

# Energy Innovation Forum Helping to shape SIF innovation ideas

12 July 2022

### **Agenda**







### **Introduction to ENA**

#### The voice of the networks

- 29 million electricity customers
- 21.5 million gas customers
- 180,000 miles of gas network
- 519,304 miles of electricity network

### Areas we support the Networks

- Integrating Low Carbon Technologies
- Transition to Hydrogen programme
- Data and Digitalisation
- Safety, health and environment
- Governance of Engineering codes And many more...





### **Smarter Networks Portal – Your Window into Network Innovation**

**Over 2,000 live and completed projects** 

### Account holders receive weekly progress updates on projects in their interest areas (free)

### **Repository for Innovation information**

- Funding mechanisms
- Energy Network Innovation Process
- Events

Many more...

#### Innovators submit their ideas directly to Networks

https://smarter.energynetworks.org

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		Sma	rter Net	wor	ks P	ortal		•
	×		Search fo	r a proj	ect	•		
	Q :	Search by reference num	ber, technology etc.		K		Search	

#### Project Proposal to Energy Networks

Keeping your ideas flowing

Here, third party innovators can propose or pitch new and innovative ideas for Energy Networks to consider







### **Whole System Innovation Strategy**

- 1. Data and digitalisation
- 2. Flexibility and market evolution
- 3. Net Zero and the energy system transition
- 4. Optimised assets and practices
- 5. Supporting consumers in vulnerable situations
- 6. Whole Energy Systems



## Network Innovation and the Strategic Innovation Fund

## Sian Rowlands, Wales & West Utilities

12 July 2022

EIF Slides WWU





50-

Innovation Funding Summary

# **RIIO-2 Innovation Funding Routes**

### 1. NIA

Network baseline totex <5M per project

Requirement 1 – facilitate energy system transition and/or benefit consumers in vulnerable situations

Requirement 2 – potential to deliver net benefit to consumers re financial, social, environmental or wider energy supply resilience

Requirement 3 – involve Research, Development or Demonstration

Requirement 4 – develop new learning

Requirement 5 – must be innovative (not BAU) and have unproven business case with some risk re Research, Dev or Demo Project to demonstrate effectiveness

Requirement 6 – not lead to unnecessary duplication

## 2. UIOLI

Network baseline totex

#### Eligibility Criteria

Early development work in design, pre-construction of facilitation for Net Zero that may result in a reopener submission.

Low regret capital projects with high Net Zero input not captured by other funding mechanisms or not at a level for re-openers

Can also be used for BEIS Hydrogen Grid R&D programme and small/repeatable projects

## 3. SIF

Annual SIF Challenges set by Ofgem (£450m over GD2) • Clearly identified net benefit for customers • Network Innovation • Must address an Innovation Challenge

Feasibility Studies

• - Outline Problem & Value

Outline Problem & Value
Public Webinar Launch/Close
<2 Months</li>
Capped at £150k

Experiment & Develop

- Prep & Test Stages
- Progress Report mid-project
- <6 Months</li>Capped at £500k (? evidence)

Build/Operate/Demo

- Deployment Stage
- Annual Progress Report
- 6 Months 5 Years
- Start at 500k (? Cap in ICD)

### 4. Re-openers

Network triggers application for NZASP with Ofgem

NZASP - Pre Construction & Small Projects
Optioneering
FEED or Desktop Studies
Initial Feasibility/Early New Work
Technical Design
Consulting
Stakeholder engagement

Net Zero - Construction Projects

Commissionable / Commercial Projects

#### Ofgem Triggered Heat Policy – Policy Changes

Gas quality & composition in GSMR or Gas Calc. Thermal Energy Regs
Spc 4B – connection charging arrangements
Promotion of energy efficiency S.33BC

Large Load – Construction Projects



**SIF Overview** 

## High Level Details & Update

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# **SIF Round 2 Challenges**



