Cadent

Your Gas Network

Appendix 08.00

Supporting Evidence for our Approach to Innovation

- Contents

1.Building on the success of RIIO-1

1.1. Disruptive innovation – gas industry challenges

Reducing disruption to our customers

Table 08.01 outlines some of the activity we have been undertaking, and collaborating on, to identify technology that can support the reduction of disruption and interruptions to customers' gas supply. Whilst not all of these projects have progressed to deployment, they have encouraged important learning for future projects. Some of these are now being deployed, for example CISBOT (see below) mains remediation robot and new repair techniques such as Microstop and EZ Valve™ for multi-occupancy buildings. These technologies have created a platform for us to develop untethered robots which can automate tasks traditionally requiring manual and disruptive work techniques, which will be a focus of our RIIO-2 innovation plan to support a future network. Further research is currently ongoing (through the H21 collaboration project being led by NGN) on the compatibility of hydrogen with assets of all types. This includes analysing whether assets that have been subject to a range of new and innovative repair and remediation techniques are suitable to transport hydrogen in the future. The outcomes of this research will be considered in our application of robots in the future, and when we assess the impact of remediation carried out to date.

Minimising disruption and delivering a safe and reliable network: CISBOT

An innovation recently introduced into the UK from the United States and now being used by both Cadent and SGN in North and South London where traffic congestion makes conventional mains replacement difficult, CISBOT is an illustration of how innovation can bring major benefits to customers and stakeholders. The photographs above are taken in central London on Strand and Oxford Street where the relatively small footprint of CISBOT allows large diameter mains joints to be sealed internally to prevent gas escapes.

Transport for London and Local Authorities fully support the use of this technology as it minimises congestion compared to full mains replacement that might require road closures and it enables local shops and businesses to trade normally with little disruption. While the costs of this technology are comparable with mains replacement, the savings to highway authorities, businesses and reduced disruption to commuters make this a very attractive alternative in central London. With CISBOT, customers also benefit because we can avoid any interruption to their supplies.

Table 08.01 also illustrates the areas in which we have taken global technology and worked with SMEs to develop it for the UK gas industry. We scan horizons and engage with wider industry and suppliers, including those overseas – primarily via our membership of industry groups and forums – which enables us to stay connected to activities well beyond Cadent and the UK. We also engage with our existing supply chain, via the Energy Innovation Centre ('EIC') and our professional networks, to understand what opportunities are readily available to us.

Table 08.01 – Our journey to reduce disruption and interruptions

Technology/projects	Technical origin	Supplier	Excavation and disruption	Reduces time off gas	Traffic and community impact	Multi occupancy buildings	Learnings/next steps
Pull In Place ('PIPP') **Blown Air Extrusion** **2016-2017** Pre-made composite sleeve delivered to site flat and pulled through existing pipe, then inflated and cured	Global sewage industry Japanese gas industry	MACAW 3M ALH New Flow	✓	✓			Limited practical application because of integrity of liner in a gas environment Learning is to build more integrity into liner with potential application in multi-occupancy buildings
Cured In Place Pipe ('CIPP') **Pipe Replacement In Situ Manufacture ('PRISM')** **2014-2017** **NuFlow** **2016-RIIO-2** Liner inserted into existing pipe and secured with grout pumped between new and old pipe	Global sewage industry Japanese gas industry	MACAW 3M ALH New Flow	✓	✓	✓	✓	More structural integrity than PIP but further field trials required to test technology in different applications
High Density Polyethylene ('HDPE') **Thin Wall PE Liners** **2014-2017** **NuFlow** **2014-RIIO-2** High density means liners can be thinner, making it less expensive and easier to insert – thereby reducing disruption	New technology	Rosen Radius	✓	✓	✓		Learnings from PIP and CIPP adopted as part of this project
Tethered Robots **Tier One Replacement System (TORS)** **2014-RIIO-2** **System Two Assess and Seal System ('STASS')** **2014-RIIO-2** **Cast Iron Joint Sealing Robot ('CISBOT')** Robots (or other automation) than can perform tasks normally delivered by humans, but with less disruption	New technology Global oil industry and gas utilities USA mains remediation	Synthotech ULC Robotics	✓		✓		Early trials of TORS successful, but still more economical to use traditional methods. As technology improves and business environment changes, price point will change STASS field trials required CISBOT being used in London and rolled out elsewhere Next steps: combine with other technology (e.g. leak detection system) and take learnings to develop untethered robots

Using innovation to improve our service to customers

In addition to our work to reduce disruption, we have been proactive in improving the services we provide to our customers, especially those in vulnerable situations. This is illustrated by the following case studies.

Case study 1: Leading the industry to support customers in vulnerable situations

Working in partnership with EIC, we have initiated a project inviting a range of technology suppliers to come forward with solutions that can help utilities and other service organisations safeguard customers in vulnerable situations.

This originated at the recent 1-year anniversary of the launch of Dementia Friendly Utilities ('DFU'), where we co-hosted a roundtable event with Alzheimer's Society to bring utility companies together and understand how good practices had developed since the original DFU Guide launch in 2018.

Outputs from the roundtable event resulted in several commitments from companies, but importantly we took the action to work with EIC to launch a cross-utility call for innovation to support customers living with dementia and those who care for them. The scope of this project has since grown, and we are now inviting ideas for innovations that can support customers in a range of vulnerable situations.

