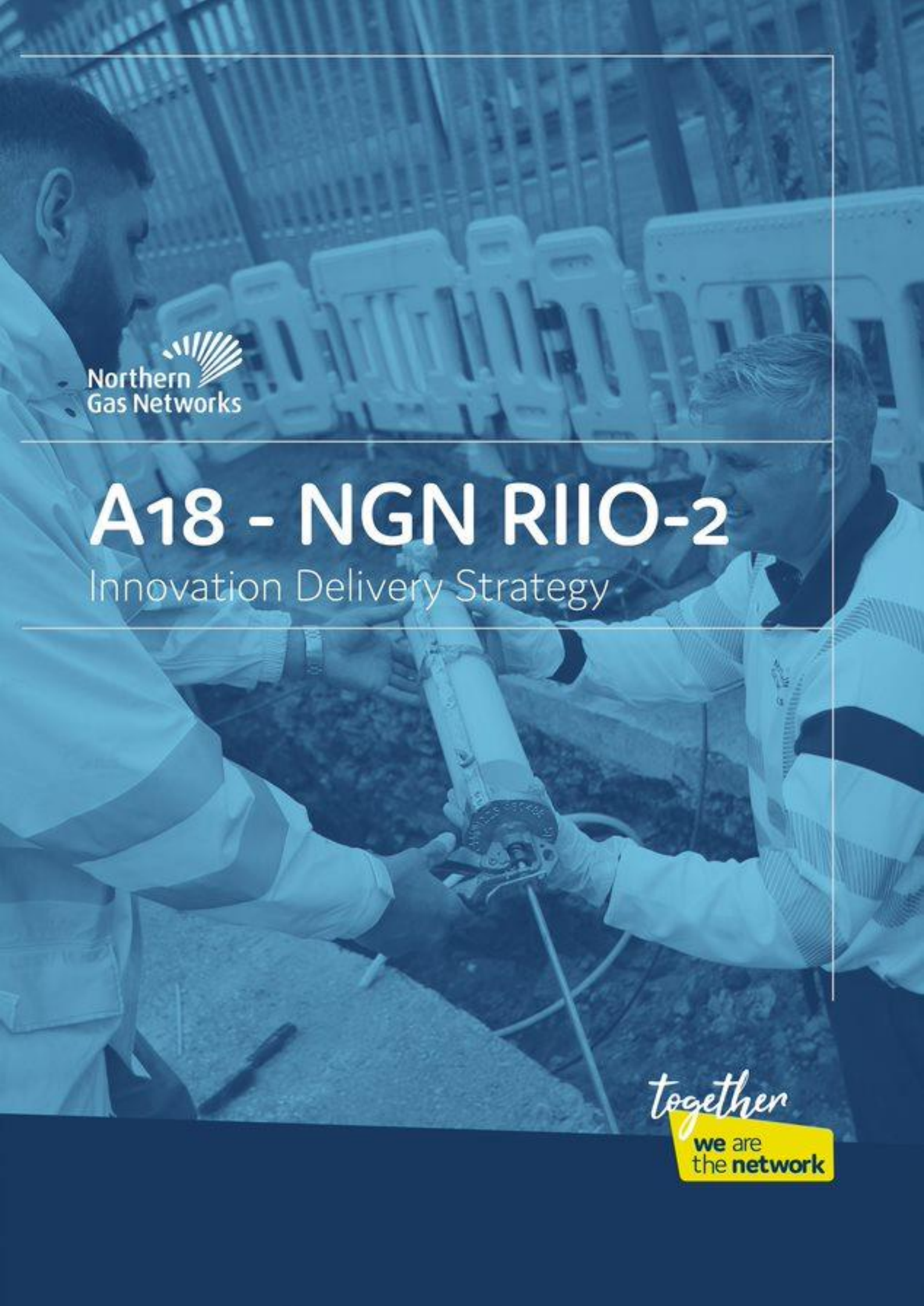

Northern Gas Networks

A18 - NGN RIIO-2

Innovation Delivery Strategy

together we are the network

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Foreword

This document outlines Northern Gas Networks' Innovation Delivery Strategy. This strategy addresses Ofgem's business plan guidance for us to provide information on our approach to innovation in our RIIO-2 Business Plan. We have developed this strategy in conjunction with key innovation stakeholders.

Importantly, NGN is committed to supporting the achievement of the UK's net zero emission targets and our Innovation Delivery Strategy sets out how we intend to contribute.

The purpose of this document has been to assist us with:

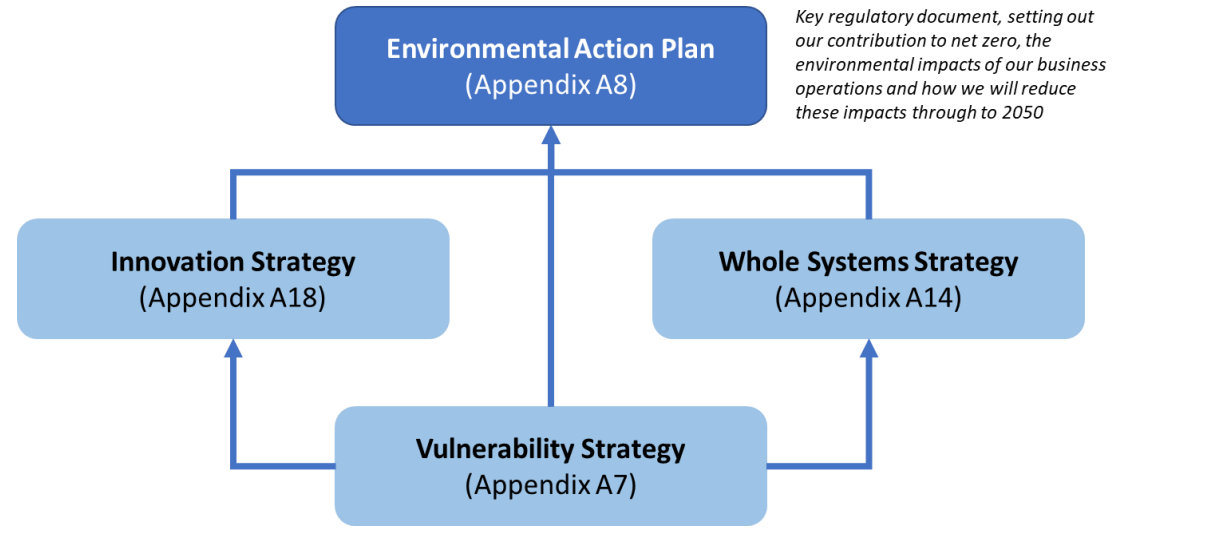
- delivering wider cost reduction and efficiency improvements on our business outputs
- determining and providing the research and development required to provide essential evidence to support the energy systems transition
- determining our role and impact on customer vulnerability and creating solutions to minimise impacts

We also note the interactions between this document, our Environmental Action Plan, Whole Systems Strategy and Vulnerability Strategy:

- *Environmental Action Plan* – this is the primary regulatory document that sets out the environmental impacts of our business operations as well as short-term initiatives to reduce these impacts and our long-term strategy to contribute to the net zero emission targets by 2050, for the benefit of customers.
- *Whole Systems Strategy – this document sets out our approach to adopting whole systems thinking in our business, with a focus on how we will contribute to the achievement of the UK's net zero emissions target.*
- *Vulnerability Strategy* – this document sets out our approach to working with customers in vulnerable situations in RIIO-2 and includes consideration for ensuring a whole systems focus in our approach.

These four documents are complementary and together, set out our contribution to net zero.

Figure 1: Our Contribution to Net Zero



Further information on our Whole Systems Strategy has been provided in Section 5 of our Business Plan, with this document providing additional detail to supplement our main Business Plan document.

Northern Gas Networks

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1 Executive Summary

Together, we are the network. At Northern Gas Networks, innovation is part of our DNA. We are developing an industry-leading culture of continuous innovation. Key to our approach is collaboration with our stakeholders to deliver benefits to our 2.7m customers across the North East, Northern Cumbria and the majority of Yorkshire.

We recognise the importance of the gas network in the wider energy landscape, helping to facilitate a low carbon economy while keeping costs down for energy customers. For us, the purpose of innovation is a dual one of delivering improved outcomes to our customers, while simultaneously understanding the role we need to play to help facilitate the Government's energy policy.

We believe a culture of innovation should permeate our whole business and not be restricted to a siloed function or purely driven from our leadership. All our employees are empowered to behave in an innovative manner, and relevant professional development is offered to give them the tools and confidence to innovate in their day-to-day roles.

We are ambitious. We believe innovation is fundamental to the future success of both our business and broader energy sector. Innovation facilitates the trialling, testing and development of new ideas and capabilities. It enables us to break the cycle of deploying the same technology, or simply adopting methods and equipment which has already been proven by others. Our customers and stakeholders want us to continue to deliver innovation projects both in the transformational and business improvement related categories.

We believe successful innovation projects, allied to the learnings from unsuccessful ones, provide the building blocks for the future. We have established a range of internal processes which allows us to progress innovation projects from ideas through to implementation with minimal approval hurdles. We want to continue to develop this, with a "fail fast" approach to innovation (supported by cost benefits analysis) and with more robust tracking of project benefits to further improve the way we manage our innovation projects.

We want to establish ourselves as the leading GDN for innovation, becoming the 'go to' GDN for suppliers and SMEs to trial and develop new products and services, while taking a lead in collaboration and sharing learning with and from others. In relative terms, we were the biggest utiliser of NIA funds through GD1. We have participated in the NIC, either solely or in a collaborative bid, in every year it has been available. In proportion to our network size, we are the GDN that has turned over the highest number of projects with the Energy Innovation Centre (EIC). Our innovation activities to date have enabled us to deliver £6m of savings to our customer in RIIO-1.

In GD2 we want to go further. The benefits realised from our innovation portfolio through the GD1 period has demonstrated the value which investment in innovation can deliver for our customers. We have ambitious plans for innovation across the next and future price controls. In this business plan, we have set ourselves challenging output targets which will require us to innovate to meet them. These targets include £24,000,000 of financial savings due to innovation – some of which requires further developments before it is operational. Consequently, as a business we are committed to expanding our innovation portfolio and will be investing even greater funds and resources to innovation and embedding learning into the business.

