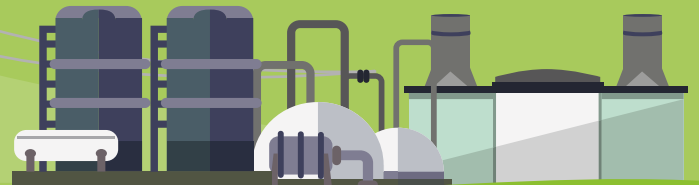




Wales & West Utilities

Innovation Report 2019/20



Innovating to deliver for customers **now and in the future**

I'm proud to welcome you to our Innovation Report for 2019-20 – a year that will certainly live long in the memory.

2019 saw an intense period of activity at Wales & West Utilities, as we worked to put together our Business Plan for 2021-2026.

Written by more than 25,000 of our customers, it sets out how we'll deliver for the communities that rely on us. And it explains our approach to innovation in RIIO-GD2 and beyond.

We'll continue to focus on delivering for customers today by improving the way we work; and we'll prepare for the future through research projects and practical trials, like our HyHy project. Analysing Cardiff, HyHy has demonstrated how smart hybrid systems and hydrogen can get us to net zero quickly, in an affordable and sustainable way.

But the first half of 2020 has shook the very foundations that underpin our society.

Coronavirus has changed, irreversibly, the way many of us work and live our lives.

What has helped nations right across the globe fight against and rise to the challenge of Coronavirus has been innovation.

Online food shopping, deliveries, web chats and videoconferencing have helped maintain as much normality as possible and kept us in touch with our loved ones. And in the healthcare sector, development of new treatments, testing and vaccines continue at a pace never seen before.

Much of this technology would have been unimaginable, even at the turn of the Millennium.

So while gas engineering is certainly lower in profile, if ever there was a time that demonstrates the power and importance of innovation – this is it.

I hope you find this report of interest – and as always, if you want to talk about how we could work together in the future, get in touch: innovation@wwutilities.co.uk



Graham Edwards,
Chief Executive



Contents

Page 2	Welcome
Page 3	Contents/How to use this document
Page 4-5	New strategy and portfolio alignment
Page 6-7	The value of our portfolio
Page 8-17	Case studies
Page 18-21	Work with us
Page 22-23	Get in touch