We lead on the National Mental Capacity Forum ('NMCF'), which contains representatives from business and consumer bodies across energy, water and telecommunications. Working closely with the NMCF and EIC, we are reviewing innovation proposals on an ongoing basis to ensure they are fit for purpose.

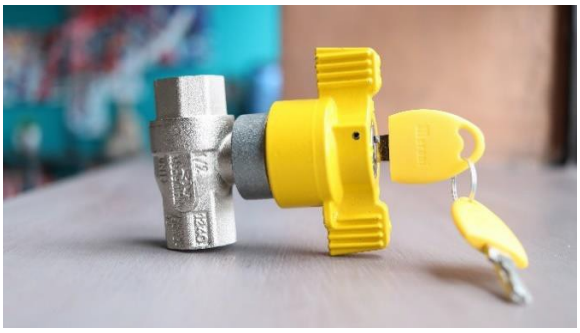
To formally launch this project, we co-hosted a 'Dementia – Call 4 Action' workshop in London with EIC. On the day, we were joined by innovators, businesses and charities to discuss solutions to help customers living with dementia.

Alzheimer's Society, the Royal National Institute for the Blind ('RNIB') and Carer's Trust were present to share some valuable insights and further develop delegates' awareness of dementia, along with guidance on how other needs might need to be considered when looking to create new products and services. It is only by fully understanding the context of dementia that innovators and businesses can find and develop the solutions to make a difference.

Delegates also had the chance to walk around mock-ups of a lounge, kitchen and bathroom as they considered and discussed cross-sector innovation ideas to enable customers with dementia to stay living independently in their own homes and enjoy a better quality of life.

Our cross-sector project with EIC builds on and expands our work earlier in RIIO-1, when we developed the Locking Cooker Valve (see Case study 2) to support customers living with dementia. We recognise the value of simple technologies like this – now, our ambition is to make utilities services as accessible as possible to anyone, no matter who they are or what their personal situation is. We are working closely with EIC on the Easy Assist ECV (see Case study 3) and inviting innovators and businesses across utilities and customer service sectors to follow suit.

Case study 2: A RIIO-1 safeguarding innovation – Locking Cooker Valve



The Locking Cooker Valve is a simple solution which helps customers with dementia and in other vulnerable situations retain their independence, keeping them safe and warm in their home.

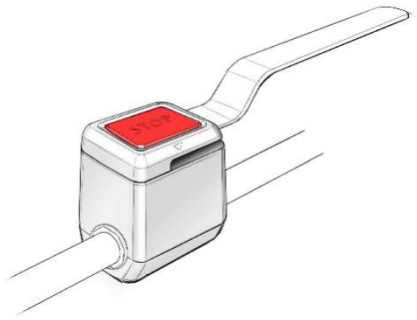
When the valve is locked, using the key provided, the gas supply is isolated. This means the gas cooker can't be unintentionally turned on or left on, and there is no risk of gas escaping. The valve can easily be turned on or off, enabling the gas cooker to be turned off safely under supervision.

It is free to apply for a Locking Cooker Valve. The device is suitable for those who can no longer operate their gas cooker safely and may be at risk of harming themselves and their home by leaving gas unignited or forgetting to turn the hob off. We have been encouraged to see it rolled out to all other gas distribution networks, maximising the number of customers across the country who can benefit from this technology.

Case study 3: Looking ahead – Easy Assist ECV

The emergency control valve ('ECV') can be found at your gas meter and allows you to easily turn your gas supply on and off. When a customer calls the National Gas Emergency Service to report a gas escape, our call handlers will advise them to turn off their gas at the ECV if at all possible.

We have identified that there are 500,000 customers on the Priority Services Register who would find it difficult to turn off their gas supply in the event of an emergency, due to poor mobility or hand movement. With this in mind, we have launched a project with EIC to develop a new type of ECV that delivers maximum ease of use.



The proposed solution is a mechanical device that can be retrofitted over the existing ECV, with a single push button which could be extended from the device. The device would then turn the ECV to the off position.

We have carried out initial scoping of requirements with support from the project team at Oxford Product Design (a technology supplier who were not previously in our supply chain, and who we reached out to specifically for this project), our emergency engineers and our Customer Centre. We are thoroughly considering user acceptance from both the customer's and engineer's perspective.

Case study 4: Educating children about the dangers of carbon monoxide

Our Safety Seymour campaign is designed to raise awareness of carbon monoxide among children aged 6-8 years. It comprises a series of fun, accessible classroom sessions for children including those whose first language may not be English. At the end of the session, they take home a carbon monoxide alarm, an information pack and a treasure hunt to identify signs of carbon monoxide with their family and friends.

We are using carbon monoxide hotspots to identify target schools, and over the last four years we have reached over 9,000 people. This initiative has now been adopted by the other gas distribution networks and in 2018/19, we partnered with Fun Kids and other youth radio stations to reach an audience of up to 600,000 young people.

This behavioural theme is one we are looking to explore further in RIIO-2, to support both current and future customers.

1.2. Continuous innovation

Our Performance Excellence programme encourages a bottom-up approach for employees to understand their team's performance and drive incremental innovation at a local level, delivering bespoke process or technological change. The case studies below illustrate some of the projects that we have delivered through this approach.

