem to actively participate as innovation champions to bring solutions that unlock the benefits of whole system thinking.



Purpose

“Accelerating collaborative innovation to deliver whole-system solutions for a secure, decarbonised energy future.”

In February 2025, we launched our new corporate Strategy 2025-2031 focused on meeting Northern Ireland’s collective renewable energy ambitious through significant collaboration and partnership working with the Northern Ireland Executive and the Utility Regulator. Delivering on the targets requires an accelerated understanding of the energy system over multiple time horizons and continual delivery of novel, whole system solutions to overcome the challenges ahead.

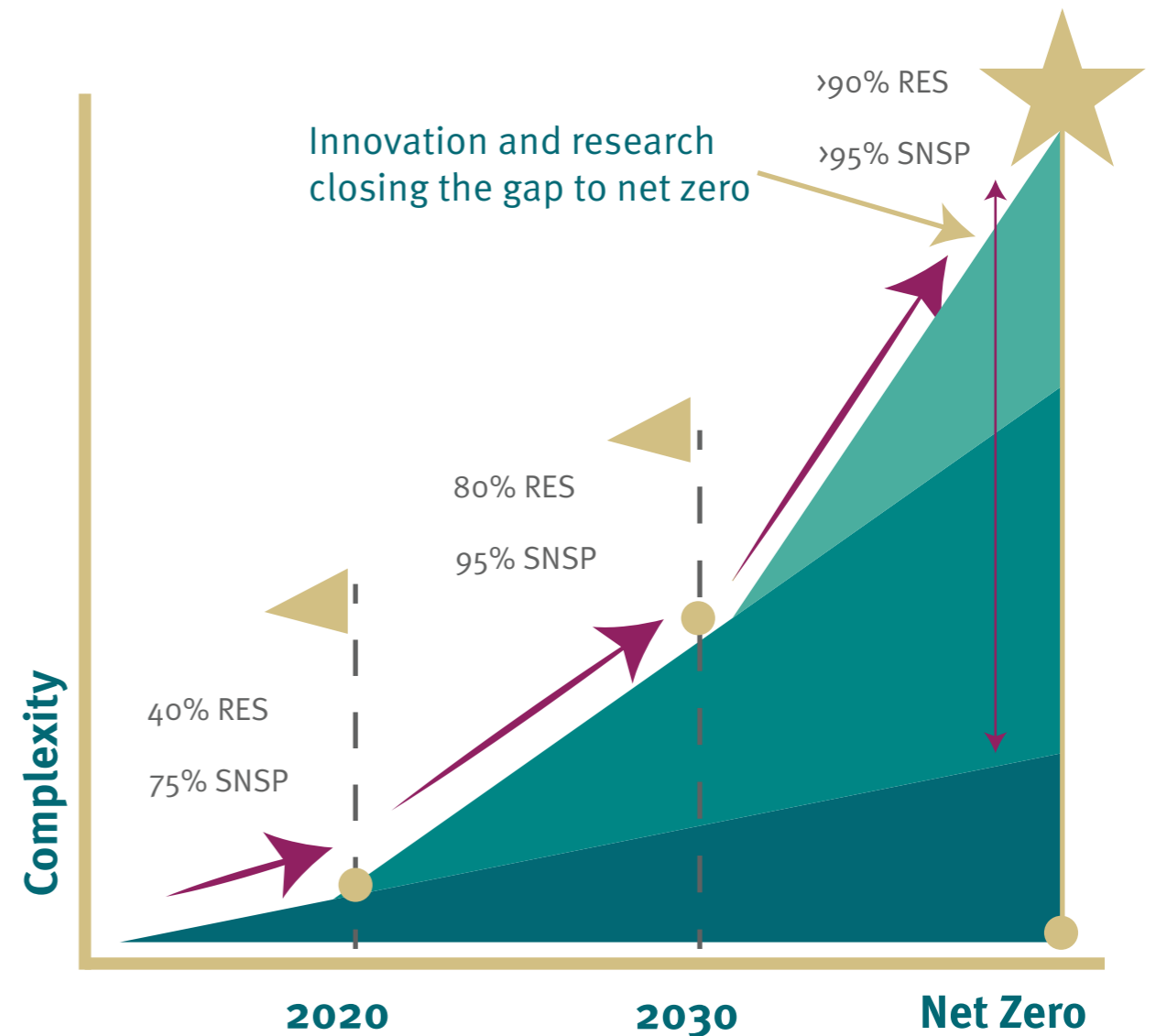
Our Strategy 2025-2031 states our commitment to build our research and innovation capabilities to support evidence-based decision making. The purpose of our refreshed Innovation and Research Strategy is to position SONI to innovate at a greater pace and scale to address these ever-more-complex, system-wide challenges.