### **Ofgem Strategic Innovation Fund**

#### **Round 2 Challenges – briefing**



# **SIF Round 2 Challenges**

## **Key dates**

Dates for your diary for 2022

#### Discovery

- Launch webinars: 2<sup>nd</sup> March or 7<sup>th</sup> March
- Project dates: 1<sup>st</sup> March 30<sup>th</sup> April
- End of Phase Report due: 30th April
- Show and Tell webinars: 19th May 23rd May

#### Alpha

- Applicant briefing: 22<sup>nd</sup> April
- Competition opens: 3<sup>rd</sup> May
- Competition closes: 18<sup>th</sup> May
- Interviews: w/c 30<sup>th</sup> May (Zero Emission Transport, Heat, Data & Digitalisation), w/c 6<sup>th</sup> June (Data & Digitalisation, Whole System)
- Notifications and feedback: 8th July
- Project dates: 1st August 31st January 2023
- End of Phase Report due: 31st January 2023





## Network aims / goals

## Sian Rowlands, Wales & West Utilities

12 July 2022

# WWU Strategy Overview

High Level Strategy & Priority Areas

# WWU Net Zero Strategy

#### Our Business Plan - Wales & West Utilities Business Plan

- Meeting the needs of consumers and network users; support projects that bear uncertainty or where benefits are valid to society but difficult to commercialise
- Delivering an environmentally sustainable network; deliver customer benefits and provide the lowest cost pathway to heat decarbonisation
- Maintaining a safe and resilient network; support projects that help our business to adapt to a changing environment that will be fit to provide energy for generations to come
- ENA key strategic areas Energy Networks Innovation Strategy 2022
  - Data & Digitalisation
  - Flexibility & Market Evolution
  - Net Zero and the Energy System Transformation
  - Optimised Assets and Practises
  - Supporting Consumers in Vulnerable Situations
  - Whole Energy System

- Our key strategic areas -
  - Hydrogen; this includes the role of hydrogen at blended and 100% levels e.g., research, evidence building, practical demonstration and delivery of commercial solutions
  - Data & Modelling; future evidence for forecasting and capacity, sharing of data, alongside data to support local area planning
  - Transport; understanding and exploring the role of gas in transport and investigating fuel choices, particularly our own fleet, to provide consumer choice and fuel solution options, particularly around hydrogen
  - Consumer Heating Solutions; exploring consumer options for use of hydrogen to support hybrid heat development
  - Biomethane; includes new production capacity on our network
- SIF Round 2 challenges for 2022 (Data & Digitalisation weaves through all themes) -
  - Supporting a Just Energy Transmission
  - Improving Energy System Resilience and Robustness
  - Preparing for a Net Zero Power System
  - Accelerating Decarbonisation of Major Demands

# **Key Areas of Interest**

High Priority Areas for WWU are looking to invest in for 2022/2023:

- Supporting a just energy transition, and accelerating decarbonisation of major demands.
- New production capacity for biomethane on our network and increasing the understanding of the role of hydrogen for net zero and within our network for blending and at 100% levels.
- Better identification and inclusion of vulnerable and disadvantaged customers to support decarbonisation of heat and mobility for rural and consumer groups with reduced access to opportunities for decarbonisation.
- Improving resilience using multi-energy systems, with strengthening energy system supply chain resilience to support efficient roll out of new infrastructure, allowing us to effectively manage, facilitate and integrate multiple demands e.g., heat and transport, and integrating heat networks for wider energy network management.
- Consumer options and supporting hybrid heat solutions development.
- Understanding role of gas in transport and investigating fuel choices, particularly our own fleet.
- Data and modelling regarding capacity, sharing, and supporting local energy planning.



## HyPark Project SIF Round 1 Discovery Phase – Heat & Zero Emission

As the number of electric vehicles (EVs) on our road's increases, so does the demand for charging facilities. This project aimed to assess the part gas could play in helping to power EV charging stations at commercial and local authority properties and in areas where the electricity network is constrained and unable to support EV charging at scale.