Case Study 5: Greasit

Greasit was conceived, developed and implemented by one of our emergency supervisors and went on to win a CEO award for innovation.

There are times when a leaking ECV cannot be exchanged for a new valve without a full-service relay being required. Normally, the root cause of the problem is that the grease within the ECV's body has dried out and a small leak has occurred.

The cost and disruption associated with a 'full service replacement' solution are disproportionate to the issue at hand. Our entrepreneurial supervisor spotted this problem and believed that he could develop a better solution. The solution he created allows leaking ECVs in customers' properties to be returned to 'as new' condition by means of an innovative approach to regreasing the ECV without interrupting the customer's gas supply or excavating on their property. We estimate that this project has so far delivered over £100,000 worth of benefits.

Case Study 6: Base locations and work segregation

This Performance Excellence project helped improve the efficiency of our emergency response engineers in the East of England.

It involved analysing the density of our workload by geographical area, and how long it was taking our engineers to reach their target location. Through our analysis, we were able to better align engineers' base locations to strategically place them for reactive work.

The next phase was to look at the work engineers were doing and segregate it into planned or emergency response work. With this approach, we were able to increase the overall productivity of each team per day. This, together with our work on base locations, meant that we are able to deliver our services with slightly fewer engineers, which has delivered a cost saving of £560,000 per year.

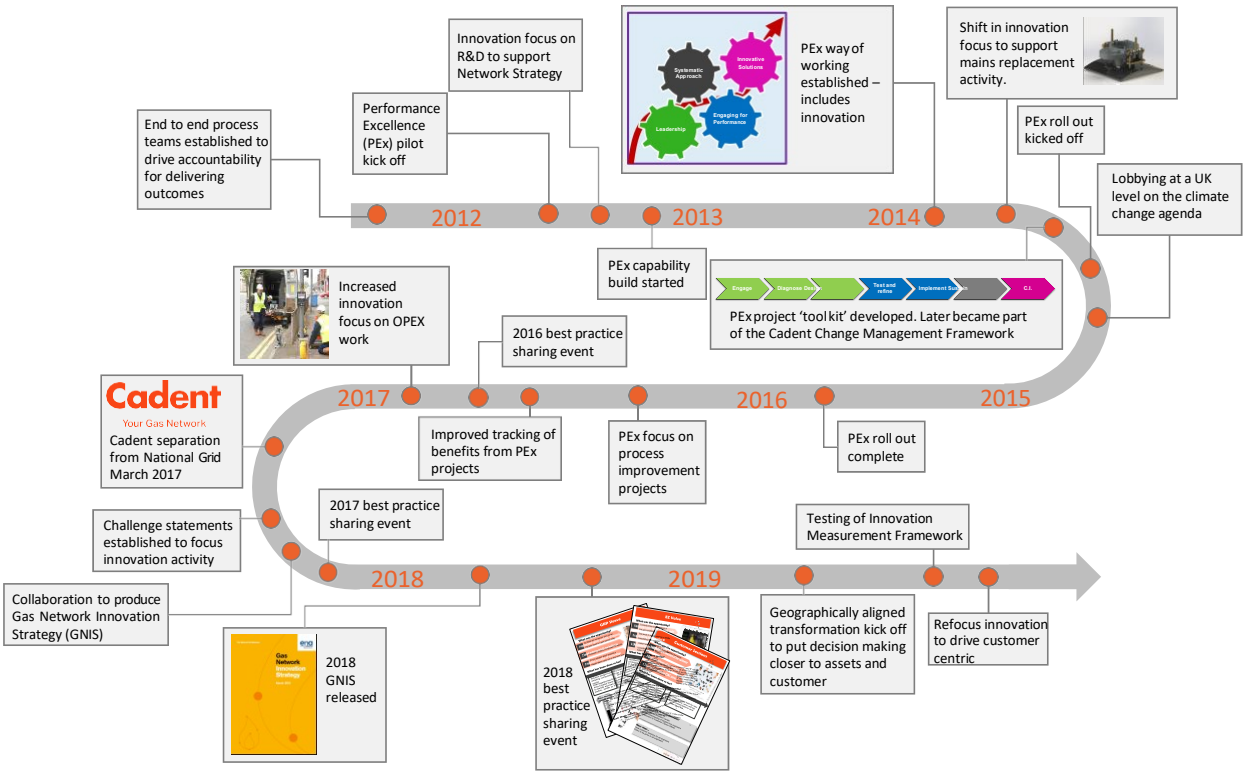
2. Our approach to delivering innovation

2.1. The development and evolution of our approach to innovation

Figure 08.02 illustrates our innovation journey, through both disruptive innovation and continuous innovation via our Performance Excellence programme.