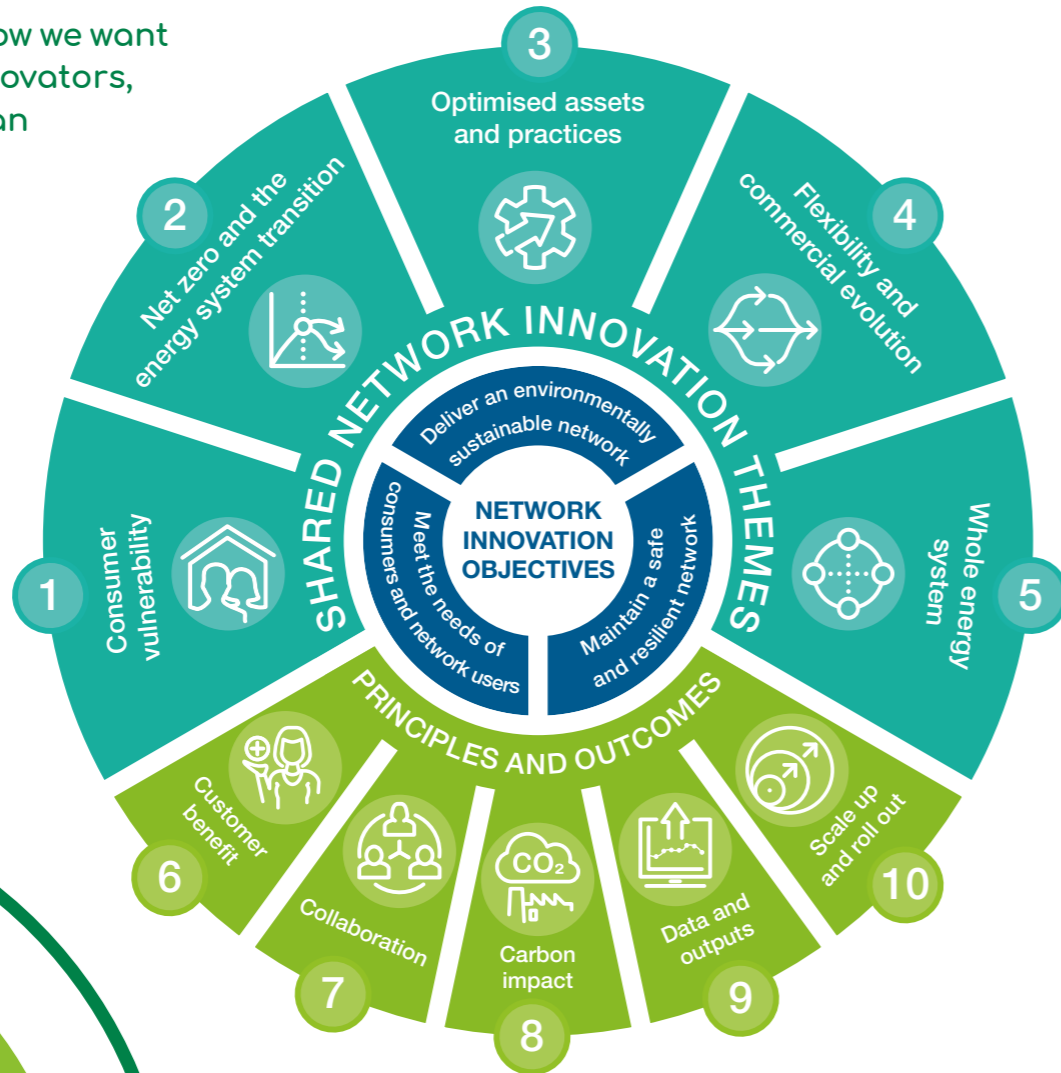
Our Innovation Report goes digital

This year, we're delivering our Innovation Report digitally as an online flipbook, with new interactive content. As well as eye-catching animations to bring our pages to life, you can click on links to websites or email addresses.

New strategy and portfolio alignment

We have identified our strategic aims to 2050 and these align with what customers want and value from networks. Building on our national Gas Network Innovation Strategy, we have determined our innovation focus areas for the 2020s.

This strategy sets out how we want to work with you, the innovators, on new solutions that can help us deliver safe, resilient networks that facilitate the net zero transition and meet the needs of our customers.



1 Consumer vulnerability

- * Ramp Up
 - Street Score

2 Net zero and the energy system transition

- * Hybrid-Hydrogen (HyHy)
 - H21 – field trials design
 - Higher chain alkane gases from anaerobic digestion
 - Hydrogen Deblending in the GB Gas Network
 - IGEM Gas Quality Standard Working Group
 - Assessing the Gas Network Decarbonisation Pathway
 - Flexible biomethane production
 - Tools of Engagement

3 Optimised assets and practices

- * ESEAL
 - Climate Change Impact Mapping
 - Pressure Control and Management
 - Composite Repairs to Complex Shapes
 - Cryogenic Pipeline Cracking Technology
 - Permanent Leak Repair Clamps Phase 2
 - Girth Weld Inspection
 - Safe Removal of Concrete
 - Debris In Pipe
 - Risk based Approach HP Filters & Pig Traps
 - Duraseal Repair Method
 - Eye In The Sky

4 Flexibility and commercial evolution

- * OptiNet
 - Future Of Gas Transportation Charging

5 Whole energy system

- * Regional FES
 - A decade to make a difference
 - Zero-2050
 - Green City Vision
 - Net Zero South Wales
 - Pathfinder Plus
 - Bridgend Future Modelling Phase 4