Over the next price control period, we have identified four priority areas to help us deliver on our aims.

Firstly, we want to continue to develop our people to empower them to innovate. We will expand on our existing training and streamline our internal processes to further embed our culture of innovation. We believe that this cross-organisational approach is crucial to making innovation a habit across the business. This will be supported by enhancements to our ways of working and the engagement we have with our stakeholders, alongside investment in projects delivering new technologies to enable better outcomes for our customers and stakeholders.

Secondly, we want to reduce the cost of innovation to our customers. To do this we will reform our innovation funding model. Our shareholders will continue to support innovation, we will also seek to leverage other existing funding mechanisms and we will ask our innovation partners for greater financial contributions towards specific projects. This will require deepening the relationships we have developed with technology providers and innovators during the last price control period.

Thirdly, we want to expand our collaboration with stakeholders to learn from other sectors. We do not want to be content simply sharing best practice across gas networks, or even energy networks. We want to work with leading innovators across a range of sectors to learn how we can improve our business.

Finally, we are committed to better monitoring of our innovation portfolio to understand what the business case for certain innovations looks like. This will enable us to engage with our stakeholders on the value of innovation.

It is crucial to demonstrate that innovation investment is delivering value for money is crucial and throughout RIIO-1 we have been actively tracking and reporting on both the quantitative and qualitative benefits of completed projects, and the subsequent adoption of the solution. We will continue to track and report on benefits in RIIO-2 as part of a collaborative framework.

The challenge of accurately measuring the impact and value of an innovation project is complex, and in recent years we have worked with the EIC and other GDNs and DNOs to develop a collaborative, industry-wide framework to report on the outputs and outcomes of innovation.

The framework enables comparable review, and in RIIO-2 we understand that the clear, detailed reporting of return on investment is required. Additionally, where projects are proven successful and have been deployed into BAU, we will report on performance against the cost of investment.

2 Our Leading Innovation Culture

2.1 Our vision for innovation in NGN

NGN Innovation delivers improvements for our customers and networks, actively seeking ideas to help us modernise today and prepare for tomorrow.

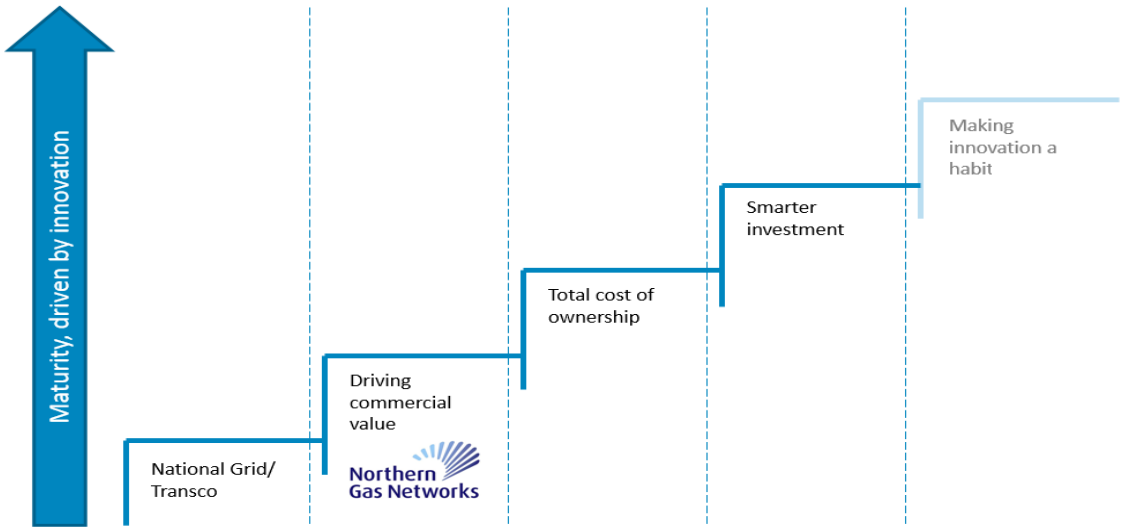
Through collaboration with colleagues and suppliers, we're developing new and novel solutions to deliver valuable benefits and make lives easier.

2.2 Our innovation journey

We have not just started innovating in the last price control period. We have been gradually developing our innovation model over several years as shown in Figure 1 below. The innovation stimulus in the last price control in the form of NIC and NIA has acted as a strong catalyst to our innovation activities. Allowing us to devote more resources to innovation, trial and develop new concepts and work with a much greater range of parties and technology providers.

We will continue to innovate and deliver positive outcomes that have been identified as priority areas by stakeholders at external forums, partnership reviews and through challenge groups.

Figure 2 Evolution of our innovation programme



The progression of our innovation model is directly linked to our culture as an organisation, investment in people and devolved innovation portfolio where all colleagues are encouraged and supported to innovate.

Table 1 Evolution of our innovation programme

Time Period	Pre-2005	2005-2010	2011-2013	RIIO-1	RIIO-2
Key Business Challenges	• Day to day management of the network	• Step change in commercialisation and efficiencies to meet demerger expectations • Disciplined control of demerger cost and delivery of step changes in operational performance	• Continue to meet stakeholder expectations • Continue to drive productivity and value for money • Ensure the network can transition to a low carbon economy	• Responding to new and smarter technology • Other sources of gas in the network • Potentially changing usage pattern of energy	• Keep bills affordable • Improve the customer experience • Inform policy decisions: on future decarbonisation of the energy sector • Improve the way we manage our network
Key Innovations	• PE pipes • Insertion	• Market-tested strategic asset management model underpinned by a commercial asset services agreement • Partnering with a strong utility provider	• Total Cost of Ownership model • New business model • Measurable asset health • Total Network Management • International benchmarking	• A variety of technology-led solutions • Potential new approaches to using smarter data and distributed sources of gas	• Developing smarter ways to deliver core network services, with focus on the needs of vulnerable customers. • Focus on transition to net-zero and provide evidence to support a policy decision on hydrogen. • Exploring automation and analytics to enable a technology driven and digital network.

2.3 Our innovation culture in NGN

A culture of innovation permeates our whole business and not be restricted to a siloed function or driven exclusively by our leaders. Throughout RIIO-1, all our employees have been empowered to behave in an innovative manner, and relevant professional development is offered to give them the tools and confidence to innovate in their day-to-day roles.

We believe our culture and specifically the devolved nature with which we approach innovation, is a key differentiator for our business. Our ambition is to become one of the UK's leading companies, with a reputation for a high-quality approach to business, delivered through a united and empowered team. This has been translated into a unique set of core values that reflect and reinforce our culture, several which apply directly to our innovation agenda:

Trailblazing approach - *we will strive to become an effective people-first organisation that promotes pioneering collaborative thinking and revolutionary practices across all aspects of our business*

Intellectually Curious - *we believe in the power of combining intelligence, experience and curiosity to deliver innovative, invigorating, future-proof and sustainable ideas*

Empowered people - *we are a business that values and encourages individuality, teamwork, passion, courage, new experiences, growth and change*

2.3.1 Trailblazing approach

We believe that innovative behaviours need to permeate our entire business to maximise the value we can deliver for our customers. We believe a true measure of innovation is the ability to both generate ideas and deliver on them. We do restrict our sources of inspiration – anyone in the business can raise an idea. We look externally to see what our partners, SMEs, fellow GDNs and other companies have delivered which may be beneficial to us. These ideas are then tested and challenged, and if taken forward, delivered in a manner which ensures we learn the lessons and can feed knowledge back into the process – making innovation a self-sustaining ecosystem.

We are constantly looking to do the right thing for our customers by helping to reduce their bills and improve the levels of service we can provide. This means having the confidence to challenge accepted norms, and to explore if there are better and more efficient ways of operating and delivering change. Therefore, we have developed a culture where fear of failure is not allowed to stifle innovation - failures can be key to future success, and delivery of value back to our customer base.

Consequently, the role of our innovation team is not to run trials in silo from the rest of the business but to continually identify, evolve and embed innovation as a competency across the organisation. Their role is to inform, educate and mature our culture through training, engagement and quality assurance of our ideation, development and roll-out activities.

2.3.2 Intellectually Curious

We encourage our people to question how we do things and take an interest in the world outside NGN to identify improvements. As part of the delivery of innovation projects, we work with many different partners and SMEs. Consequently, our employees are a great sounding board for potential innovation projects, and we use digital surveys to help monitor appetite and identify potential use cases for technology.

We believe in supporting the local economy, as this will help ensure we have engaged, local

stakeholders who can contribute ideas, support initiatives, and bring relevant perspectives to our innovation work. As an example, through GD1 we have organised the contracted delivery of REPEX through around 30 small, locally based SMEs, rather than through the more traditional larger national companies.

We give our employees the time and opportunity to listen to, and learn from others, who may have wider experience in the gas industry, or from other industries. This helps build our internal knowledge capital, spawn's ideas, and gives our employees access to information regarding the latest technological advances. We encourage engagement with the market to find better ways to do things. We engage the market through assessing the suitability of solutions proposed by suppliers and by seeking specific solutions to problems via "calls for innovation".

2.3.3 Empowering our people

Having given all our staff responsibility for innovation and asked them to question to the way we do things, we want to empower them to change how we run our business. To support this, in 2015 we set up our Innovation Think Tank. This is an internal forum, consisting of specialist colleagues and expert practitioners from across the business, which has the authority to approve innovation projects. The Think Tank meets monthly and has the core aim to sanction innovation projects and play back the outcomes from completed or in-flight projects. A key mantra for the Think Tank is that "no idea is a bad idea", and an informal "no negativity" rule exists. Decisions are consensus based and made in an evidenced-based manner, not based on traditional organisational hierarchies.