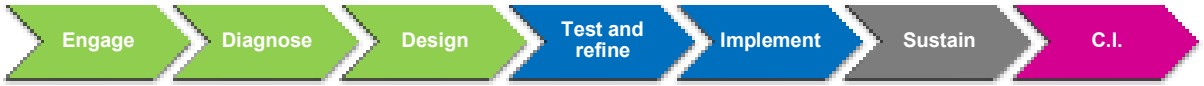
For disruptive innovation, at the beginning of RIIO-1, we were relatively internally focused (compared with our current view) looking at research and development to support our network strategy. As the business climate changed, we began looking at technology to reduce costs associated with mains replacements and repair, with a focus on more complex situations. This is now demonstrating success, with some technology being used on our networks for business as usual activity (e.g. Bonded Saddle, CISBOT). Over time, we have widened our collaboration and supply chain to share learnings more effectively and reach beyond our industry norms for more innovative technology. Further to this, and with more of an emphasis on the customer, we are looking to ensure benefits are realised by rolling out technology more effectively across our business and encouraging the other gas distribution networks to do the same, with improved visibility and reporting.

Figure 08.02 – The development and evolution of our approach to innovation



Our Performance Excellence programme was piloted in 2013 and rolled out across the business in 2014/2015. The initial focus was engaging our teams in their performance and providing them with the tools and techniques to help them improve. Our Performance Excellence toolkit was designed to be scalable and applied to more complex problems, thereby enabling specialist teams centrally, and locally, to deliver projects that make more of a step change in performance. This approach can be applied to process, people or technological change, and has delivered some significant innovation (see **Figure 08.03 – Our approach to delivering innovation: The Change Management Framework**).

Figure 08.03 – Our approach to delivering innovation: The Change Management Framework



Engage – "I have an idea": ***Engage*** *is all about communicating with individuals and teams to understand what success looks like for their change, and to get people on board to support that success.*

Diagnose – "Understanding the problem or opportunity": *During* ***Diagnose****, the individual/team is developing a full understanding of the current state or the "as is". To accurately design a solution or fix, they need to fully understand how things work (or don't) at the moment.*

Design – "Exploring the best solutions": *During this phase, the individual/team designs their solution based on the diagnosis. They will be fully refining planned benefits and planning a solution that is sustainable in practice. This will include what the measures of success are, and the input and communication required.*

Test and refine – "Testing to ensure my solution is the right one": *During this step, the solution is tested to make sure that it performs as planned and will deliver the expected benefits. It is also a chance to see if there is a more efficient way to implement the change, and to ensure the planned handover to business as usual is watertight and can be sustained.*

Implement – "Testing to ensure my solution is the right one": *During the* ***Implement*** *phase, the designed and tested change is rolled out. Performance is tracked to ensure that everything is working as planned.*

Sustain – "Making sure it sticks": *During this phase, the individual/team is monitoring the solution to ensure that it will continue to perform as expected once the project team has stepped away. Using KPIs and performance metrics and ensuring ongoing stakeholder management to pick up on any potential issues, by the end of this phase there is confidence in the change's ongoing success.*

Continuous improvement: *As part of the completion of any change project/initiative, the change should be handed over to business as usual. The change delivered by the project should now be the new way of working (tested throughout the* ***Sustain*** *phase of the project). Performance metrics should be in place to monitor the performance of the new ways of working, to support the team in tracking and identifying any deviations from the standard. Where an opportunity is identified for further improvement(s), the opportunity should be progressed using the Change Management Framework.*

We recognise that any culture change needs to be kept 'live' and adapted to reflect changes in the business climate and customer requirements. We continue to evolve and build upon our Performance Excellence approach. Since becoming an independent business, we have started to move towards a 'depot-centric' model to put the decision making closer to our assets and our customers. This will build upon the foundations of Performance Excellence.

2.2. Sharing and learning from best practice

To share innovation across our networks, we run best practice conferences and regular technical update days, as well as sharing through our routine meetings, management processes and communication channels. We recognise that there is not a 'one size fits all' approach to sharing information, hence the need for multiple channels and forums. **Figure 08.04** illustrates some of these routes.

To learn from ideas external to our business, not only do we review projects implemented by the other gas distribution networks, but we work with the EIC to carry out cross-market searches to identify innovations to address particular issues. These searches look beyond the utilities sectors and invite suppliers to share their technology and thinking, and work with us to adapt the innovation for our industry – we call this approach 'innovation laboratories'. Although in its infancy, this approach is working to good effect through our activity to support customers in vulnerable situations (see Case studies 1-4 for examples of this) and in multi-occupancy buildings. We intend to use this innovation laboratory approach much more in the remainder of RIIO-1 and into RIIO-2 as we build our internal capability, and that of our partners, and look to deliver outcomes that address our customers' priorities.

We are also members of the European Pipeline Research Group ('EPRG') and Pipeline Research Council International ('PRCI'). These memberships have enabled us to gain access to international research to help build our understanding of the integrity of our assets.

Figure 08.04 – Our communication channels

We collaborate with colleagues from the other gas distribution networks at the Low Carbon Networks & Innovation ('LCNI') conference and Utility Week Live, to share ideas across the sectors and learn from others.