- WHO: Wales & West Utilities, Western Power Distribution, Scottish and Southern Electricity Networks and SP Energy Networks.
- **PROJECT PARTNERS:** Easee and Passiv UK

Approach - HyPark seeks to bring together existing technology such as fuel cells, battery storage and photovoltaic solar panels into a shipping containersized charging station that uses intelligent controls to charge vehicles using the most efficient energy source according to the time and conditions.

- The discovery phase was to prove the concept's viability and consider the investment case in taking the stations to commercial production against upgrading the existing electricity networks.
- Partnering with Passiv UK, a developer of advanced algorithms for aggregation and flexibility services, and EV charging specialists Easee, we looked at current and predicted EV uptake, future traffic patterns and likely charger use over the next 15 years to assess the need for capacity.
- Following this, we worked with Western Power Distribution, Scottish and Southern Electricity Networks and SP Energy Networks to measure indicative costs for the upgrade of the electricity network against the cost of connecting fuel cells to the existing gas grid.
- Using this data, we proved the feasibility of HyPark and its potential commercial viability and have submitted an application to take the project to alpha testing.

Benefits - Successful completion of the discovery phase proved gas has a viable and important part to play in the future of EV charging. Among the benefits HyPark would bring are:

- Accessible EV charging stations that ease the pressure on the electricity grid
- Energy efficient fast and slow charging
- Potential heat from fuel cells fed into local heating networks
- Potential for HyPark to become community energy hubs.



## **Regional Decarbonisation Pathways Project** NIA - Net Zero and the energy system transition

Achieving net zero emissions targets by 2050 will mean dramatically changing the way we transport, store, convert and use energy across the country. While there have been high-level studies into how that will happen, until recently there has been little research in to what it means at the local level. This project developed an analysis and a plan of how we might decarbonise our gas network at a regional and sub-regional level.

- WHO: Wales & West Utilities.
- PROJECT PARTNERS: Energy Systems Catapult, Costain

Working with project partners Energy Systems Catapult (ESC) and Costain, we undertook two separate but complementary studies to devise a strategic plan and a conceptual plan for the decarbonisation of our gas network.

The strategic plan was developed by ESC, with input from Costain, and consisted of whole system modelling and assessment of the network implications, while the conceptual plan was an engineering analysis by Costain showing what the gas network could look like and how to achieve it.

The analysis is based on three credible energy system pathway scenarios to net zero by 2050:

- a high hydrogen scenario
- a high electrification scenario
- · a balanced scenario lying midway between these.

In all three scenarios, hydrogen and the gas networks have a significant role to play. Natural gas was largely removed, with industrial and heating demand being met by hydrogen, although some use alongside carbon capture and storage by industry was modelled in all three scenarios

Both in-depth plans have helped provide the data and analysis we need to advise on energy network transformation policy on the pathway towards net zero. The project also demonstrated how Wales could become a net exporter of hydrogen in future thanks to its existing liquefied natural gas infrastructure and deep water ports. Key findings:

- hydrogen has an important role in energy system designs that cost-effectively meet carbon budgets and net zero goals
- · adopting hybrid heating systems offers significant value to the energy system
- hydrogen can completely replace liquid fossil fuel use in industry
- the decisions made by industry will have a large impact on the scale of hydrogen production
- a transition to hydrogen can be achieved by developing a dedicated hydrogen backbone









## Network aims / goals

## Alexander Yanushkevich, National Grid Electricity Transmission

12 July 2022



# Innovation Priorities

Alexander Yanushkevich Innovation Manager NGET

12 July 2022

nationalgrid

## **Strategy areas**

#### Innovation strategy areas:



#### Delivering cleaner energy

Create a road to net zero by reducing our carbon footprint and helping others reduce theirs. Accelerating the testing and rollout of new technologies for use across the whole Energy System by leveraging the new facilities at our Deeside centre for innovation.