Potential innovation projects can be proposed from any person within the business and are presented and assessed by the forum. We believe in empowering our colleagues and expediting the delivery process where possible - all projects which meet or surpass the assessment criteria and scrutiny of the group are progressed. For all projects up to the value of £100k, no further approval from senior managers/directors is required. Supporting the Think Tank are weekly innovation stand- ups with director-level colleagues – designed to ensure constant communication with interested parties regarding the progress of innovation projects.

Our innovation projects are, in the majority of cases, led within the business and delivered by our employees. We believe that this approach helps ensure projects are fit for purpose to meet the needs of our network. It also further develops the skills of our employees, enabling us to harness the experience of our colleagues, and ensures knowledge capital is retained for future projects and/or implementation in order to maximise the benefits of innovation for our customers.

2.4 Embedding innovation as a habit across our business

We have confirmation from stakeholders that we have the right approach and culture of innovation to build upon. Our vision for delivering innovation in GD1 has been "weaving Innovation into the fabric of NGN". In GD2 we aim to take this to the next level by "making Innovation a habit".

Our innovation successes to date has been built around empowering our staff and giving them the freedom and scope to innovate. We see expanding this approach as crucial to our continued success. Figure 2 below outlines the key stepping stones to deliver this commitment and highlights the approach that we will further develop the culture of innovation within NGN.

Figure 3 Stepping stones to embedding innovation as habit in NGN

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2.5 Our Personal Development Plan

To provide structure and stability to something that is by definition uncertain, we offer an internally developed innovation professional development course within NGN as part of our employee development programme. This is designed to help further embed and grow the innovation culture within the company.

To support our colleagues, we created an internally developed innovation professional development program (PDP). Three development levels are available to colleagues, ranging through from gaining awareness of our innovation portfolio and how to become involved in innovation within NGN, through to the direct management of the innovation project. We offer our employees the three development levels outlined in Table 2.

Delivery of innovation projects is part of the performance objectives for our project managers, and in 2016/17 we launched a step-by-step guide to the delivery of innovation projects for our project managers. This is supported by mentoring, and in 2017/18 we recruited 36 experienced Innovation Representatives to help further embed innovation throughout NGN, this internal 'network' is continually growing.

A diverse mix of people manage and contribute to innovation projects within NGN, some have established management skills whilst others are field based engineers who possess technical skills, with no formal exposure to management techniques and the PDP provides a structured method for self-development and further embedding of a wider culture change. To date, 38 colleagues have completed an element of the PDP in its current guise.

In RIIO-2, we plan to further develop and embed this program to incorporate formal industry accreditation. The formal accreditation will support the required culture required for innovation to flourish and 'innovation professionals' will support the colleagues to create a wide 'innovation eco-system'. In RIIO-2, we also plan to further expand our network of 'Innovation representatives' within NGN – a business- wide network of colleagues that promote interaction between our dedicated innovation team and the wider business.

We have consciously delivered the clear majority of our RIIO-1 innovation projects through using existing NGN employees as technical experts to fulfil the role of project manager. This has provided tremendous development opportunities and ensured projects are closely aligned to our business needs whilst also creating a wider spread innovative community across the business.

Highlighted in Table 2 are the key component parts of the professional development programme, specifically what the key innovation learning objectives are.

Table 2 Our innovation professional development programme

Level	Key Learning Objectives	Topic Areas
Bronze – "An Appreciation"	• Focus on importance of Innovation within NGN and ownership of development and implementation	• Ofgem's innovation framework including NIA and NIC • Innovation culture in NGN and the wider industry • Why do we need to innovate? • Where does innovation fit within NGN and how do we support R&D? • How we look after our customers and stakeholders
Silver – "An Experience"	• Understand the benefit of innovation • Development of presentation skills, analysis of broad data sets, communication skills, time management and prioritisation	• Innovation Think Tank – candidates will become a member for a 2- month period. The candidate will be required to complete a short report on each proposal submitted • Innovation culture in NGN – candidates will support the relevant Innovation Team member at a local innovation awareness event
Gold – "An Impact"	• Gain knowledge of the required level of effort to successfully complete an innovation project in terms of product development, process management and engagement with colleagues for specific area of improvement Principles for investment decisions and business priorities	• Build on the Silver standard • Project/programme responsibility • Build business cases where applicable • Successfully present at the Innovation Think Tank (ISG if required) and obtain approval • Interact with key external/internal stakeholders

2.5.1 Expanding our Innovation Think Tank

We will undertake a number of improvements to our sector leading Innovation Think Tank:

- Expand the invite to selected third parties, to enable us to obtain a wider viewpoint and benefit from external expertise/challenge on our innovation ideas;
- Rotate attendance from individuals from areas across the business, to ensure diversity of opinions and viewpoints and increase exposure to the Think Tank to all staff;
- Increase transparency by publishing the minutes from each session on our internal systems, and ensure the meeting can be attended by anyone in the business with an interest
- The outcomes and decisions made will be documented and summarised in regular all-company communications, and fed into the innovation training as real-world examples

We believe that these steps will further develop our culture of innovation, so it is truly embedded throughout our organisation. This will build on our efforts in GD1 to empower our colleagues and to setup processes and mechanisms to deliver on the ideas and inspiration they highlight.

2.5.2 Use 'big data' to help identify and evaluate innovation opportunities

In RIIO-1 we have imbedded our new SAP HANA solution into the business. This is already starting to vastly improve the breadth and quality of data which we have in the business, providing predictive analytics and supporting data led investment decisions at a more granular level.

We will look to further mature and invest in our SAP HANA solution, ensuring it is the catalyst and backbone for further growth in our innovation ambitions. Building in "automation by default" will help free up resource to participate in value-add innovation activities.

The SAP HAHA solution will also enable us to fully leverage available data and integrate artificial intelligence and machine learning into our organisation to allow us to explore, develop and learn at an increasing rate.

3 Innovation Delivery Process

Alongside having the right culture and capabilities among our people, we have focussed on having the right processes in place to allow innovation and maximise the benefits it can deliver. These processes fall into three categories which we discuss in turn below

- Getting the right ideas into our business;
- Managing innovation projects effectively; and
- Working effectively with other gas networks

3.1 Getting the right ideas into our business

Through empowering our people, we have managed to generate several successful innovations, but we do not have a monopoly on good innovation ideas. The best ideas can come from cross-fertilising

different experiences, outlooks and capabilities. This requires engagement with third parties and facilitating an eco-system of innovation in which we are the party who helps facilitate and market test the innovation which others have developed.

We have established several avenues for this engagement. We have hosted Innovation Tours, in partnership with experts from our suppliers to demonstrate our technology to employees based in our offices and depots – the most recent ran for over 19 days, with over 500 people attending. We have found that as a result, we have developed a mutual understanding with technology companies and other providers – they understand our business and challenges and come direct to us to with ideas and we understand their capabilities and how that can help our business.

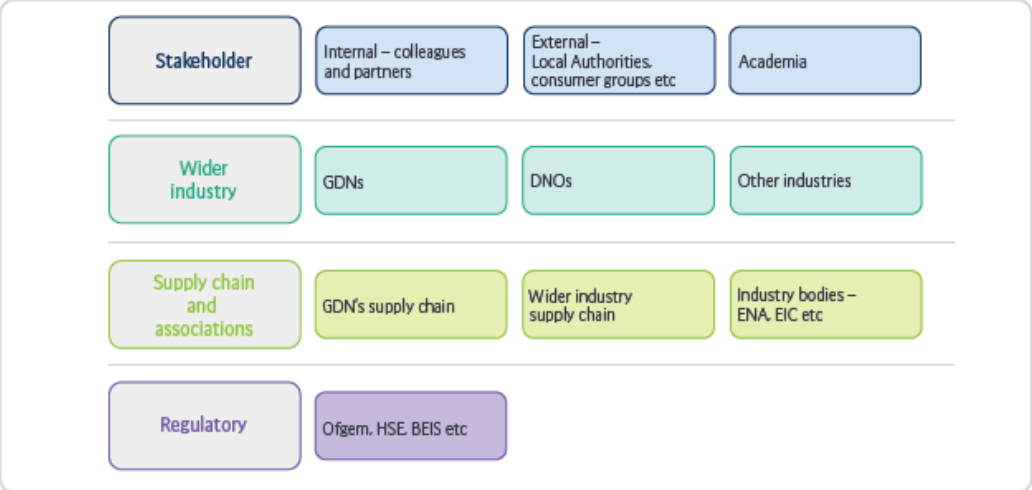
Now that we have established this type of relationship and are seeing parties come to us with great innovation ideas, we have made changes to our procurement rules to allow us to move quickly in appointing these types of suppliers in order to facilitate innovation and roll out.

Separately, we operate in partnership and engage with the Energy innovation Centre (EIC) using their "Call for Innovation" service or they come directly to us with proposition. The EIC acts as an industry wide conduit for small and medium sized innovators and technology companies. We use the EIC to outline specific challenges we are facing and invite solutions. Creating a strategy to effectively share information relating to innovation portfolio progression has been a key area of focus for both NGN and our stakeholders. We will use the established and recognised industry methods, such as a formal annual summary and annual collaborative conference as a foundation to build upon.

We will act on feedback from our stakeholders which suggests shorter, more regular engagement on innovation. We are devoting more time for our innovation team to lead this engagement, share our experiences with others, and bring back relevant learning into the business and to other GDNs. This relates to engagement about our live innovation projects and testing the ideas or challenges that have been presented. We are aware that our stakeholders are suitably placed to provide early insight and ensure that enough rigour is placed upon every project as it progresses through each stage of the innovation value chain, from idea to life.

There are four key groups that are critical partners as part of our innovation journey at NGN which are highlighted in the figure 3.

Figure 4 – NGN innovation stakeholders



We have identified several areas for further improvement, including:

- Setting up a permanent forum for innovation conversations to supplement traditional procurement exercises, allowing suppliers to showcase their products to us
- Developing relationships between suppliers and our colleagues, who are the end users of technology, not just procurement partners
- Expanding our list of innovation partners to those who offer 'innovation as a service'
- Making our data accessible to third parties, to better allow suppliers to innovate and further understand NGN's needs
- Further sharing of solutions with the wider industry, and adoption of successes proved elsewhere, to avoid unnecessary duplication
- Continue reaching out beyond the traditional boundaries of gas networks or even regulated utilities, and understand the culture, behaviours and processes of sector-leading innovators. Where we think we can learn lessons from such organisations, we will adopt them.