Our strategic innovation projects and our lead on tackling the response to climate change are giving our employees the opportunity to work with their local regions and truly shape the way energy is delivered to these communities into the future. This was evident at the launch of the HyNet North West project in Manchester in 2018, and in the innovation awards we have since won:

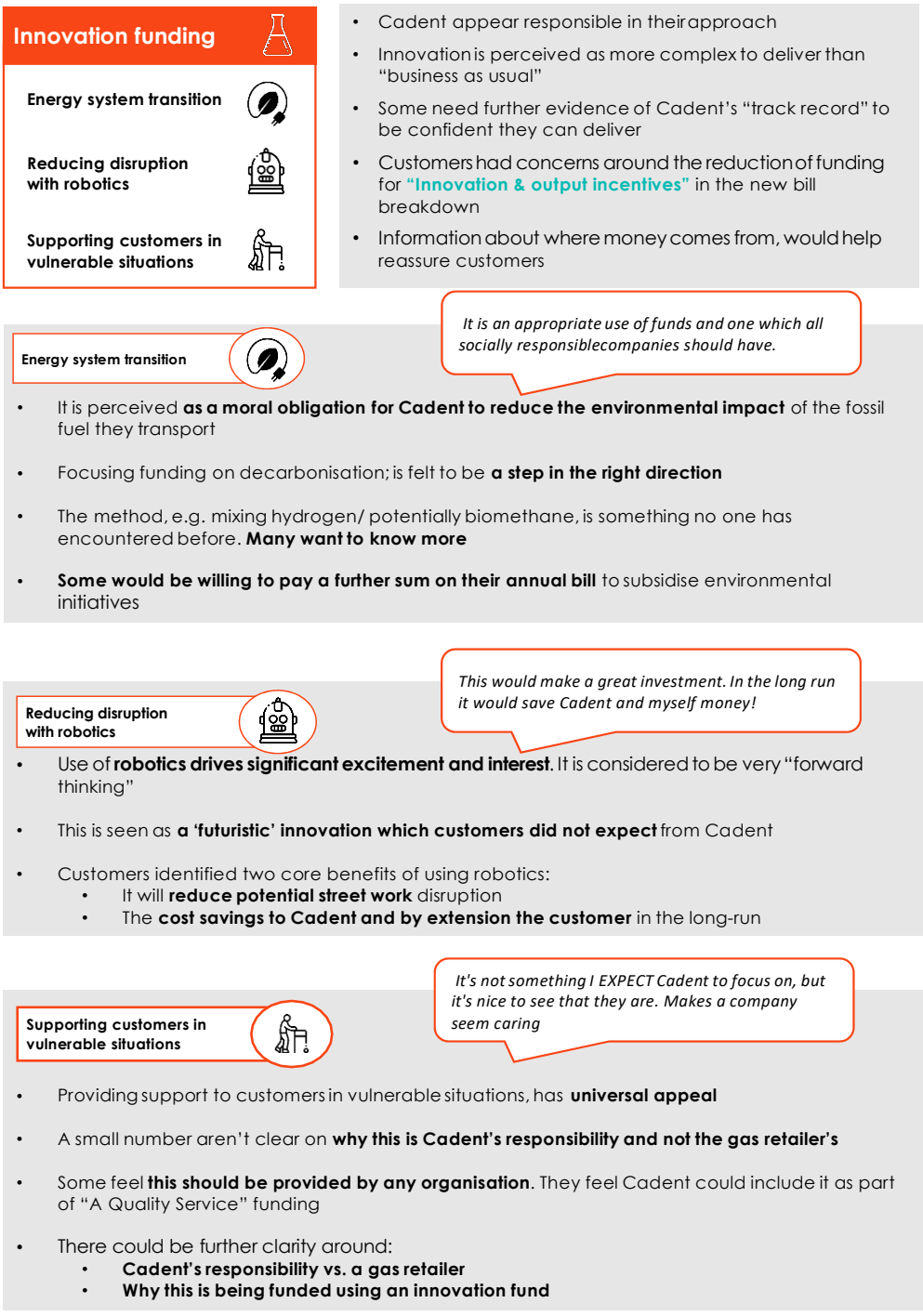
- EUA/IGEM Awards 2018 Young Persons' Achievement
- Paul Gerrard – Chairman's Award for Outstanding Achievement – Street Works UK
- UK's Best Company for Apprentices to Work For – TheJobCrowd
- Nav Bawa – Power Graduate of the Year at the National Skills Awards 2017
- 'Communication Leaders' Street Works UK Award for our efforts to effectively communicate with the local community in Stratford-upon-Avon whilst completing our mains replacement works

3. Our strategy for RIIO-2

3.1. What our customers said about innovation

We have carried our extensive engagement to create our approach to innovation in our RIIO-2 Business Plan. The outcomes of this engagement have enabled us to understand our customer priorities, which in turn has helped us create our innovation themes. To test our thinking around innovation, we carried our further engagement which we have summarised in **Figure 08.05**.

Figure 08.05 – Customer feedback on innovation



3.2. What we plan to do – collaborate to best support our customer priorities

Although we value collaboration to support our own and others' innovation activity, we recognise the level of collaboration and engagement can sometimes slow the pace of deployment, with relatively limited return for all parties involved. **Table 08.06** outlines the level of collaboration we would expect for different customer outcomes. It should be noted that this is for guidance only, as all collaboration activity should be considered on a case-by-case basis.

Table 08.06 – Collaboration categories

Challenge/customer outcome	Collaboration category	Industrial/supply chain capability	Technology/idea maturity
Broad societal issues (e.g. energy system transition)	Cross-vector	Low	Low
Shared customer experiences and asset issues (e.g. customer vulnerability, futureproofing of assets)	Gas distribution networks	Some	Some
Business as usual activity (e.g. specific local issues facing our customers, assets or control of individual networks)	Cadent networks	High	Some – high

We will continue to build our relationship with other gas distribution networks, wider energy networks and other third parties to share best practice and learning, with the help of the Energy Networks Association ('ENA'), EIC and other collaborative activity.