Which in turn will be critically enabled through our third strategy area:



#### Delivering cheaper energy

Through a long-term innovation programme, deliver a net zero whole energy system strategy at minimum achievable cost.



#### Delivering an innovative culture

Driving a more externally referenced, collaborative, open and innovative approach across all of our organisational disciplines, whilst at the same time building capability and unlocking potential in our people.

Our innovation strategy is therefore as much about how we deliver innovation for stakeholders as it is about what we are focussed on delivering. A strong combination of the two will deliver an improved overall outcome for stakeholders, customers, consumers and NGET itself.



## Six priority areas

Our innovation priority areas to deliver our strategy are:

## Transforming the business through digitisation

We will develop tools and techniques that allow the digitisation of many of our processes, and overall management of data, as well as exploring the application of Artificial Intelligence across many of our activities

## Facilitate decarbonisation of wider industries

We will collaborate with and support industries cross sector to decarbonise transport, explore opportunities for achieving net-zero in industrial clusters, explore the appetite for transition to a hydrogen economy and the implications on network providers

### Reducing the environmental impact of our activities

We will develop options for driving down greenhouse gas emissions from SF6 and other emitters, identify methods for minimising impact of construction, utilise novel materials, and develop new techniques to monitor and measure our performance

#### Provide long term system benefits through Deeside Centre for Innovation

We will open the innovation centre up to a wide range of stakeholders to allow improved development, better testing and faster implementation of low carbon technologies

#### Being responsive to customers

We will create new construction and installation techniques that will improve our agility for connecting renewable energy customers, whilst driving down carbon impact and overall cost, and delivering better customer experience

#### Deliver technical innovation

We will continue to technically innovate on the equipment and technologies we utilise across the network to drive down costs, minimise carbon impacts and deliver the levels of reliability that our stakeholders require



- **Challenges and Funding**
- 'Good outcome from innovation'
- NIA funding of £50m for T2
- for energy transition and vulnerable consumers
- projects up to £2m
- -lower TRL or long term development
- Strategic Innovation fund (SIF)
- projects over £2m
- targeted at net zero problems
- higher TRL, ready to implement in 3-5 years



## How to approach us

- For BaU innovation or ready products/solutions
   <u>https://www.nationalgrid.com/suppliers</u>
- Innovation updates and news <u>https://www.nationalgrid.com/electricity-transmission/innovation</u>
- Current and past projects Annual summary on Innovation page or ENA portal
- Submit your idea or contact us
   <u>box.NG.ETInnovation@nationalgrid.com</u>

#### Get in touch

If you would like to speak to someone in the innovation team, please email us on the link below.

#### Email us

#### Got a project idea?

Collaboration is vital to the success of innovation and to achieve net zero please share your ideas here.

Share your idea







## How to get involved How to submit a strong proposal

## Simon Stromberg, SSEN Transmission

12 July 2022

# Strategic Innovation Fund Projects How to engage as a third party

Simon.Stromberg@sse.com



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## **The Size of the Prize**

### National Grid reveals £54bn wind power network upgrade plan

By Simon Jack Business editor

🕓 4 days ago





Our journey to deliver a network for net zero has taken a major step forward today following the publication of National Grid ESO's of 'Pathway to 2030', paving the way for £7bn+ investment in our north of Scotland transmission network.



# Some Hint's and Tips

(how to get SSEN-Transmission interested in your idea)

- Solution looking a Problem versus Problem looking for a Solution
  - SSE will be most interested in ideas that directly address problems and priorities already identified by SSE.
- •Be succinct in setting out your idea (idea on a page). Consider using a structured approach:
  - For example, SCQA (Situation, Complication, Question, Answer) see example in later slide
  - °700 words