We are currently delivering a portfolio of innovation programmes to achieve government renewable and emissions targets. The net zero carbon targets now necessitate enhancing and accelerating our approach to overcome the natural limitations of many established technological, operational and market practices, and delivering ever-greater innovation capability and solutions to address whole system challenges.

We also need to accelerate and scale how we innovate, ensuring our efforts are fully focused and co-ordinated to efficiently solve the highest priority challenges alongside key partners and the best national and international research organisations.

SONI’s role is to provide efficient and effective solutions to decarbonise the all-island power system on behalf of society while maintaining a reliable and secure electricity supply for consumers. In support of this, our Shaping Our Electricity Future initiative outlines a blueprint for a secure transition to deliver an electricity system that can enable up to 80% renewable power system by 2030 in Northern Ireland.

At present we recognise the many challenges that lie ahead which will require innovative solutions. This Innovation and Research Strategy will help prepare SONI to close the gap, recognising the need to collaborate in a different and more comprehensive way across a wider spectrum of stakeholders, working together to solve challenges and successfully meet the government set targets. Finally, it identifies several strategic innovation programmes aiding us to meet the targets.



SONI Strategy 2025-2031 “This new phase marks a pivotal period in our organisation’s history and presents significant potential for change and innovation.”

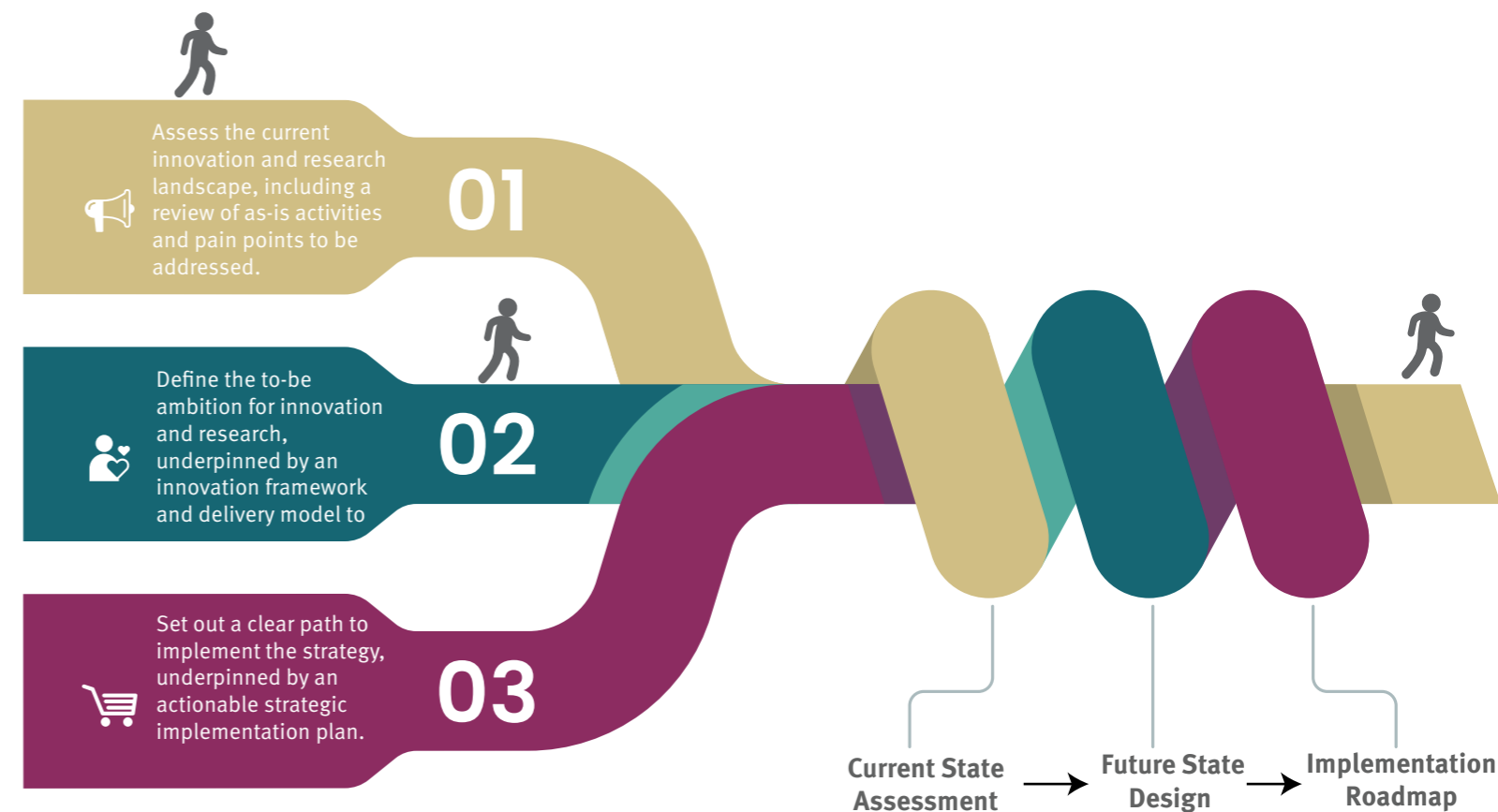
IEA Global status of clean energy innovation in 2020 “A clean energy transition to net-zero emissions requires a radical change in both the direction and scale of energy innovation.”

Climate Change Committee (CCC) report on Northern Ireland’s Fourth Carbon Budget “Reducing dependency on fossil fuels will increase economic resilience against price shocks in volatile international fossil fuel markets.”

Development Approach

We have drafted this Innovation and Research Strategy with the aim of enhancing our innovation and research capability. It is designed to help us become more innovative by putting in place the necessary support structures, frameworks, and the people, who help make innovation part of who we are and how we go about doing what we do. In drafting this strategy we have considered the following:

- **Where we are:** Assess the current innovation and research landscape, including a review of as-is activities, existing governance, risk appetite, capabilities to be leveraged and pain points to be addressed.
- **Where we want to be:** Define the to-be ambition for innovation and research, underpinned by an Innovation Framework that activates our innovation purpose, identifies future capabilities needed and articulates a clear and transparent end-to-end process. Develop the delivery model to realise this to-be ambition, including governance.
- **How we will get there:** Set out a clear path to implement the strategy, underpinned by an actionable strategic implementation plan and clear roadmap to deliver the strategic innovation programmes.