3.2 Managing innovation projects effectively

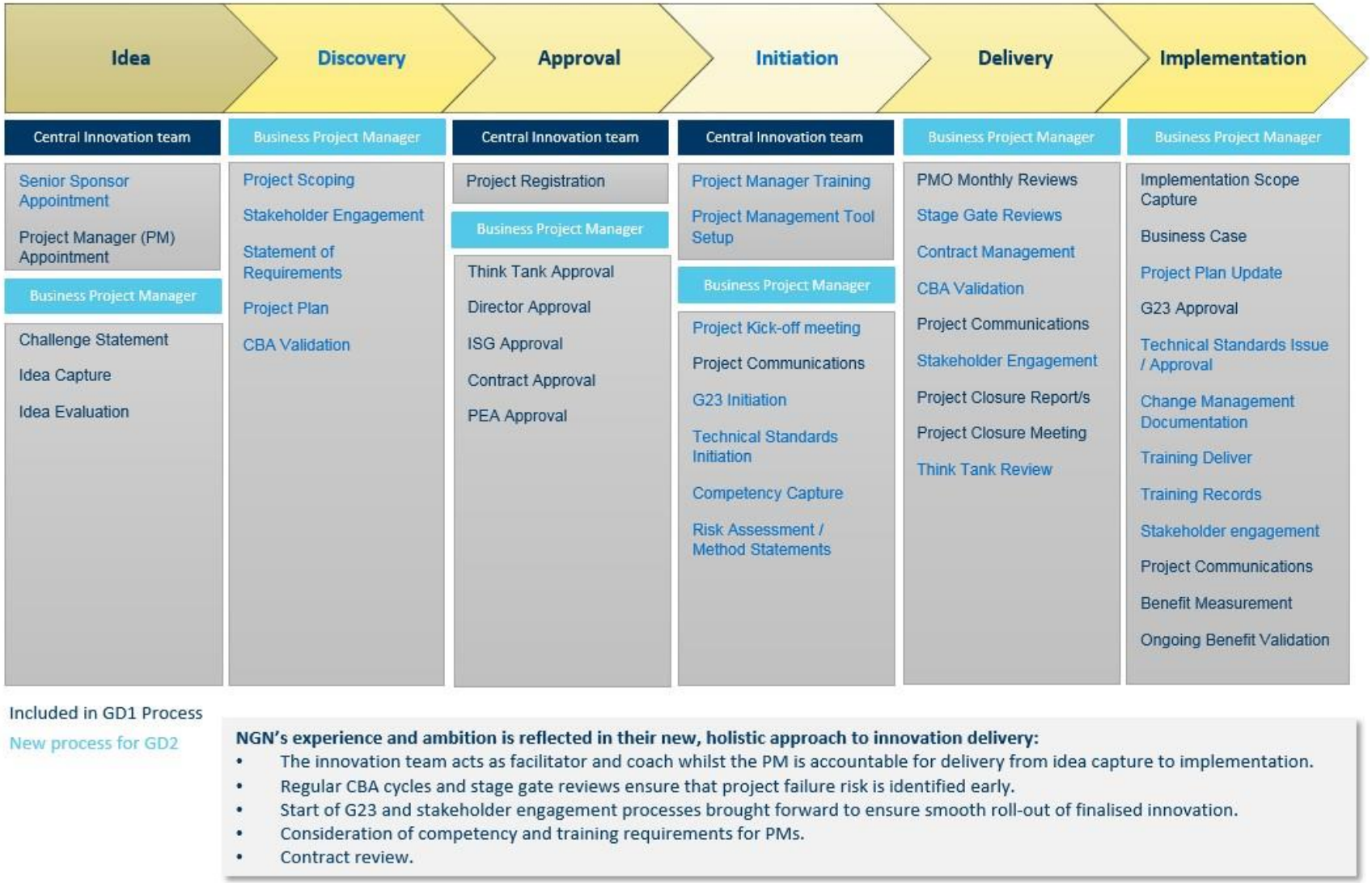
We do not just innovate for the sake of it. We innovate to understand how to improve our business and in doing so, deliver benefits to our customers. This means that we need to manage our innovation projects so that they are focussed on the benefits they deliver. We have implemented a process which allows us to assess the potential or delivered benefits at each stage of the innovation cycle – from initial idea through to implementation and maximise the benefits for our consumers

This process is outlined in Figure 5, along with the improvements we are implementing for GD2. In line with our approach of empowering our people, we are looking for the specific managers within the business to drive these activities forward, with the role of the innovation team focussing on oversight and ensuring consistency of approach. We believe that our approach is fundamental in avoiding the trap of creating a siloed innovation function which is divorced from the rest of the business. We find that our approach develops natural champions for specific innovations within the business, making it far easier to roll out that innovation.

We have identified that there are a number of improvements we can make as we transition into RIIO-2 that will increase the probability of project success. These include a better definition of the problem statement in the initial business case specification phase. The phases of innovation are key considerations, low TRL (high investment risk) ideas are significantly more complex than higher TRL (lower investment risk and closer to being commercialised) solutions and our revised innovation process will help identify barriers to realising a successful outcome earlier and ensuring that these are removed for the project. Aligned to this is the requirement to better understand the project data requirements up front. As we prepare for RIIO-2, we aim to reduce the cycle time from idea specification to successful delivery, and through a more robust approach to managing and tracking benefits, to more rapidly stop projects where targeted benefits won't be realised.

We want to continue improving the process of identifying and embedding innovation projects. Increased efficiency and working in a more agile manner will deliver more rapid benefits and ensure that innovation is adopted at scale, whilst tailoring our approach to ensure maximum take-up of innovation. To date, we have rolled out innovation on a small scale and then gradually ramped up implementation over time. The success of our innovation portfolio, combined with the improved process control and information we will receive on innovation benefits, has enabled increased ambitions in our roll-out plans. Where an innovation project cost benefit analysis demonstrates significant potential, we want to be able to implement it at scale, faster. We will enhance our internal processes and systems to adopt a more flexible approach to enable this.

Figure 5 NGN Innovation management process



Northern Gas Networks

Innovation proposals will only progress beyond the ideas stage subject to rigorous assessment and confirmation that it can meet our business case tests and be aligned with our five key principles designed to deliver improvement through innovation, and to ensure we do the right thing as a business:

- Optimise investment to deliver benefit for customers
- Collaborate with innovative partners
- Be efficient, effective and deliver value for money
- Deliver a portfolio to make us reliable and safe
- Be socially and environmentally responsible

Table 3 - NGN Innovation process to streamline the roll-out to implementation

Item	Detail
Idea	We use a specific "Ideas Capture Form" which is used to capture how an idea meets key criteria as well as indicating how it can deliver benefits into our business and ultimately to our customers. Anyone can submit ideas as part of our inclusive innovation culture. For an idea must be progress to the next stage it must meet a pre-determined scoring threshold and also have a project lead and senior sponsor identified in order to progress for review as innovation project.
Discovery and approval	In preparation for RIIO-2 and as part of our revised process, we have added a new discovery phase to our process. This is designed to help us to understand how the project will integrate within our business, if determined successful. We test it with both internal and external stakeholders, including other gas networks and use the feedback to inform a CBA validation which ensures that the results provide us with the best view of how the innovation can lower cost or improve service for our customers.
Initiation	This is a new and revolutionary phase of our process which has been established in readiness for transition to RIIO-2. The purpose is to ensure that every innovation project that has achieved approval to proceed is set up to succeed and increase the probability of seamless roll out into the business. As well as highlighting key risks, we also assess at this early stage what would be required for roll-out and make sure that the project manager is ready and able to proceed.
Delivery	A critical element of the delivery phase, other than research and development, is to validate the assumptions made in the business case for the innovation through cost benefit analysis validation. This is a crucial part, needed to understand the commercial factors that may impact future implementation. We consider it is vital this is assessed as part of the project progression to ensure that successful innovations do not 'sit on the shelf'.
Implementation	Continuity is key to enable a smooth roll-out and that the knowledge is directly deployed into the business, to the benefit of our customers. This framework for roll out includes making the changes to technical standards and delivering training required to our staff. This is coordinated by the project manager and business area lead, who takes ownership to ensure that the identified challenges that had been overcome throughout the project are met and that implementation of the new solution is complete and fully embedded.

3.3 Scaling up our innovation roll out ambitions

To date we have rolled out innovation at a small scale and then gradually ramped up implementation over time. The success of our innovation portfolio combined with the improved information we will receive on innovation benefits has given us the confidence to be more ambitious in our roll out plans. Where an innovation shows significant benefits, we want to be able to implement it at scale, faster. We will enhance our internal processes and systems to adopt a more flexible approach to enable this.

We want to continue improving the process of identifying and embedding innovation projects. In addition to the changes to the Think Tank proposed above, from a process viewpoint we recognise there is a need to increase efficiency and work in a more agile manner to deliver more rapid benefit and ensure innovation is adopted at scale across the business. We recognise that different implementation approaches may be required across the different regions in our network, and for projects of different levels of complexity, and we will tailor our approach to ensure maximum take up of innovation.

We have identified there are several improvements we can make that will increase the probability of project success. These include better definition of the problem statement in the initial business case specification phase, helping identify barriers to realising a successful outcome earlier and ensuring these are removed for the project. Aligned to this is the requirement to better understand the project data requirements up front. Through our lessons learned process, we're logging systemic challenges such as governance thresholds or cycle times for policy change and resolving these at a business wide level.

We aim to reduce the cycle time from idea specification to successful delivery, and through a more robust approach to managing and tracking benefits to more rapidly stop projects where targeted benefits won't be realised. We plan to implement a "fast track" process to enable the rapid adoption of "no brainer" solutions, where projects will be prioritised to enable early realisation of benefits.
Reducing the cost of innovation for our customers

4 Collaboration with other gas networks and industry bodies

We recognise that where innovation is funded by our customers, we have an obligation to work as closely as possible with our fellow gas network companies to make the most efficient use of that funding. Through the Energy Networks Association (ENA) we have implemented a number of process steps which help maximise the value of innovation funding.