KEY: * = EXEMPLAR PROJECT

6 In 2019/20, more than **3,000 customer disruptions were avoided**

7 Since 2013/14, we have been part of **60 collaboration projects**

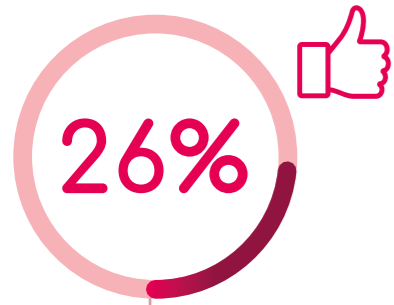
8 In 2019/20, more than **1,000 tonnes** of waste to landfill was avoided

9 In 2019/20, we attended **200+ engagements** reaching **8,000+ stakeholders**

10 Since 2013/14, we have embedded **100 projects**, delivering almost **£13m in benefits**



The value of our portfolio



of our projects are successfully implemented within the business



of our projects come from outside our organisation



of our projects are in collaboration with network partners

1000

ideas have been received to date, since 2013



500

partners targeted in GD2



1st

Freedom – our first cross-sector demonstration project began

16/17

11

Above & Beyond – our largest collaboration of 11 network partners began

17/18

£10m

Value of project benefit delivered

18/19

£15m

Target value of project benefit delivered

100

Projects fully embedded within our organisation

19/20

20/21

Getting ready for GD2 – 2021-2026:

1. We want to build on this R&D and invest in demonstration projects to allow us to achieve our new net zero ready ambition.

2. We have an ambition to achieve a further £18m worth of project benefit by 2026, as well as delivering long-term customer benefits.

3. We want to broaden and extend our reach to work with more than 500 external organisations over the next six years.

Delivering in GD1 – 2013 to 2021:

1. To date, we've invested in 34 decarbonisation research & development (R&D) projects.

2. We forecast to have delivered £15m worth of project benefit by 2021.

3. To-date, 50% of our innovation comes from outside of our organisation.





Case study

RAMP UP



MEETING THE PROJECT DELIVERY TEAM IN CARDIFF, LEFT TO RIGHT, JO FASHAN, LUCY MASON & JAKE SAMI

Ramping up collaboration

Innovation is allowing us to explore how best to support the needs of those in vulnerable circumstances and take a more inclusive approach. This could take the form of new services, data and management practices, technologies or partnerships.

Reducing the impact our essential works have on the public is always at the forefront of discussions at our annual Customer Conference, so when concerns were raised about the ramps we use on our sites, the opportunity to innovate emerged.



Need

We learned some of our vulnerable customers can find it hard to navigate around our street works, so we looked for an innovative solution. The problem was that traditional kerb ramps used around street works can create challenges for customers using mobility scooters and wheelchairs.

Whizz-Kidz is pleased to be involved in the Ramp Up project. It allows us to share views and experiences on how difficult day-to-day life can be for wheelchair users. We believe it is important for our families to be involved in campaigning for improvements in their community and we are excited to be part of the results.

– Jo Fashan, Associate Director at Whizz-Kidz



Approach

We understand the importance of collaboration, not just to make sure learning is shared and duplication avoided with our network partners but also to make sure we fully leverage the expertise and capabilities of our supply chain.

This project brings together 11 partners, led by Wales & West Utilities and supported by the EIC, four gas and electricity networks, three manufacturers, Frazer-Nash Consultancy and children's charity Whizz-Kidz.

This project will produce a better kerb transition ramp, and Whizz-Kidz plan to test the prototypes and make recommendations on which they found easiest to navigate.



FACT FILE

We have delivered vulnerability training to more than **1,680** colleagues to help them identify signs of vulnerability, and giving them the tools to provide additional help.



Benefits

This pioneering project demonstrates how lots of partners can come together to tackle a nationwide problem.

Working with experts is essential and bringing in Whizz-Kidz gives us invaluable insight into how wheelchair or mobility scooter users view our street works, something that will help generate ideas for improving accessibility in all aspects of our work. Involving three manufacturers enables supply chain growth, which could lead to more inclusive product designs and competition.