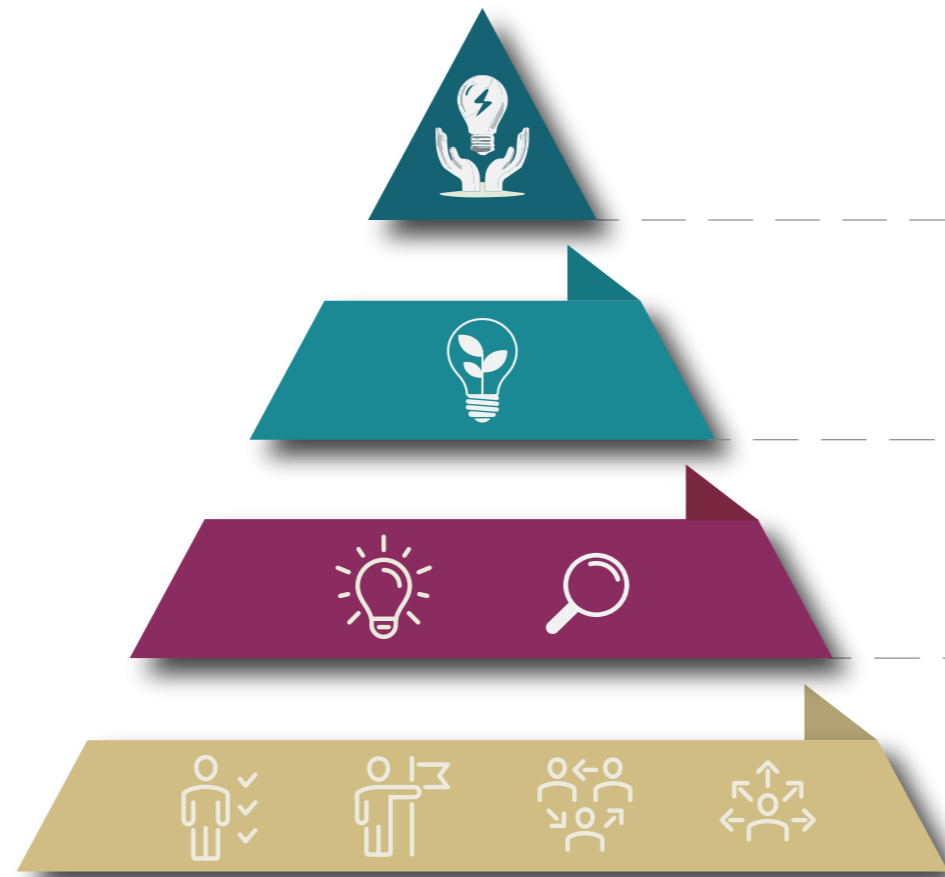
Strategy Overview

Our ambition is to enhance our approach to innovation, actively pursuing and implementing new solutions, both established and novel, to improve the way we work and the technologies we deploy. We will also enhance our approach to research, horizon scanning and investigating to further our understanding of future challenges and opportunities to deliver on the government targets.

We have defined an ambition which recognises our pioneering renewable integration capability in tandem with a need to be a fast follower of advancing innovation where appropriate. The fast follower approach enables us to utilise our investments strategically, minimising risk by adopting innovations and research from across the industry to the unique environment of the island of Ireland. This approach will enable us to work on several concurrent strategic programmes, learning fast and moving on to deliver the maximum value to the citizens of Northern Ireland.

The focus of the strategy is to identify and define the factors that will enable us to deliver on our ambition. These core foundational elements can be summarised as follows:

- Innovation Environment:** To enable our teams and collaborators to innovate effectively, we must work in an environment that enables and encourages innovation. We have identified several key enablers that will directly challenge current thinking and look to leverage opportunities both internally and externally. As the environment changes, and the needs of innovators adapt, these key enablers will be reviewed and updated accordingly.
- Innovation Framework:** Enhancing the processes, governance, and toolkits to deliver innovation at scale that will help us realise our future ambition.
- Collaboration and Partnerships:** Enhancing a connected and inclusive stakeholder ecosystem that ideates, incubates and activates innovation collaboratively with others.