The ENA's Gas Innovation Governance Group (GIGG) retains an up to date register of all planned innovation projects across the gas networks. This is updated monthly with planned new projects discussed at each GIGG meeting. The purpose is to both share all new ideas with other gas networks to avoid duplication across projects. GIGG has a standing agenda item to review the innovation list and discuss new projects.

Only once other gas networks have had chance to comment and confirm that the project does not conflict with other ongoing innovations and aligns with the themes agreed in the ENA Gas Innovation strategy do we proceed. It also provides an opportunity for other gas networks to collaborate on projects. We believe this process avoids duplication, ensures a good split of strategic innovation

priorities across gas networks and embeds a culture of collaboration which flows through into sharing subsequent learning from projects

In this spirit of collaboration, we regularly share the outputs of our innovation projects, leading to them being developed further or adopted by other GDNs. We firmly believe that there is benefit in an open-collaborative approach to innovation across all participants. In our view, it is essential that the open collaborative approach needs to continue across GD2 and beyond, to fully drive improved outcomes for our customers and the industry as a whole.

We regularly discuss with other GDNs the successful innovations projects they have carried out through GIGG. This is compiled on the industry wide 'Implementation log' that we helped create and update on a periodic basis, all GDN's share the detail behind the log which allows us to review and adopt and implement the resulting products or services where these fit with our business.

Engaging with a broad range of external stakeholders ensures we can adopt the best emerging processes and products available. Throughout the course of RIIO-1, we have formed partnerships and undertaken formal projects with 165 organisations. In addition, we have engaged with a total number of 260 innovative organisations as part of our strategy to look for gas-specific and cross- sector solutions to network challenges

We have established several avenues for this engagement:

- Innovation tours attended by colleagues and suppliers. The most recent of these ran for 19 days, with over 500 people attending. The events enabled suppliers to more fully understand our business and work directly with our colleagues to generate ideas.
- Energy innovation Centre's (EIC) - which acts as an industry-wide conduit for engaging 7000 small and medium-sized innovators and technology companies.
- The ENA Gas Innovation Governance Group (GIGG) – an industry group which allows us to share learning and ideas to enable collaboration with other gas networks.
- Collaboration with other CKI group companies across the world.
- Collaboration with other utility companies in our local area as we have formed the Regional cross utility group, facilitated by the EIC and focussing on cross sector challenges.

To build upon the successes in RIIO-2, we will extend engagement between external stakeholders, the supply chain and our workforce. A broader range of investors and innovation partners will enable a more diverse innovative culture across NGN and the wider industry.

4.1 Deeper collaboration across a broader set of stakeholders

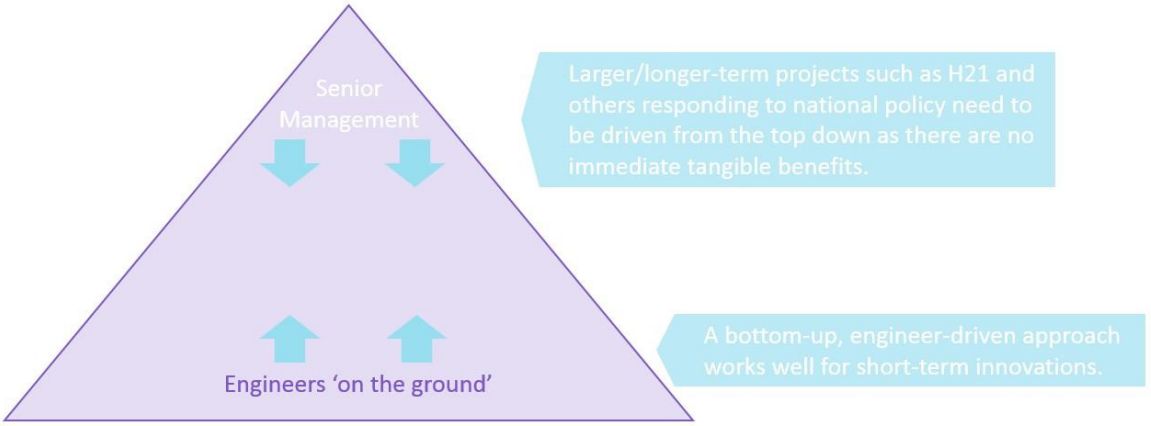
We have established excellent collaborative relationship with other energy networks over the GD1 period, to help understand the role we need to play in a whole systems approach to energy. We have also engaged more widely to form partnerships with suppliers and technology providers. Going forward we want to expand the way we engage with other networks – energy and non-energy focused – sharing learning wherever things are transferable and collaborative. An example of this is our commitment to the Infrastructure North initiative[1], which aims to minimise the social impact of infrastructure work, which we're looking to expand and formalise throughout GD2.

We plan to act on feedback from our stakeholders which suggests shorter, more regular engagement

[1] http://www.infrastructurenorth.co.uk/

on innovation. We are devoting more time for our innovation team to lead this engagement, share our experiences with others and bring back relevant learning into the business and to other GDNs. Stakeholders have praised the effectiveness of NGN's engineer-led innovations and highlighted that alongside the bottom-up approach utilised, top-down, strategic, long-term innovations are also important – as indicated in Figure 6.

Figure 6 Bottom up approach to innovation facilitated by senior buy-in



While the feedback on the innovation work done to date has mainly been positive, we are striving to continue this engagement, and further strengthen our stakeholder relationships and ways of working with the industry. We have identified several areas for further improvement, including:

- Setting up a permanent forum for innovation conversations to supplement traditional procurement exercises, allowing suppliers to showcase their products to us;
- Developing relationships between suppliers and end users of technology, not just procurement partners;
- Expanding our list of innovation partners to those who offer "innovation as a service";
- Making our data accessible to third parties, to better allow suppliers to innovate, and further
- understand NGN's needs; and
- Further sharing of solutions with the wider industry, and adoption of successes proved elsewhere, to avoid unnecessary duplication.

We also want to reach out beyond the traditional boundaries of gas networks or even regulated Utilities and understand both the culture, behaviours and processes of sector leading innovators. Where we think we can learn lessons from such organisations, we will adopt them.

4.2 Engaging with our stakeholders on the value of innovation

Our stakeholders are interested in understanding the value of innovation projects – particularly when it has been customer funded. We recognise that the processes we use as an industry to forecast and track the benefits of innovation could be improved.

Under our devolved innovation model, we have trusted the judgement of individuals within the business trialling the innovation to help define its success and measure the benefits. This has led to low overheads and been effective at implementing the "no brainer" solutions. However, it means that

the evidence to support innovation decisions is less detailed than we would like. Going forward, we are looking to adopt a new common approach to forecasting and tracking the benefits of all our innovation projects. This approach has been developed by Baringa Partners for the Energy Innovation Centre (EIC) and will be rolled out by all EIC members. It will provide a pragmatic way to use cost benefit analysis to understand the success of an innovation and check that the success is matched when the innovation is rolled out.

Alongside these financial benefits, we want to capture the wider improvements in service which innovation enables e.g. shorter repair jobs, improved safety and greater sustainability. We are committed to reporting innovation benefits regularly to our stakeholders to demonstrate these values. We believe this is a crucial part of creating a legitimate basis for our innovation activities. The legitimacy is crucial in fostering the innovation eco-system which we want to establish with our customers and wider stakeholders.

5 Our innovation strategy

5.1 RIIO-1 strategy

All UK gas networks faces similar challenges. We all need to deliver a safe reliable service, at the best price, while preparing for decarbonization and a net zero future. To provide greater coordination around innovation, the five UK gas networks (consistent with the transporter licence) jointly created and now maintain a national innovation strategy.

This helps the gas industry share knowledge, avoid duplication and provide a clear steer to the supply chain, decision-makers and the public about the sectors priorities.

The existing RIIO-1 strategy is structured around seven innovation themes which set out the challenges we face as a business:

- **Future of gas** the gas network plays a vital role in the current energy system. What role should it play in the future? How will technology, policy and customers' demands evolve and what does that mean for network innovation?

- **Safety and emergency,** we always seek to minimise the risks of operating the gas network. How can we reduce the safety risks associated with essential activities now and in the future?

- **Reliability and maintenance** Our network has been serving customers since the Victorian age. We must deal with the effects of ageing assets and examine the potential of new materials to transform the way we operate. As smart systems are increasingly adopted how should our network management adapt to a digital future?

- **Repair** Much of our metallic network is being replaced with polyethylene plastic, though a significant component will remain metallic after the current replacement programme finishes in 2032. We need repair technologies that can solve issues with legacy metallic pipe alongside technologies that can repair plastic in an efficient and cost-effective way that causes as little disruption as possible to customers and road users.

- **Distribution mains replacement** The iron mains risk reduction programme has accelerated

work to replace old mains with polyethylene plastic. We look to innovation to improve efficiency, reduce disruption and lower costs.

- **Environment and low carbon** The need to Improve our environmental performance is more important than ever. How can we do this? There are many issues to consider, ranging from gas leakage and venting during field operations, to dealing with decontamination during decommissioning and how we remediate legacy industry sites.

- **Security** Cyber and information security have become crucial issues for businesses and network operators are no exception. As we move to a more digital network with ever increasing connectivity, the way we protect our network must change too. Innovation will be vital to preserve and enhance both our physical and cyber security.

For RIIO-2 we continue to believe this joint strategy is the correct approach as we see the need for ever closer working and collaboration on the key challenges facing gas networks and the wider energy industry.

Working with the other gas networks we will shortly be consulting stakeholders on formally updating this strategy by March 2020, consistent with our licence obligations. Based on the stakeholder engagement we have carried out for this business plan we believe this strategy continues to be an appropriate foundation for RIIO-2.