Several of our innovation themes require working across the industry and across different sectors. For example, 'Whole system solutions' requires a range of stakeholders and third parties to play a role in developing new and innovative ideas across our customers' four key priority outcome areas. This requires a partnering approach, both at a regional level and at a national level. Our innovation collaboration plan is therefore to:

- Leverage the **ideas of our supply chain** partners (building on the successful innovation sharing approach from our existing Gas Distribution Strategic Partners);
- Utilise our **regional stakeholder groups** to identify and discuss innovations across the utilities sector and beyond;
- Continue our work with EIC to **develop the small and medium enterprise market**;
- Build upon the learnings from our activity around robotics to further **reach out internationally**;
- Work with our geographically contiguous **electricity, water and telecoms** utilities to consider how we can better plan together and support network issues on each other's networks;
- Develop partnerships with **academia** and think tanks to research into customer behaviours;
- Support and leverage research with **thinktanks** such as Sustainability First's Fair for the Future project to draw best practice and develop thinking on wider social and environmental innovations.

3.3. How we plan to innovate – extending and developing our culture of innovation

Align the organisation and build capability to improve

As part of our broad cultural transformation, we recognise we need to realign and build the capability of our organisation. The approach we are taking includes:

- **Geographically aligned business capabilities** to support rapid decision-making closer to our customers and assets. Our local depots will also be designed to a support a Totex focus, with engagement in asset investment and full work stack visibility and control. We will decentralise and geographically align core business support capabilities, enabling new ways of working and delivery methods with the fast adoption of new technology and local teams leading input to innovation;
- A decentralised **supplier model** aligned to the local depot, with a range of suppliers from small and medium enterprises to multinationals, all invested in the success and outcomes of the local depot. We will align suppliers' incentives to share intellectual property and knowhow, with engineers across the supply chain fully engaged to support innovation;
- Innovation in the **model of leadership** at first line management level – we have recognised that, to support fast and effective local decision-making at depot level, we need to reset the leadership model from a historically hierarchical, command-control model, to a model supporting entrepreneurship, with a customer and commercial focus across engineers and local leaders;
- **Incentive models** to drive continuous improvement in the customer experience, encouraging engineers to create and quickly adopt new ways of working, techniques and technology. These incentives will also encourage engineers to work with colleagues to ensure the end-to-end process is designed around the customer experience. The incentives will help engineers to act as 'owners' of the local customer-facing depot;
- **'Bringing Ideas to Life' annual campaigns** to engage frontline staff, including our supply chain, to generate innovation to be driven by the local teams though the course of the 12 months. This will include engaging customers and key local stakeholders. The first of the campaigns will commence in autumn 2019, to build momentum towards RIIO-2;
- **A project delivery methodology and toolbox** (the Change Management Framework) based on our Performance Excellence learnings in RIIO-1. This methodology enables staff at all levels of the organisation to follow a structured project delivery approach to solving problems. It has been structured such that it can be used for all projects, regardless of complexity and scale, and still deliver a consistent approach and quality outcome.

This cultural journey is also supported by taking an innovative approach to our new talent. Our graduate recruits are exposed to an innovative culture from the very start. As part of their induction programme, they are asked to assess one of our key challenges across each of our network regions, reviewing the blockers and key issues involved to provide an innovative solution on how the customer experience could be made better. The best ideas are then implemented by the graduates, with close support from the business.

Our EmployAbility programme is another example of our innovative approach to career opportunities, offering a route for people with special educational needs. Our internship programme helps not only the new recruits, but also the recruiting managers and their teams develop new skills and appreciation for the diverse range of talent available in our communities (see 'Creating a thriving environment for our employees' in **Chapter 7 Our Commitments**).

Measure the overall effectiveness of our innovation activity

For the energy networks, measuring and benchmarking the progress made through innovation in RIIO-1 has been a challenge. The ENA is supporting and facilitating the industry to overcome this, and we have recently undertaken an initial benchmarking activity using the ENA's **Innovation Measurement**

Framework to measure the effectiveness of our innovation activity. The outcomes of this benchmarking are summarised in **Figure 08.07**, with further detail in **Table 08.08**.

It should be noted that, as the benchmarking has only recently been carried out, we have not had time to fully process the results and create an action plan based on them. We intend for this step to signal our commitment to implementing and improving our measurement of innovation, working with the ENA and other network companies to develop a framework that supports the best customer outcomes from innovation.