# Some Hint's and Tips

- Do your homework, key pieces of information you should be familiar with:
  - The Strategic Innovation Fund (SIF) governance document
    - https://www.ofgem.gov.uk/publications/sif-governance-document
  - $\circ$  The current Ofgem SIF challenge areas
  - Understand the electricity market and the difference in business models between Transmission and Distribution
  - RIIO-T2 Final Determination for SSEN-Transmission (SHET) :
    - //www.ofgem.gov.uk/publications/riio-2-final-determinations-transmission-and-gas-distribution-network-companies-and-electricity-system-operator
  - SSEN-Transmission Innovation Strategy:
    - <a href="https://www.ssen-transmission.co.uk/riio-t2-plan-and-uncertainty-mechanisms/innovation-strategy/">https://www.ssen-transmission.co.uk/riio-t2-plan-and-uncertainty-mechanisms/innovation-strategy/</a>
  - UK Government Policy and strategy documents for example, Policy Paper: British Energy Security Strategy. 7<sup>th</sup> of April 2022



## Making a Pitch



YOU HAVE ABOUT 10 MINUTES BEFORE YOU LOSE THE INTEREST! Keep it simple – focus on the why, make it relevant.



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## But you might need the details



### Sometimes there is an engineer in the room!

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But if you get past the first ten minutes you need to be on top of the details (but only give detail if asked)



# **Example of Good Problem Statement (SCQA)**

### Network-DC (DC Circuit Breakers – DCCB's)

<ul> <li>Combat climate change, the UK needs clean energy.</li> <li>our coasts provide a large potential for offshore wind. We currently have an installed offshore wind capacity of 12GW and are targeting increasing the total capacity to 50GW by 2030 and more than 100GW by 2050.</li> <li>Given the scale of the developments proposed and their increasing distance from the onshore grid, the most efficient option is to connect these to the network using Direct Current (DC) cables, protect the electricity grid from faults on the offshore DC network.</li> </ul>	<u>S</u> ituation
<ul> <li>However, as the number of wind farms increases, so the number of AC convertor stations increases in a point-to-point system. This impacts coastal communities through an ever-increasing number of convertor stations and cables. It is also costly to install and maintain many converter stations, which increases the consumer cost of electricity.</li> <li>The big idea is to create DC networks connecting multiple wind farms into a DC substation to connect to fewer converter stations.</li> </ul>	<b><u>C</u>omplication</b>
<ul> <li>How do we de-risk use of DC Circuit Breakers in the UK market</li> <li>To do this, we need to use DC circuit breakers (DCCB), an innovative technology untested in the UK and European</li> </ul>	Question
and prove the use of DC breakers using real time-simulation of systems and controls so that we can implement DC networks that can deliver safe, reliable, and cost-effective energy to the consumer.	<u>A</u> nswer



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## The Right Buttons to Push

- How do we connect customers faster, cheaper sooner
- Faster more efficient connection of renewable energy, particularly offshore wind:
  - For example DC Networks
- How can we minimize asset footprint but maximize the connection capacity
- How do we improve network resilience and reliability
  - More intelligent approaches to inspection repair and maintenance
  - The right design for the right location (considering locational risk)
  - Managing the impact of climate change on asset integrity
  - Data integration for improved resilience and reliability
- Sustainability
  - Reduced carbon budget
  - Recycling of equipment
  - More sustainable materials
  - Less material
  - Management of whole supply chain sustainability



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## **SIF Challenge Areas Relevant to SSEN-Transmission**



## The Right Buttons to Push

- How do we connect customers faster, cheaper sooner
- Faster more efficient connection of renewable energy, particularly offshore wind:
  - For example DC Networks
- How can we minimize asset footprint but maximize the connection capacity
- How do we improve network resilience and reliability
  - More intelligent approaches to inspection repair and maintenance
  - The right design for the right location (considering locational risk)
  - Managing the impact of climate change on asset integrity
  - Data integration for improved resilience and reliability
  - Risk forecasting (future risks due to changing conditions)
- Sustainability
  - Reduced carbon budget
  - Recycling of equipment
  - More sustainable materials
  - Less material
  - Management of whole supply chain sustainability