5.2 RIIO-2 strategy

For RIIO-2, we believe that continuing the joint strategy is the correct approach, as we see the need for even closer collaboration on the key challenges facing gas networks and the wider energy industry.

With the other gas and electricity networks we are consulting stakeholders on formally updating this strategy by March 2020, consistent with our licence obligations. Based on the stakeholder engagement we have carried out for this business plan, we believe this strategy continues to be an appropriate foundation for RIIO-2, albeit with a few key changes:

- Replace the theme of the future of gas with a theme of delivering whole-energy solutions that help move the UK towards net-zero carbon emissions. Innovation will be critical for delivering to such solutions.

- Add a new theme on addressing the needs of customers in vulnerable situations How can we do things differently to improve our service and treatment of customers in vulnerable situations, and contribute to reducing fuel poverty?

- Give more focus and priority to reducing the environmental impacts of gas distribution throughout the strategy. Currently this appears to be a stand-alone theme, but it affects all aspects of our business.

A clear area of focus remains to innovative in the areas that are directly impacted as a result of general business operations. Examples of such are excavation work or venting operations. Both of these operations have an impact on the environment, such as venting of gas operations and carbon release to atmosphere, further information can be found in our Environmental Action Plan, Appendix (A8).

6 Our Innovation Record

Innovation has been at the forefront of our performance in GD1. We have delivered forward thinking projects (particularly around hydrogen conversion), developed an ecosystem with suppliers, technology providers and stakeholders to develop new ideas and test them. Most importantly, we have rolled out successful innovation on our network and given other GDNs the tools and knowledge to do likewise.

6.1 Summary results of our innovation portfolio

During RIIO-1, we have sought to efficiently utilise both our own Totex funding and that provided by the innovation funding mechanisms NIA and NIC, to deliver benefits for both our existing and future customers.

We have invested £30m of shareholder funding and £12.2m of NIA funding in innovation projects so far during RIIO-I. We have successfully bid for £34.5m of funding from the NIC. The key outcomes that have been delivered from this investment are:

- Delivered annual financial benefits during RIIO-1 of £2.6m, which are also reflected in our RIIO-2 cost forecasts
- Contributed to major improvements in our customer service, safety and environmental performance
- Developed a supply chain which is bringing new ideas and adapting new technologies for use in the gas distribution sector
- Brought cultural developments which have aided the business in facing immediate challenges and those it will face in the future
- Influenced the UK government's Clean Growth strategy and delivered learning on the potential use of hydrogen to decarbonise heat. This work has the potential to deliver billions of savings on the decarbonisation pathway compared to an alternative all electric solution.

While obviously financial benefits are crucial in terms of reducing costs for our customers, a number of non-financial benefits are tracked and reported on and we consider this represents an excellent immediate return on our NIA allowance, given that these benefits will be enduring for our customers

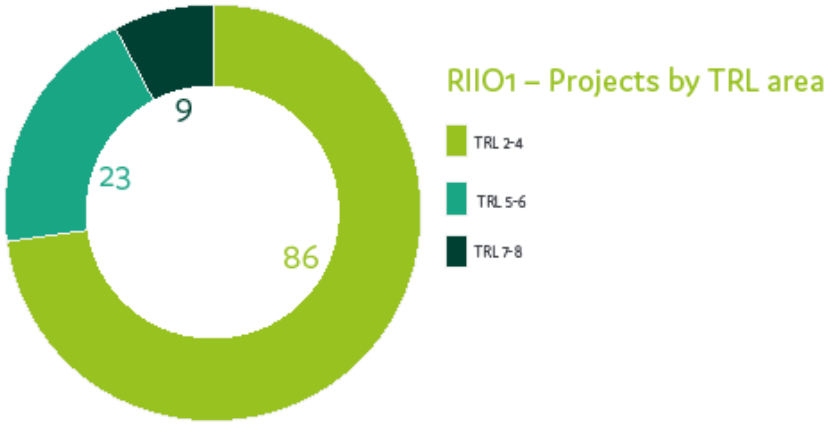
Another key non-financial benefit which is more difficult to capture are the partnerships formed with internal and external stakeholders and other third parties, which subsequently deliver benefits both to the gas distribution sector in GB, but also to the country as a whole.

This is particularly relevant in our region, supporting wider economic development and helping enable the "Northern Powerhouse" proposal to boost economic growth in the North of England. We have a specific procurement process for innovation projects which allows for single source procurement, helping remove barriers for SMEs. We have received strong feedback from SMEs that this has been effective, helping them to bring new products to market.

NGN has been at the forefront of research into repurposing the existing gas network infrastructure to transport 100% hydrogen through our H21 NIA and NIC projects and exploring the potential for using up to 20% blended hydrogen through the HyDeploy NIA and NIC projects. The second category of innovative projects seek to improve the efficiency, customer service, safety and environmental performance of the network in the short to medium term.

Our NIA projects have been undertaken at a range of technology readiness levels (TRLs) but as shown below the clear majority have started at a high risk, low TRL and would not have progressed without investment through the NIA funding arrangements.

Figure 7 – RIIO-1 NIA projects by TRL



6.2 Our innovation successes

In our GD1 business plan we highlighted the evolution of our company, with the aim to change the way we managed expenditure by embracing the shift to a Totex framework. In this period, we have transformed our approach, and within our Customer Operations division we have moved towards a full Totex model across each of our nine operational regions.

The delivery of our innovation portfolio through the GD1 period has helped us realise our aim to remain the most cost efficient, safest and customer focused GDN.

Our innovation strategy for GD1 had four key components:

- **Integrated business model**: fully integrated business model that allows functions to work together
- **Total Network Management**: a more holistic and total cost of ownership focused approach to asset management using health indices
- **Innovation Investment programme**: detailed innovation plans including new ways of working, new technologies, and new processes
- **Benchmarking**: an understanding of best practice internationally and in other industries

The focus on these components has allowed us to deliver on our ambitions and further improve our efficiency and service provided to customers:

We have either been the highest, or second highest, ranked GDN in 4 of the 5 measured periods, on both Customer (AVCSC) and Stakeholder (SEIRS) measures across GD1[2], and innovation has been highlighted as a key theme in helping us deliver these results;

[2] https://www.ofgem.gov.uk/data-portal/customer-satisfaction-network-owners-gas-distribution-riio-gd1

We have outperformed our 'fuel poor' connections commitment (8,593 v 8,400);[3]

We have achieved a consistent value of 99.998% network availability throughout GD1 - the second highest average percentage[4] - several our innovation projects have helped increase our availability metrics, and our longer-term ambition, through "Project Zero", is to eliminate some types of customer outages altogether; and

We have far exceeded our 'risk removed' target and have the highest proportional reduction rate[5]. Similarly, we have exceeded our shrinkage targets, and were the best performing GDN each year across the period to date.[6]

This performance has been specifically driven by a number of our innovation projects which we have taken from idea to concept through to delivery. Some of these specific projects are highlighted below.

From the £8.4m investment we have made, we have already delivered £6m of financial benefits both in terms of direct cost savings and cost avoidance. This investment has resulted in a lower cost for customers during RIIO1 and will result lower costs for customers in RIIO2 as we reflect the use of these innovations into our forecasts for RIIO2.

Our NIA projects have been extremely diverse and have focused on delivering short or medium-term benefits to our customers through new techniques and processes, alongside energy decarbonisation and future of gas projects with longer-term outcomes.

Table 4 - RIIO-1 innovation investment and benefits

NIA Project Portfolio	Number of Projects	Cost of Projects (£m nominal)	Benefits delivered
Decarbonisation and future of gas	28	£3.8	The research projects completed here have informed and Influenced the future energy landscape and provided essential evidence to contribute towards the development of NIC bids.
Network improvement	90	£8.4	Our network improvement projects have enabled a range of business improvements, including better leakage detection, the ability to undertake complex operations in a less invasive and more cost-effective manner, the use of predictive analytics to drive decision making for offtake booking and the use of robotics and 'keyhole surgery' to maintain assets.
Total	118	£12.2	

[3] https://www.ofgem.gov.uk/data-portal/fuel-poor-connections-gas-distribution-riio-gd1
[4] https://www.ofgem.gov.uk/data-portal/network-availability-gas-distribution-riio-gd1
[5] https://www.ofgem.gov.uk/data-portal/risk-removed-network-gas-distribution-riio-gd1
[6] https://www.ofgem.gov.uk/data-portal/volume-gas-lost-distribution-network-riio-gd1

6.2.1 Customer operations

Mercaptan detecting sniffer dogs

In 2016 we launched a trial to determine if dogs could be trained to detect the gas odorant. The trial proved the dogs were able to locate leaks in real life situations with a high level of accuracy – as a result the project was progressed to a live trials phase, across 14 different sites, to test the effectiveness against existing gas detection equipment.

Following the success of these live trials, the potential benefits were demonstrated during a major gas supply incident in Burmantofts, Leeds. A burst water main kept 550 properties off gas for three days, with a large proportion of vulnerable customers involved. Using the dogs helped reduce the length of the incident, through rapidly pinpointing the exact spot where water was entering the pipe.

A post-incident calculation showed that overall, costs of £85,000 were saved in Burmantofts and its duration reduced by two days. Out of this, the dogs' efficiency was calculated to have saved around £35,000 and a day's time in getting customers back on supply. As well as cutting the need for digging exploratory holes and minimising environmental waste, the dogs' improvement of leak location and repair times meant they became business as usual technology for use across the network in December 2017, with a forecast cost benefit of c.£500k in total during RIIO-1.

Connecting homes for health

Connecting Homes for Health delivered free gas connections, new gas central heating and energy advice to our most in need people. Building upon the existing 'Fuel poor' mechanism, in which the networks are committed to providing free gas connections, the project sought to design and evaluate an alternative mechanism of eligibility, one that moves away from household income, to a criteria determined by the ill health of our people.

The project delivered 103 homes with gas central heating and continues to evaluate the merit of targeting ill health as an effective 'driver' to reducing fuel poverty. The project will conclude in 2020, but has already made a real term impact, with a participant of the initiative expressing; "It feels like a lottery win" after living in a cold home for several years.