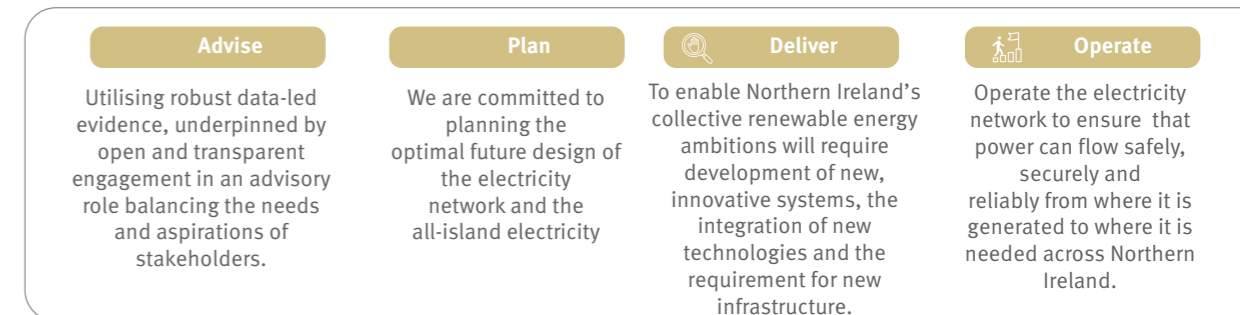


Our Purpose
Meeting Northern Ireland’s energy needs, today and in the future

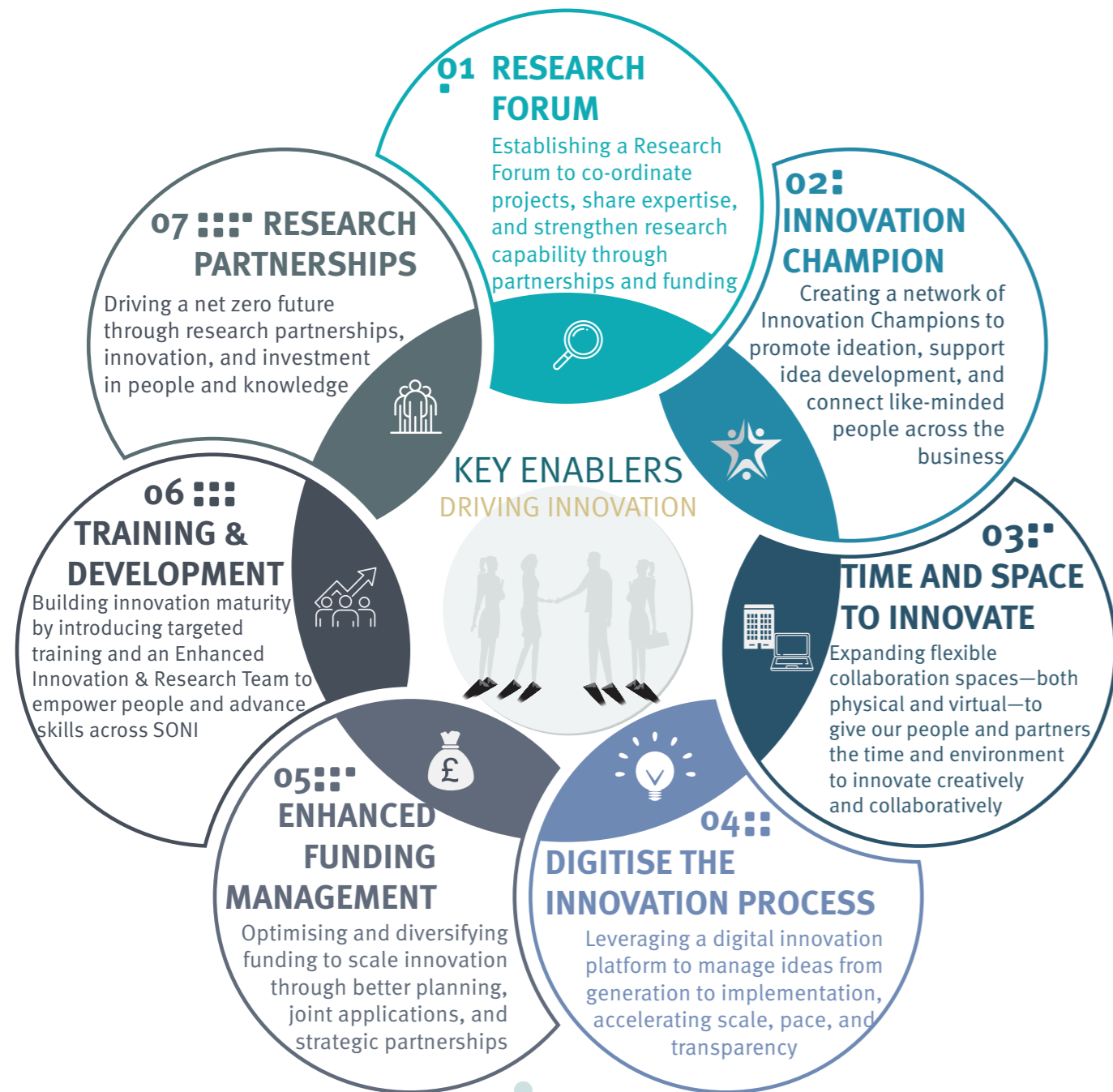
Enabling solutions to realise sustainable energy benefits