### Challenge: Preparing for a net zero power system

Strategic context	Themes	Network relevance
Government has committed to decarbonise UK's power system by 2035. The offshore wind target by 2030 is 40 GW. On the demand side there is likely to be 28m EVs on the road and over 1m heat pumps being installed annually*. Such a power system needs significant and diverse flexibility, particularly to deal with low inertia to be secure and reliable. It additionally needs to connect and manage the significantly higher demand cost effectively	<ul> <li>Novel ways to reliably support low inertia systems</li> <li>Accessing grid/system support from renewable generators</li> <li>Accessing grid/system support from hydrogen electrolysers</li> <li>Role of power electronics in supporting low inertia systems</li> <li>Sector coupling opportunities for cost effective RE integration</li> <li>Accelerating OSW connections</li> <li>Efficient rollout of new infrastructure</li> </ul>	Gas distributionGas transmissionElectricity distributionElectricity transmissionElectricity transmissionElectricity system Operation
*EV (202E) and boot norma (2020) figures taken from CCC's Sinth Carb	an Dudaat Nat Zara Danast	Scottish & Southerr

### **Challenge: Improving energy system resilience\* and robustness**

Strategic context	Themes	Network relevance	
While UK energy system is highly reliable, there are two main trends	<ul> <li>Novel approaches to improving resilience using multi-energy systems</li> </ul>	Gas distribution	
around greater deployment of new assets such as EV, heat pumps storage and hydrogen infrastructure leading to	<ul> <li>Electricity-gas coordinated approaches to recover from outages</li> <li>Improving UK's energy system supply chain resilience</li> <li>Improving customer communication during outage events</li> <li>Improving customer status visibility during energy restoration</li> </ul>	Gas transmission	
greater and complex interdependencies and increased risk profiles associated		Electricity distribution	
with increased frequency of extreme weather that needs to understood and		Electricity transmission	
a secure and robust manner	<ul> <li>Improving fault and failure predictions in energy systems</li> <li>Novel or improved approaches to</li> </ul>	Electricity System Operation	
	<ul> <li>Novel or improved approaches to asset protection</li> </ul>	Operation	

\*Resilience is 'the ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such events



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Themes	Network relevance
<ul> <li>Demonstrating whole system benefits of local/regional and national system coordination</li> </ul>	Gas distribution
Development and testing of new value	Gas
capture frameworks from smart local energy	transmission
<ul> <li>Systems</li> <li>Systemic planning of hydrogen into</li></ul>	Electricity
local/regional energy systems	distribution
<ul> <li>Coordination of regional energy and</li></ul>	Electricity
infrastructure planning approaches <li>Improving user experience of network data</li>	transmission
for regional energy planning	Electricity
<ul> <li>Novel approaches for unlocking capacity in</li></ul>	System
constrained grids	Operation
	<ul> <li>Themes</li> <li>Demonstrating whole system benefits of local/regional and national system coordination</li> <li>Development and testing of new value capture frameworks from smart local energy systems</li> <li>Systemic planning of hydrogen into local/regional energy systems</li> <li>Coordination of regional energy and infrastructure planning approaches</li> <li>Improving user experience of network data for regional energy planning</li> <li>Novel approaches for unlocking capacity in constrained grids</li> </ul>

 Testing and demonstrating novel concepts such as energy innovation zones



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## Feedback

12 July 2022



### Energy System Catapult "IC8 Programme"

If you are ready to submit your proposal to SIF then please submit here: <u>smarter.energynetworks.org</u>

If you are not quite ready for SIF this year, this programme could help. It offers two streams of support for innovators, but you must apply before end of July:



Find out more, register and apply here: <u>https://es.catapult.org.uk/news/innovators-invited-to-apply-for-two-challenge-calls/</u>



### **Slido Poll**

- Please feedback via Slido
  - Please go to: <u>www.slido.com</u> or <u>www.sli.do</u>
  - Enter event code: #EIF



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