6.2.2 Network Improvement

Stub end abandonment innovation

Total stub end abandonment enables remote abandonment of assets, removing the need for large excavations in major carriageways which would typically create significant stakeholder impact, thus reducing congestion and impact on traffic.

This NIA-funded project has unlocked a range of both qualitative and quantitive benefits. With approximately 720 applications of the technique throughout RIIO-1 and delivering a financial cost saving of over £4m, these significant savings are included in our RIIO-2 repex cost forecasts. In addition, reduced volumes of excavated spoil waste are sent to landfill with associated vehicle journeys. Building from current usage rates we forecast 720 operations throughout RIIO-1 with a c.£4m of cost benefit

6.2.3 Asset management

PE Asset Health

In addition to delivering the NIA-related innovation projects, we have utilised our regulatory returns to internally invest in several other projects with an innovation or technical development slant. An example of this is the year-long pilot with ControlPoint, a quality assurance system provider, aimed at testing technology to improve the operating lifetime of the underground pipe network.

Following the success of this pilot, NGN signed a contract with ControlPoint to inspect and assess joint quality as part of network construction to prevent leakage. Other examples of project of this type include trialling Hexi-trailers to optimise polyethylene pipe utilisation and reduce plastic waste.

This proactive intervention delivers c.£1m of future avoided risk per annum on the PE network per annum and has attributed to an increase in overall quality.

6.2.4 Decarbonisation and the future of gas

From the £3.8m NIA investment we have made in decarbonisation and the future of gas we have been able to significantly advance research in the use of hydrogen as a potential mechanism for decarbonising heat in the UK. Our work, along with that of the other GDNs, has had a direct impact on government thinking and is reflected in both the Industrial Strategy and the Clean Growth Strategy.

A decarbonisation pathway for heat using hydrogen has the potential to deliver savings of £170bn compared to an all-electric pathway (source KPMG's "2050 Energy Scenarios" 2016). We are also contributing to a range of different areas of research and trialling decarbonisation in our own operations, gas as a transportation fuel and heat.

Undertaking initial research and evidence gathering for a Network Innovation Competition bid is an essential pre-requisite for success. This investment has also led to five successful bids into the Network innovation Competition.

6.3 Outcomes from Totex Allowance investment and other funding sources

Funding for innovation outside of our NIA and NIC funding comes from shareholders directly, other GDNs, our TOTEX allowances or other sources of innovation funding outside of the price control framework. During RIIO-1 we used all these sources. Shareholders have funded the innovative changes we have made to our business in re-engineering our workforce and delivery of the mains replacement programme. The direct investment from shareholders to facilitate these changes has been more than £30m in RIIO-1.

Throughout RIIO-1 we have undertaken a broad range of BAU funded innovation trials across the business as we continually strive for improvements. In addition, some additional targeted innovation projects were commissioned and have been completed at a cost of approximately £168,000, also funded using the Totex allowance.

We use our TOTEX funding to trial and roll out new innovative products and services. We use this mechanism to test out innovations developed close to market readiness (high TRL) by our supply chain.

In these cases, we will trial the products and provide feedback to the supplier. If successful we will adopt these products or services into business as usual. We estimate direct costs in supporting these innovations is £168,000. We have delivered £1.8m in savings from such innovations and investment.

Stand-out BAU funded projects in RIIO-1 include:

Water filter bags – Deployed across our operational workforce that enable the 'on site' management and disposal of excavation water that is contaminated with hydrocarbons rather than containment, transfer and disposal.

Soil pick/ jet wash - We worked with supply chain to further develop the solution to enable our engineers to easily remove mud and mess from sites following excavation works and improve customer satisfaction.

Infinity trailer - We have fully implemented this solution across our entire network and our engineers use this for flexible bypass connections to maintain gas supply, reduce duration of work and significantly reduce PE pipe wastage as part of our network operations.

Anaconda tee - Installed in c.6,000 locations each year and can accommodate different trench configurations avoiding multiple connections and reducing installation time. The Anaconda tee delivers a forecast of £100k per annum cost saving.

In addition to NIA funded innovation we have also used Totex funding of c.£200k plus time and effort from our staff to trial, test and implement new innovations. These include innovations adopted from other GDNs or products/services developed by our supply chain. These have delivered savings of £1.8m since 2017.

We will continue to innovate to further develop industry best practice techniques and other solutions that can minimise the impact of network activities on local communities. In addition, we will build on previous successful development in areas such as geospatial data capture and digital automated rules engines, where the solutions require further development to commercialise and enable transition to BAU.

In RIIO-2, we believe that our supply chain and project partners are well placed to take more of the risk of innovation – either by committing time to projects or by providing additional funding. We are in a unique position to help them test and develop cutting-edge products and provide them with a clear route to market. As such, we would expect them to undertake more of the conceptual development of new products and technologies themselves.

7 Building on Our Innovation Success

We are ambitious but not complacent in our approach to innovation. We recognise that it is a long- term investment and that we can continually improve on our approach, by learning from our experiences and from our continued engagement with other sector leading innovators and stakeholders. This section of our strategy sets out our plans for the forthcoming price control period. We provide a summary on the content areas of focus before providing detail on our approach to delivering sector leading innovation across these focus areas.

7.1 Our innovation approach

We believe our focus is clear and that our efforts should be deployed on the approach to innovation in these areas. Building on the success outlined in sections 2 and 3, we have identified key themes which will govern our approach to innovation and help us to delivering real and tangible benefits both for the company, our customers and the wider sector. These are outlined below.

7.2 Our innovation focus areas

The ENA's gas networks innovation strategy set out the key themes for innovation among GDNs. We will continue to work with our gas networks colleagues to ensure that we explore the full range of these themes, efficiently, between us.

We intend to lead the following innovation focus areas:

- **Wider cost reduction and efficiency improvements on our business outputs**
- **The energy systems transition**
- **Customer vulnerability**

In GD2 we have a clear view of what technologies and solutions we need to invest in to deliver benefits in these areas, and against our wider business plan specified in our Digital Strategy. We recognise that a number of these technologies – artificial intelligence, the Internet of Things, automation, etc. – have huge potential, but haven't been widely deployed in the gas networks space. As such, we see these as key areas where innovation funding can be utilised to help develop successful proof of concepts for wider adoption by the industry. We've seen the success of this model where smaller scale research projects have led to successful NIC bids, such as the H21 initiative.

In addition to the problem/solution projects, we will continue to innovate in areas such as talent, skills development and commercial models which don't necessarily require new technology or equipment. As an example, we are beginning to explore innovative commercial models to enable deferred payment and risk sharing with suppliers. Separate to the focus areas, we have outlined four objectives where results from our focus areas need to flow into, to improve outcomes for our customers and our business. These are outlined in Table 2 below and are designed to be high level and not restrict our thinking. We have mapped how each focus area will enable delivery of these objectives.

Table 5 - RIIO-2 innovation focus areas

Area	NGN NIA funding	Match/Collaborative funding	Total Investment
Customer vulnerability	£3,610,000	£410,000	£4,020,000
Energy Systems transition	£7,890,000	£5,420,000	£13,310,000
Total Funding	£11,500,000	£5,830,000	£17,330,000

Table 6 - Key innovation objectives in GD2

Focus area	Creating solutions to reduce any detrimental impacts on vulnerable customers from our day-to-day works	Enduring solutions for customers in vulnerable situations beyond our day-to day-activities	Whole systems and smart grids to reduce poverty	Creating evidence based solutions to support the transition towards a hydrogen future	Creating data-driven networks to manage risk enable transition and modernise delivery	Enabling decarbonisation through whole energy system solutions
Outcome	This focus area will remove or reduce the impact of 'everyday operations' on customers in vulnerable situations. Through research, development and demonstration, we will create opportunities for the creation and deployment of appropriate solutions.	We will build upon the learning from innovation projects in RIIO-1, where we identified that the impact of cold homes on wider health is a wide ranging and complex issue. We will further explore where network operations create situations that are unmanageable for vulnerable customers and undertake research and development to mitigate risk.	At recent engagement events, our stakeholders have reinforced the need to expand the reach from what a GDN would traditionally focus on and undertake research to define vulnerability, in the context of gas network activities, to clearly identify those requiring support as a direct result of network activities.	The energy systems transition will create significant change within our industry, with technology development, evidence gathering, and policy change essential steps on the decarbonisation journey, beyond the timescales of RIIO-2. Our innovation portfolio will undertake targeted research and development that will support our sustainable heat solutions strategy.	The advancement of digital technology can enable a network with enough flexibility to operate at a whole systems level. The innovation in this area will support our sustainable business solutions policy. Advanced digital technology is proven in wider industry, yet in the context of connected energy systems, remains largely unused across the gas sector at scale.	The future decarbonisation of the energy networks will be made possible by creating evidence-based solutions. It is essential to provide a clear pathway for policy decisions to enable future decarbonisation of the energy sector, whilst ensuring an immediate focus on delivering a positive environmental impact throughout RIIO-2.

7.3 Reducing the cost of innovation to our customers

We acknowledge that innovation carries risk and to date most of that risk has been born by our customers. We believe that continued customer investment in innovation is crucial to its success, but we want to share this risk more widely going forward. This will help further reduce pressure on customer bills. While the approach to innovation within NGN will follow a more agile process, the management of complexities that are associated with unproven and high-risk opportunities are significantly different to those at higher TRL. We acknowledge that innovation carries risk, and under NIA, most of that risk has been borne by our customers, but our customers also receive the benefit of successful innovation.

For RIIO-2 we will look to leverage funding more evenly across four sources and the success we have had through innovation in last price control allows us to invest more of our money into innovation. We recognise that a commitment to innovation is fundamental to a sustainable business that can continue to deliver value for our customers. We plan to focus this additional investment more at the mature end of the innovation scale which is likely to deliver benefits to our customers in the nearer term.