The scale of this collaboration will ensure the benefits of our solution will be felt and learning shared throughout the UK.



Case study

HYHY

Hybrid-Hydrogen (HyHy)

We're looking for solutions to decarbonise heat for homes. We want to integrate all available renewable energy, innovate with heat technology and prepare our networks to become low carbon gas grids.

The HyHy project examined how hydrogen and hybrids could decarbonise the heating of a city sooner and more effectively than alternatives.



Need

This study sets out an achievable path to net zero which keeps disruption to communities and cost to customers as low as possible.

CARDIFF BAY FROM ABOVE



Approach

The project studied the Welsh capital of Cardiff and simulated the decarbonisation of home heating in a number of different ways.

It showed that using smart-controlled hybrid heating systems – where you pair a boiler with an air source heat pump – can reduce carbon emissions quicker.

Hybrid installations of this kind use renewable electricity when it is available, and green gas like hydrogen and biomethane when it is not. It also reduces the amount of green gas needed to heat homes, relying on electricity for 80% of the time and on hydrogen or biomethane to meet peak heat demand.



Benefits

The existing gas network is already able to transport various amounts of hydrogen as it has done in the past. If Government mandate that all boilers should be hydrogen-ready, then the conversion process will entail little more than a short visit from a gas engineer.

First rolling out heat pumps for use alongside existing gas boilers (fueled by an increasingly green gas supply) means we can start to decarbonise home heating sooner using existing infrastructure, before switching to hydrogen in the future.

The main findings also show local hydrogen production is a viable and affordable alternative to a national supply. This solution could significantly reduce the amount of hydrogen required to meet Cardiff's energy demand, simplifying the transport and storage of carbon dioxide from the hydrogen production process.

“Most exciting of all is the prospect of producing low-carbon heat; using smart hybrid heat pumps in combination with natural gas in the short-term, with the potential for hydrogen in the long-term.”

– Lord Deben, Chairman of the Committee on Climate Change (CCC)

FACT FILE

- Before conversion to natural gas began in 1967, the gas network was used to transport a manufactured gas, commonly referred to as towns gas. Hydrogen was the majority component.
- Our study has opened the door to the possibility of local hydrogen supply – by demonstrating that an economic balance of flexible hydrogen production with critical storage is now a viable option for coastal towns and cities like Cardiff around GB and beyond.



Case study
ESEAL

Seals in savings, cuts disruption

We are always looking for innovative ways of replacing mains efficiently and in the least disruptive way possible.

One of the latest is ESEAL (Enhanced Stub End Abandonment Live), initially developed by specialist contractor Steve Vick International with Northern Gas Networks (NGN) in an NIA-funded project (NIA_NGN_088).



Approach

We're always keen to learn and seek out opportunities to build on past projects other networks have completed. So, we worked with Northern Gas Networks to understand their business case, before partnering with Steve Vick International, where we staged 16 trials of the technique to evaluate its effectiveness for our network and customers.

We found ESEAL to be an efficient alternative as it remotely seals the stub end under live gas conditions. It involves opening a small access excavation away from the main road or junction where the stub end is usually located. Engineers use CCTV inside the main to remotely insert an inflatable bag into the section being abandoned, then pump in expanding foam, turning the bag into a gas-safe plug. More foam is added to fill the rest of the pipe and completely seal the stub end.



FACT FILE

- ESEALs done since being launched: 21.
- Cost avoided: Almost £60k total, and approx. £3k average per job
- Speed/time needed vs conventional excavation: ESEAL has saved more than 60 days of customer disruption – and also the same number of days of traffic management avoided.



Need

Current mains replacement methods often leave behind a one-metre section, known as the stub end, where it joins the parent supply. To fully remove – or abandon – the stub end, we dig a long trench so it can be taken out.

This type of work means disruption for our customers and local road users. With the connection between the mains often under a major highway or junction, extensive traffic management is needed during the work.