Figure 08.08 – Innovation Measurement Framework summary

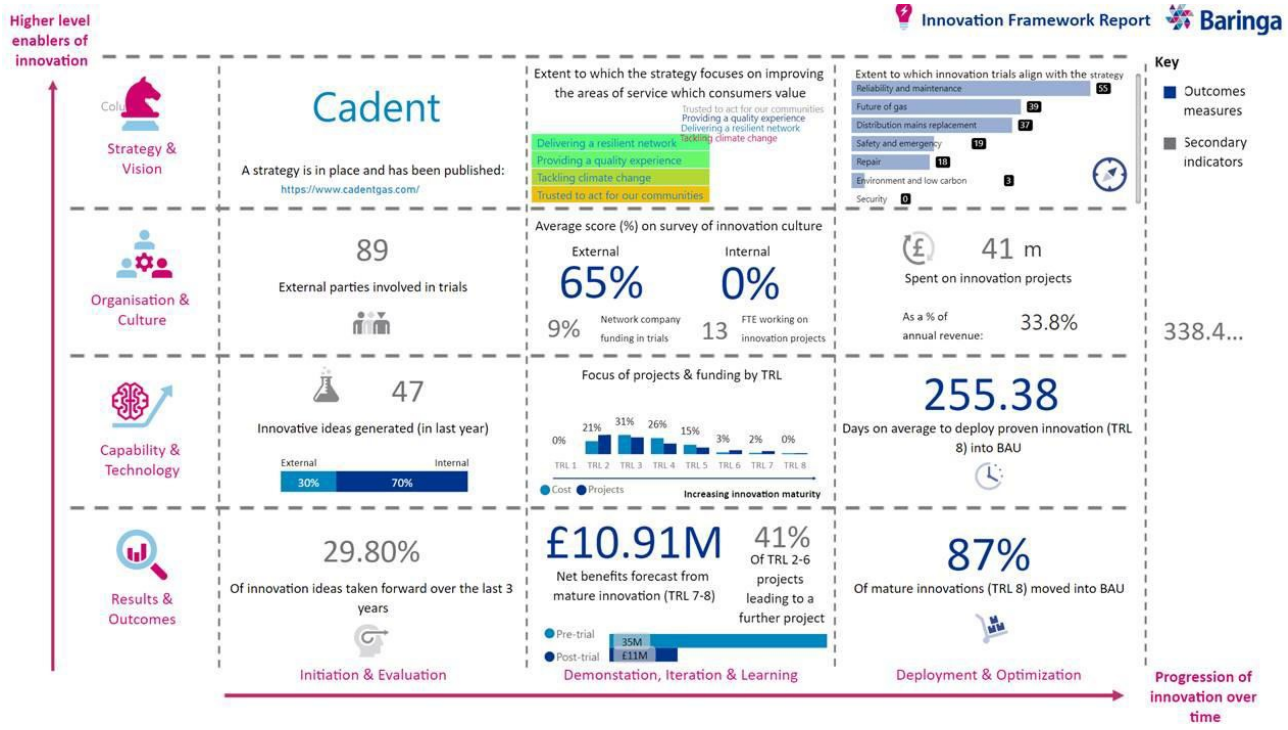


Table 08.08 – Innovation Measurement Framework detail

The references in the table below are for the 'primary' (O references) and 'secondary' (S references) measures for each of the cells provided in **Figure 08.08**.

Ref	Definition	Commentary
O1	An innovation strategy was included in our Business Plan submission and led to the award of an NIA fund which was at least 0.5% of Allowed Distribution Network Revenue (as defined in the RIGs) and has been updated in the last two years.	The Gas Network Innovation Strategy is updated every two years and was last published in 2018. The strategy sets out the areas of focus where gas distribution networks are looking to provide value to customers, and how they will share the lessons learnt with other organisations. In parallel to this, we have developed other Cadent strategies to focus on more specific areas where we can deliver customer value. Our Safeguarding Strategy focuses on carbon monoxide poisoning prevention, consumer vulnerability and fuel poverty, while our Future Role of Gas strategy sets out our focus areas to support the decarbonisation of power, heat and transport towards 2050 and beyond. We also have strategies to drive broader innovation as part of our business as usual activity, e.g. Data Strategy, Environmental Action Plan.

O2	Innovation projects or trials to deliver improvements in areas which stakeholders value most.	We held stakeholder events with customers in 2017 to gain insight into the areas which they valued most. This has been used to inform our innovation strategy, and shape and evolve the focus of our innovation projects against specific areas of interest. Over RIIO-1, we have increased our decarbonisation efforts, with customer feedback stating that networks need to be much bolder and more proactive in achieving decarbonisation through hydrogen and other green gases. More recently, as part of preparation for our RIIO-2 Business Plan submission, we have engaged extensively with customers to generate our outcome areas and then asked more targeted questions (e.g. on use of robotics, customers in vulnerable situations) to inform our approach for innovation in the latter stages of RIIO-1 and into RIIO-2.
O3	Innovation projects which align with the strategic themes set out in the Gas Network Innovation Strategy. (**Note:** one project can be mapped to two innovation themes – primary and secondary – hence the total number of aligned projects may be greater than the total number of projects).	To report this measure, we used the seven themes from the Gas Network Innovation Strategy to evaluate all our current and previous innovation projects over the course of RIIO-1. All our projects map to at least one of these themes. In addition to the seven innovation themes, we are now focusing on customer vulnerability and energy transition projects. These focus areas will be integrated into next year's updated innovation strategy. This measure does not include our broader continuous innovation activity (e.g. Performance Excellence) that is funded by business as usual Totex, because this activity does not necessarily align to the themes and we do not have the measurement process in place to collect this information at this stage
O4	N/A done on an individual basis.	No data. Do we have the Barringa report to measure our culture?
O5	The average score across all survey questions.	For reporting, we have used the results of a 2017, EIC-commissioned survey to the small and medium enterprise community about perceived relationships with energy network companies. The metric represents respondents' collective view (percentage or score out of 5) on working with Cadent compared to working with other network companies. Participants that work with Cadent scored us highly on our ability to effectively blend organisational cultures for better collaborative partnerships. EIC are currently undertaking an updated survey. Awaiting results.
O6	The heat map shows both where the % of projects and % of money spent sit across different TRL levels. Money spent can be taken from **Tables 7.10 and 7.11** of the gas distribution RIGs. The categorisation will be based on the TRL at the start of the trial. % of money spent will be based on the forecast spend on a project which can be updated for actual spend, once a project has concluded, in the next reporting round.	The heat map shows the highest proportion of Cadent innovation on projects and costs are weighted towards the TRL 2-4 range. This reflects where the majority of Cadent's research and development projects lie. Our focus on the latter stages of RIIO-1 is to push more or our projects through to TRL 8 to ensure the benefits from the project are realised.
O7	The time taken (in working days) for technology, operating practices or commercial arrangements which are categorised as TRL 8 at the end of project to be deployed as business as usual (BAU). The time measured will be from the date on which a project handover report is submitted within the company.	The average number of working days for projects to be deployed as business as usual is 255 days. As we move forward and become more experienced in implementing technologies and operating practices into our networks, we hope to see a marked improvement in the number of days taken.