Table 7 – Innovation funding

Totex allowance funded innovation	To deliver immediate, valuable benefits and improve the day to day delivery of network operations, NGN will use its TOTEX allowance and innovate using the maturing capabilities that have been honed throughout RIIO-1, in addition to supply chain funded, close to commercially ready solutions.
Network Innovation Allowances (NGN and other GDNs)	NGN will use NIA funding to explore opportunities and deliver value added change for vulnerable customers and addressing whole system issues.
3rd party funding	Innovation funded via wider government funding mechanisms (Innovate UK etc). Also, via innovation partnerships with academia and access to grant funding.
Strategic challenge fund	Innovation to address net zero and decarbonisation challenge. We envisage using this funding to value forward nationally important work on hydrogen.

Secondly, we want to have more honest and open conversations with our innovation partners over their contribution to innovation projects. We are in a unique position to help them test and develop cutting-edge products which have global application. Consequently, we believe that they are well-placed to take some of the risk of innovation – either through time commitment on projects or additional funding. We plan to explore this with them and how it can align with existing innovation funding. Again, we would expect this funding to be at the more mature end of the innovation spectrum and used to help get products to market. We believe that it is our role to provide a clear route to market for technology and innovation providers. If we give them confidence that they can access this route to market, then we would expect them to undertake more of the conceptual development of new products and technologies themselves.

We have a track-record of successfully implementing projects that started at the demonstration stage which then evolved through to larger scale initiatives, e.g. those funded through the NIC. For GD2 we intend to continue along this path – utilising NIA (or equivalent) funding to support the development

of ideas through to benefit-realising concepts, both in terms of financial return, but also driving benefits related to safety, customer satisfaction, and to the benefit of our stakeholders. Alongside utilising equivalent regulatory funding, we will seek to leverage other sources of external funding. Our innovation team will devote more time to exploring these. We will publish details of the others funding available to allow our project partners to assess them and bring forward proposals to us which utilise these funding sources, rather than looking to us for regulatory funding.

8 Reporting on the impacts of our innovation

In RIIO-1 we have been implementing solutions into BAU following the successful completion of innovation projects. We have developed a tracking solution and dashboard that enables clarity of the financial benefits that have been delivered because of use. The dashboard is cascaded across the business at periodic intervals to enable trend analysis and share successes with stakeholders.

Monitoring and reporting of benefits is an essential activity and we work to support the business to ensure consistent application to deliver change. The benefits dashboard creates a visible and comparable analysis to ensure that the forecasted benefits are realised and increase the likelihood of return on investment.

Figure 8 – NGN innovation benefit tracker dashboard

The demonstration that innovation investment is delivering value for money is crucial and throughout RIIO-1 we have been actively tracking and reporting on both quantitative and qualitative benefits following completion of projects, and subsequent adoption of the final solution. We will continue to track and report on benefits and will do so in RIIO-2 as part of a collaborative framework, facilitated by the ENA.

The challenge of accurately measuring the impact and value of an innovation project is complex and in recent years we have worked with the EIC other GDNs and DNOs to develop a collaborative, industry-wide framework to report on the outputs and outcomes of innovation.

The framework enables an opportunity for comparable review, and in RIIO-2 we understand that the clear, detailed reporting of return on investment is required. Additionally, where projects are proven successful and have been deployed into BAU, we will report on clearly on performance against cost of investment.

The following table summarises what we, along with all other UK GDN's, DNO's and the ENA is proposing for RIIO2 and beyond. The section following the table will describe each aspect in detail.

In order to develop this proposal, we have analysed the existing industry framework, which combines decades of operational excellence experience together with 'lean thinking', innovation and exceptional service design. We have also analysed industry regulatory reporting systems and Industrial reports, such as the Pathways for the Great Britain Electricity Sector to 2030 and the Wholesale Market Report 2019.

Table 8 – Proposed RIIO-2 innovation benefits reporting

Proposed Innovation Benefits Reporting (RIIO-2)
Bi-Annual: • Electricity/Gas Network Innovation Strategies (ENA)   ○ *Review of priorities and progress against objectives*

Annual Reporting:
 	
• Network Specific Annual Summary Reports
  ○ *Including ENA agreed Innovation Framework Dashboard*
  ○ *Including Implementation Log (BAU rollout) Summary*
• *Consistent Innovation Benefits Tables with detail behind Dashboard*
• Individual Project Completion Reports
  ○ *Individual Project Progress to be captured in Annual Summaries*
• Annual Innovation Conference
• Smarter Networks Portal
  ○ *With improved project templates and analytics*

8.1 Bi-Annual Reporting

Gas Network Innovation Strategy - It is proposed that these will broadly continue in their current form, with a renewed focus on reviewing progress made against the various themes within the strategies.

8.2 Annual Reporting

ENA Innovation Framework Dashboard - It is important that innovation outcomes from the entire LNO portfolio are reported in an open and transparent manner. The existing framework developed via the EIC has now been transitioned over to the ENA, and it will be progressed further, inclusive of all ENA Members and updated accordingly to achieve agreement across all UK Gas and Electricity companies.

The summary dashboard for each LNO from this existing framework can be seen in the figure below. This will be further refined after discussions with the other LNOs at ENA.

In RIIO-2, every innovation project that has been successfully deployed into BAU will be reported upon in terms of financial return on investment, to deliver a quantifiable NGN innovation portfolio report and a comparator. The various measures in this dashboard are explained in detail in the Innovation Strategy which is included in the appendices.

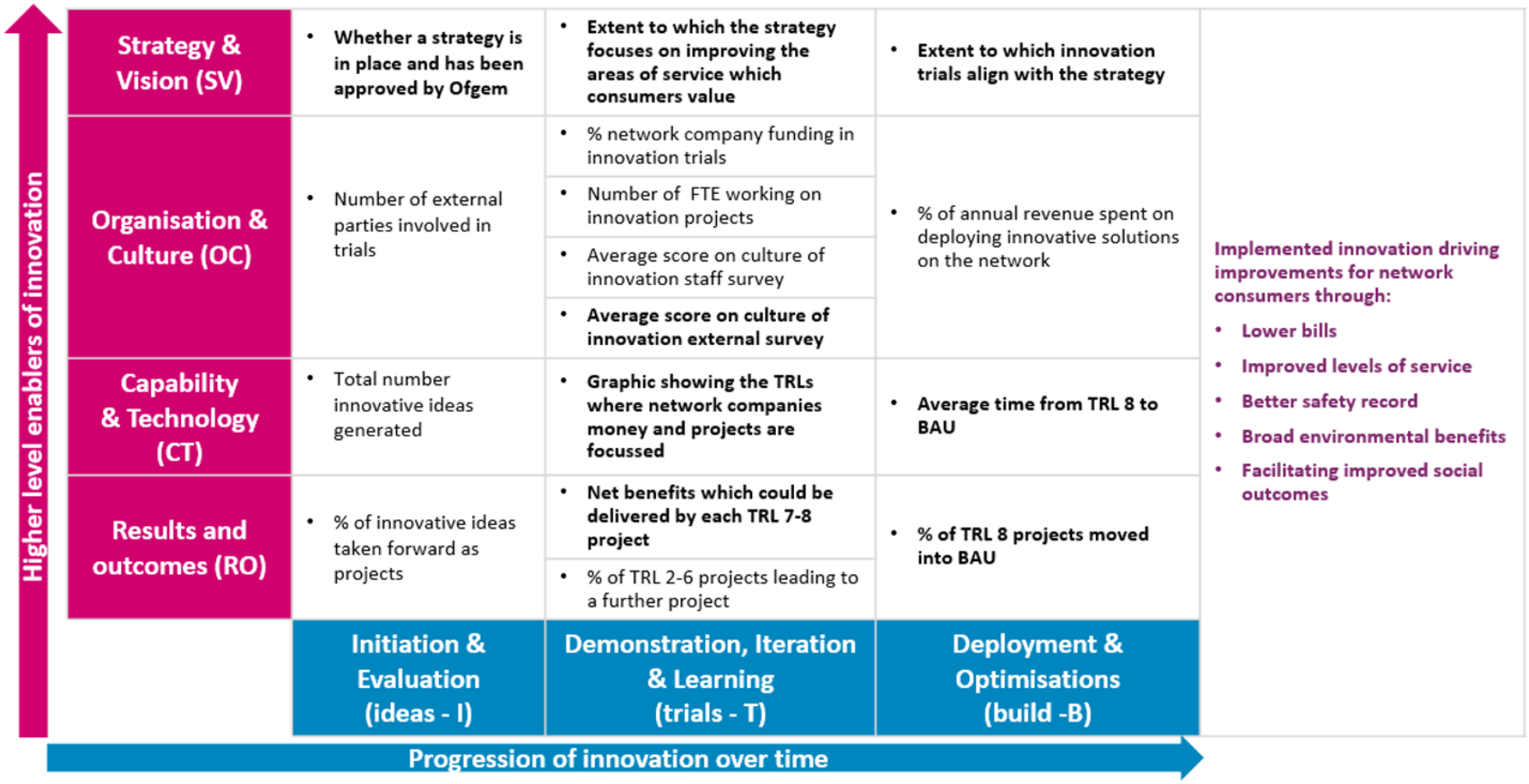
The definitions of the outcome measures and secondary deliverables have been captured separately. Once the template for the scorecard and underlying data tables have been agreed by all relevant ENA Members, this will be trialled and tested. The ENA templates will then be finalised. The completed dashboards will be made available by each LNO within their Annual Innovation Summary Reports. These can also be made available on the Smarter Networks Portal once they have been published.

To support the population of this dashboard, ENA Gas and Electricity Companies have agreed to developing template **Innovation Benefits Tables**, which capture data for each individual innovation. A number of tools and best practice guides will be agreed at GIGG and EIM to support the population of these tables, including a common CBA and TRL calculator.

We will continue to report via an Annual Summary report, project completion reports, the Smarter Networks Portal and via the annual industry conference.

The definitions of the outcome measures and secondary deliverables have been captured separately. It is important to note that these measures will be supported with a detailed narrative for each LNO, which will further highlight the benefits delivered to customers across each LNO portfolio. The Tables will be agreed at ENA and reviewed with all our stakeholders.

Figure 9 - Innovation Measurement Framework - Primary outputs and secondary indicators



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