OUR ENGINEERS AT WORK



Benefits

ESEAL is a valuable addition to our operational toolbox. It not only saves time and avoids cost compared with our previous method, it is also much less disruptive. As the remote technique can be carried out up to 60 metres from the stub end, it reduces the need for traffic management. It is also safer for engineers as they are not working in a high-risk location.



Case study

OPTINET



A FARM FIT FOR THE FUTURE - WYKE FARMS BIOMETHANE PRODUCTION SITE

OptiNet

The gas industry is facing a dual challenge as we transition to a cleaner energy system – more green gas suppliers connecting to the network and increasing demands on it, including more flexible power generation and gas for transport.

A first for the UK, OptiNet is a collaborative project to help us balance green gas supply with demand to maximise the green gas production and keep homes heated. It will support the transition to a cleaner energy system – an essential step on the path towards decarbonising by 2050.

FACT FILE

- The Pathways project (NIA_SGN0144) recently predicted availability of as much as **193 TWh** of green gas by 2050, enough to heat more than **16 million homes** across the UK.
- Combined with a hybrid heat pump using renewable electricity 80% of the time, green gas can be used to decarbonise four times as many homes as it could on its own – more than **2.5 million homes** on our network in a net zero scenario.



Need

Increasing the number of green gas connections is essential to our net zero vision. It is a cost-effective way of decarbonising heat that can be used in place of natural gas with zero impact on customers, so we want to maximise the amount of it flowing through our network.

In a net zero scenario, our network could see an additional 9.6 TWh of green gas entry per year – that’s enough to heat 800,000 homes, and as many as four million where hybrid heating is installed. But our network is reaching capacity. We have identified 16 zones where we need to balance entry (green gas) and exit (for power generation), and it is only by using new optimisation methods and technologies that we will be able to achieve this aim.



Approach

With Cadent, we are investigating innovative ways of boosting capacity, enhancing control and improving storage to maximise the use of biomethane and better manage the peaks and troughs of demand as it changes on our network, both daily and throughout the year.

The project, which runs until 2021, includes installing a gas compressor. Managed by Cadent, this will prove the concept of compressing gas on the network so that green gas can be stored, moved longer distances and used more efficiently.

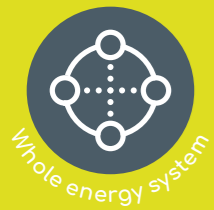
We will also install smart control on the gas network to help us quickly balance green gas availability with demand and make sure we facilitate as much green gas entry as possible.

Following the initial technical evaluation, testing now begins. We will assess the feasibility of compression into storage at scale, the commercial and regulatory barriers, network reinforcement options and advanced demand forecasting tools based on insights from the Freedom project (WPD_NIA_023).



Benefits

OptiNet will deliver detailed recommendations on how best to meet the optimisation challenges we face and the evidence we need to justify investment. This will help us develop a cost-efficient and reliable system of managing green gas injection that meets current and future demand for more flexible power generation or gas for transport.



Case study

REGIONAL FES

Regional Future Energy Scenarios

Across our energy system, huge changes are happening that will have a far-reaching impact on it. Understanding what effect they will have is crucial for both gas and electricity network operators.

Our Regional Future Energy Scenarios (FES) project, run with energy consultants Regen, developed a methodology for assessing how different regions might respond to the availability of new technologies that have an impact on gas supply and demand.



Need

We need evidence to justify future investments and we have to demonstrate we are delivering a network that takes into account economic and social factors such as decarbonisation, decentralisation, energy security and fuel poverty. That means creating projections for whole systems that contain enough detail, so we can more accurately predict supply and demand – an energy distribution FES.

While the industry already has future energy scenarios, they are currently too high-level, either at a national level or only focusing on gas or electricity.