Innovation is the active pursuit and implementation of new solutions. These can be established or novel. “It enhances the way we work and the technologies we deploy to transform the power system.”

Research is the process of horizon scanning and investigation to further our understanding of future challenges and opportunities to deliver a net zero power system.



We have identified several key enablers having the potential to enhance our ability to engage and collaborate more effectively with relevant stakeholders and partners as we innovate.



01 RESEARCH FORUM

To ensure that research projects and research needs are shared and coordinated across SONI, we will establish the Research Forum. The aim of the forum would be to enable subject matter experts across the company to share information on research activities to enhance knowledge sharing and facilitate a co-ordinated and efficient approach. We want to push this further to enhance research capability through partner diversification, secure additional funding to increase volume and value of research.

02 INNOVATION CHAMPION

To ensure that every idea – whether incremental or pioneering – gets heard and progressed appropriately, we want to establish a network of Innovation Champions across the business. Their task will be to promote ideation within each directorate supporting our people developing their ideas. They will oversee sharing ideas within the organisation and connecting like-minded people.

03 TIME & SPACE TO INNOVATE

Our people are eager to innovate and are bursting with great ideas. As innovation requires time and space to thrive, we want to offer our people opportunities and time to innovate away from operational responsibilities. Therefore, we are going to expand our range of flexible (physical and virtual) collaboration spaces to provide our people and partners an environment in which they can work creatively and cooperatively on pioneering solutions to challenges.

04 DIGITISE THE INNOVATION PROCESS

Digitisation is key to speed up the pace of innovation. To increase innovation process, scale, pace and efficiency, we want to enable digital management of enterprise innovation – from generation of ideas by internal and external sources through to the selection of ideas for implementation – by leveraging an innovation platform. This will allow us to share information and make it available to everyone within the company, thus promoting transparency.



“*Innovation flourishes when ideas are shared, spaces are open, champions lead, technology empowers, skills grow, and resources fuel progress.*”

05 ENHANCED FUNDING MECHANISM

This enabler seeks to optimise funding arrangements currently available and diversify funding options for future innovation and research. Additional sources will complement the regulatory funding sources. We also want to be involved in future partnerships and collaborations around funding opportunities. Therefore, we want to further enhance alignment with SONI priorities through effective planning and management of funding and increase the scale of resources and innovation through diversified funding sources, joint funding applications and efficiency.

06 TRAINING & DEVELOPMENT


We want to accelerate SONI’s innovation maturity. To enable our people to innovate in a targeted and efficient way, they need to be adequately empowered. Therefore, we aim to complement SONI’s training and development system with a set of Innovation and Research relevant training material. Leveraging this, we strive to establish an Enhanced Innovation and Research Team along with baseline innovation competency across SONI and promote advanced innovation skills in roles across the companies.