	The time will be measured until the date at which the key concept being trialled is deployed on the network (separate to any legacy from the trial) and in an operational environment which could be categorised as TRL 9. Projects will be categorised by type – types are to be decided.	
O8	Publish the updated net benefits analysis for each project which reaches TRL 8. This analysis should be based on the approach to CBAs set out in Baringa's report.	Original benefit estimates stand at £35m pre-trial, with benefits being calculated at £11m post trial.
O9	The percentage of projects categorised as TRL 8 at the end of a trial which are subsequently deployed into business as usual. Business as usual constitutes being deployed on our networks and ready to be used or being used. This is separate to any legacy from the trial in an operational environment, which could be categorised as TRL 9.	The percentage of mature innovations (TRL 8) that have moved into business as usual stands at 88%. We have seen a marked step change in the number of innovations being rolled out in recent years, compared to earlier in RIIO-1. Over the course of RIIO-1, we have focused strongly on research and development of ground-breaking technologies, consisting of low TRL, high-risk projects. As we move forward into RIIO-2, we are shifting our focus onto higher TRL/market ready projects to deliver customer cost-saving technologies into our networks.
S1	The number of organisations partnering with the reporting licensee on innovation projects. For clarity, this can include other licensees and other companies within the same ownership group as the reporting licensee. Collaborators includes any organisation that contributes tangibly to (i.e. they are invested in) the outcome of a project. Collaborators should be categorised in the report by type and size.	We currently have 89 collaboration partners spanning academia, utilities, government bodies (including councils), and wider industry. Partners range in size and geographic reach. Through the transition into RIIO-1 and over the course of the current funding regime, there has been a significant step change in the breadth of innovation collaborators we work with. This step change has seen a shift in the types and sizes of organisations we work with, from a more traditional research and development approach to working with small start-up companies across a cross-section of industries within the UK and abroad.
S2	The reporting licensee's investment in innovation projects as a percentage of the total spend on innovation projects within that reporting year.	We have invested 9% of innovation project expenditure over the course of RIIO-1.
S3	The number of full-time equivalent employees working on innovation projects within the reporting licensee. To be congruent with the figure reported for the ONS survey.	Our average number of full-time equivalent employees working on innovation over the course of RIIO-1 is 13. This has been derived from the ONS survey which is completed annually, across the six reportable financial years.
S4	Electricity: percentage of Base Demand Revenue (as defined in the Charge Restriction Condition 2A) in the reporting year which the reporting licensee has spent on enabling the rollout of innovation projects. Gas: percentage of Base Distribution Network Transportation Activity Revenue (as defined in Special Licence Condition 1B) in the reporting year which the reporting licensee has spent on enabling the rollout of innovation projects.	The average percentage of our Base Distribution Network Transportation Activity Revenue spent on innovation over the course of RIIO-1 is 0.3%. This equates to approximately £5 million expenditure per financial year.

S5	The number of internal and external ideas which are generated on innovation projects which pass through an initial sense check to be logged in a central register.	The number and quality of innovation ideas generated and evaluated has increased over time. We have achieved significant progress in collaborating with our innovation supply chain to utilise new ideas, through a concentration on research and development investment. We have worked with other network and leveraged the skills and ideas of our employees to drive continuous improvements in the service we offer to customers.
S6	The percentage of innovation ideas from the central register which are or have been taken forward as trials or projects.	There has been a steady increase in the volume of ideas we have been taken forward as projects. This can be put down to the quality of ideas and proactively engaging with the innovation community to share our innovation strategy focus areas. Although the success rate of ideas being taken forward as projects only stands at 29%, we have increased the number of ideas proposed year-on-year, both internally and externally, whilst also ensuring customer value for money by not duplicating projects and focusing on areas that will deliver customer value for money.
S7	The percentage of projects categorised at the end of the project as being TRL 2-6 which lead to addition projects seeking to progress the TRL further.	41% of TRL 2-6 projects led to a further project or further stage of a project.