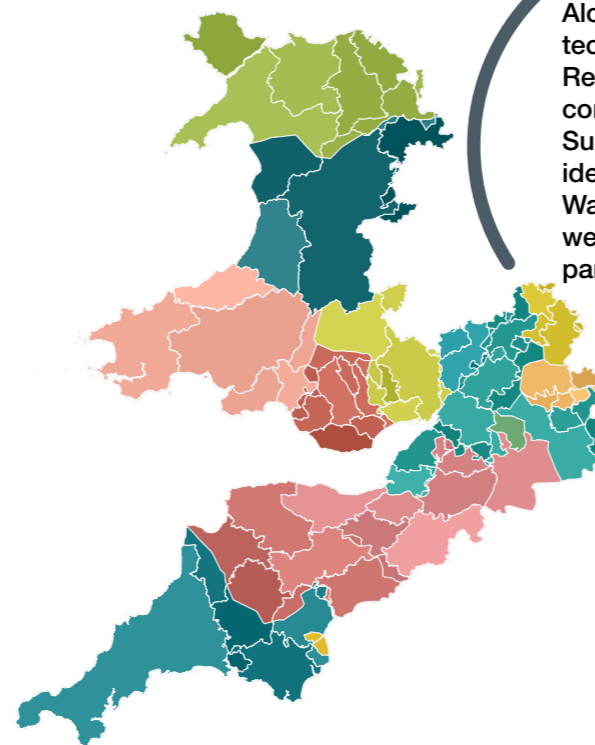


Approach

The project team developed and trialed a new forecasting methodology similar to one used for electricity networks to create a set of regional scenarios for gas and heat to the year 2035. These would provide the evidence to help us and other stakeholders understand future demand, supplies and reductions in carbon.

By developing methodologies used by the DNO in our network and incorporating local authority development plans, we were able to produce energy forecasts for gas and electricity combined – a prototype Distribution FES.

Using the four National Grid FES 2018 energy scenarios and adding a fifth, Hybrid Accelerator, provided a common framework and an overarching set of assumptions. The scenarios were developed using data gathering, energy system analysis and stakeholder engagement in Wales and south west England.



Alongside our technical partner Regen, analysis was conducted on 100 Gas Supply Areas identified across Wales and the south west of England as part our study.



Benefits

This innovative approach to developing regional future energy scenarios for gas networks is the first of its kind. Mapping every locality in our region to find long-term solutions for heat, power and transport provides benefits for all – allowing data to be extracted in geographies that are most relevant for different stakeholders.

Ultimately, it will enable closer alignment between regional gas and electricity network planning, which will be essential to a future 'whole-system' approach.

FACT FILE

- We engaged with more than 165 stakeholders at four stakeholder events across Wales and the south west of England.
- Meeting our heat demands with electricity alone would cost £300 billion in more power generation and distribution capacity, which would add an extra cost of £12,000 for every household.

Work with us



Our process



Our ambition – £18m efficiency benefits

We're dreaming big. In our next price control period, up to 2026, we want to continue investing in innovation and to make sure customers get the best value for money, equivalent to a saving of £18m over the five-year period.

Since 2013, our partners will have helped us deliver £12.8m in project benefit. We want to work with you to continue delivering real benefits for our customers and aim to increase our reach to work with more than 500 external organisations over the next six years.

We are committed to delivering long-term benefits through our future of energy projects and want to be net zero ready by 2035.

Our process – tried and tested, simple and effective

We've built a strong but simple innovation operating model – our 'innovation process toolkit' – that uses a range of tools and techniques to produce clear project strategies and plans, engages stakeholders in our vision, encourages project success and supports roll-out of equipment, products, research findings and procedures.

This year, this process has seen us invest in 30 projects and fully embed 100 innovations into the business. Our project partners have been there every step of the way, from ideation to business-as-usual, and have helped us share learning broadly.

We will keep you engaged and provide you access to the wealth of knowledge in our business, assuring pace and maximum potential success on roll-out.

Open innovation – learning and sharing

We are at the forefront of sharing our learning with other companies and interested bodies through network forums and dissemination events. In 2019/20, we attended more than 200 engagements at 36 locations – reaching more than 8,000 people in the process.