07 RESEARCH PARTNERSHIPS

Achieving a sustainable energy future requires collaboration beyond technical solutions. We are committed to partnering with universities, research institutions and consortiums. By fostering innovation through joint projects, we aim to develop new technologies, insights, and skills essential for a net zero future. These partnerships will not only advance academic research but also equip future energy leaders with practical experience. Investment in people and knowledge will help to ensure the transformation of our energy system benefits all communities.

Strategic Innovation Programmes

Several innovation projects are either in flight or due to commence as part of programmes of work, such as Shaping our Electricity Future. The programmes outlined have different lenses as to when the benefits will be realised, however all need to begin imminently to ready ourselves, so we can meet the targets. We will continually assess these programmes and will evolve them as learnings emerge.




Flexible Network Strategy

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

Benefits

- ✓ Reduce network congestion
- ✓ Serve as an alternative to extensive new network build
- ✓ Provide system services and operational flexibility
- ✓ Maximise utilisation of existing network assets
- ✓ Enable greater output from renewable energy sources
- ✓ Create potential economic benefits
- ✓ Improve reliability of the network
- ✓ In partnership with NIE Networks, enabling enhanced interoperability between transmission and distribution grids




Champion the Emergence of the Energy Citizen

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

Benefits

- ✓ Deepen understanding of active energy citizen behaviour and choices
- ✓ Strengthen our role in supporting community participation and policy alignment
- ✓ Improve planning through insights on new technologies and consumer investment
- ✓ Enhance flexibility and resilience via trials of smart solutions
- ✓ Support public engagement with best-practice research dissemination




Understanding pathways to 100% SNSP

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

Benefits

- ✓ Advance our readiness for operating at 100% SNSP
- ✓ Improve system stability through real-world insights on emerging technologies
- ✓ Reduce integration risks by validating solutions via MVPs and trials
- ✓ Enable informed investment decisions for future grid infrastructure
- ✓ Support renewable penetration and decarbonisation targets
- ✓ Build technical expertise and confidence in managing inverter-based resources





Setting the course for the Control Centre of the Future

Objective: Identify what security tools and capabilities are required to maintain the protection of SONI's control centres now and in the future.

Benefits

- ✓ Strengthen our cyber resilience against evolving threats
- ✓ Ensure robust detection, protection, and monitoring capabilities
- ✓ Build trust through partnerships with leading security providers
- ✓ Maintain a modern, adaptive security posture aligned with best practice
- ✓ Accelerate innovation with new tools and features for proactive defense
- ✓ Lay the foundation for the Control Centre of the Future






Prepare for a multi-purpose offshore HVDC grid

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

Benefits

- ✓ Enhance our expertise in HVDC technologies and future developments
- ✓ Prepare for multi-purpose HVDC grids by understanding infrastructure, operations, and market implications
- ✓ Influence global standards through participation in international HVDC policy and technical working groups





Plan for a net-zero, customer-focused, export-ready power system

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

Benefits

- ✓ Deepen our understanding of emerging renewable technologies and their large-scale potential
- ✓ Explore hydrogen as a long-term seasonal storage solution for renewable energy
- ✓ Investigate complementary technologies such as batteries, pumped hydro, and enhanced interconnection
- ✓ Prepare SONI to enable and capture benefits from mass deployment of new technologies and energy export opportunities



Future Directions

This strategy outlines our vision and ambition to enhance our innovation and research capability.

On an annual basis we will publish an Annual Innovation Report. This will outline the innovative projects and programmes of work which are enabling the delivery of Shaping Our Electricity Future roadmap. The report will also outline some of the longer term strategic innovation areas which we believe we need to investigate and seek feedback on. We will then provide this to the regulatory authorities and request additional allowances if necessary.

We will refresh the Innovation and Research Strategy as new learnings emerge, and we will evolve the Strategic Innovation Programmes where needed to ensure we realise our Innovation and Research purpose.



12 Manse Road, Belfast,
Co. Antrim. BT6 9RT.

T: +44 (0)28 907 94336
W: soni.ltd.uk