Collaboration doesn't just mean working on projects with our network partners. It means actively sharing learning from our projects and adopting best practice. We have formed and strengthened relationships through active participation at collaborative forums such as the Gas Innovation Governance Group (GIGG), where we have shared £100k worth of project benefit.

ENDURATEC Case study

Incorporated in 2016, Enduratec was set up to bring an exciting new leak repair solution to the utility sector. Following a century without change, this micro-enterprise had the ambition to transform the way the gas industry repairs leaking pipes. Here, Bruce Hutt of Enduratec shares his experience with working with Wales & West Utilities (WWU).

WWU and Cadent backed Enduratec's DURASEAL innovation from the start. After SGN published its NIA-funded project (NIA_SGN0030) that validated silicone self-amalgamating tape (SSAT) as an interim fix for metallic gas risers, DURASEAL developed this further, making the repair permanent and adding a sealing compound under the SSAT and a robust composite shell for protection.

We understood network operators want to keep customers connected, which is challenging since the first requirement is to make safe, potentially resulting in disconnection. Even small leaks create resource pressures, so we needed to create a quick, easy to apply and effective repair.

The WWU team quickly spotted DURASEAL's potential for use as a universal repair anywhere on the network.

INTRODUCTION

Bruce visited our Treforest operational depot to demonstrate the solution live in January 2017

TRIAL APPROVAL

We received further results from SGN's work, and information on Cadent's trial in July 2017 that gave us confidence to proceed to trial on the network

TRIAL BEGINS

Operations were trained up, and approval granted to begin live field trials – beginning October 2017

TRIAL COMPLETION

By January 2018, we had seen the benefits of DURASEAL and geared up for implementation

APPROVAL

In May 2018, we had finalised the implementation plan with all areas of the business engaged, and set an implementation plan in motion

IMPLEMENTATION

By July 2018, we had approved a business case to commission training for 500 engineers across our network, and by September 2018, this was complete



At the start, stakeholders from all areas of the business got the opportunity to experience DURASEAL first hand. We set up training rigs with live pressure leaks using compressed air at WWU's Treforest depot and, in autumn 2017, the first of many field trials began in Penarth, Cardiff.

Following a two-month assessment period, and with positive feedback on every application, we geared up for deployment. The launch involved representatives from each area of WWU to help remove any potential implementation barriers, while more than 500 engineers received DURASEAL training during summer 2018.

The journey to unlock potential involves a change in culture. First Call Operatives in the past couldn't repair these types of escapes, but WWU found a way to 'make safe' and 'repair' using DURASEAL.

Now, an NIA-funded project backed by WWU in collaboration with Cadent (NIA_CAD0041) is under way. Developing DURASEAL for use on larger pipework, testing to the new LC1 standard and trialling on the networks, the project will prove its suitability for below ground and acceptance as a permanent repair.

WWU's open culture meant we could work with local teams, an invaluable source of experience, which has helped develop more potential applications and made the training programme effective.

The beauty of DURASEAL is that it can be used anywhere, as a permanent repair, above or below ground, on LP and MP, on metallic and PE pipelines. The full benefit of this 'quick-fix that lasts a lifetime' will be felt when the whole operations team is empowered to use DURASEAL anywhere.

Get in touch

–we're easy to work with

See our challenges

Visit our webpage at wwutilities.co.uk/innovation

1. We are 100% aligned to the 2020 Gas Network Innovation Strategy which sets out five key industry innovation themes.
2. Here you can take a look at our calls for innovation and get in touch with your ideas.

Come and meet us

Visit our [webpage](#) to see our whereabouts, you'll find us at many digital and physical conferences and events.

See our joint successes

Visit our webpage and keep up to date by following us on Twitter

 [@WWUtilities](#) and  [LinkedIn](#).

Get in touch to submit your ideas

1. Click on the buttons below to submit your ideas via our web portal:

[Submit project idea >](#)

[Submit product idea >](#)

2. **Sign up** to our mailing list [Let's connect >](#)

3. Email your ideas directly to [innovation@wwutilities.co.uk >](mailto:innovation@wwutilities.co.uk)





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