Ofgem Strategic Innovation Fund

First round of Innovation Challenges issued in 2021

This document provides information to all interested stakeholders about the themes on which Ofgem is calling for funding applications under the Strategic Innovation Fund (SIF) this summer. The window to apply for funding under the first four Innovation Challenges will open on **31 August 2021** and close on **17 November 2021**.

Ofgem, with the support of UKRI as its delivery partner, has defined four Innovation Challenge areas. Development of these Innovation Challenges has been facilitated by extensive stakeholder engagement and consultation with industry during 2021. These are:

- Whole system integration
- Data and digitalisation
- Zero emission transport
- Heat

Feedback from stakeholder engagement suggested there is wide agreement that these Innovation Challenges represent crucial areas in which innovation will be required to achieve national net zero targets, whilst also delivering exceptional standards for consumers and other users of the energy networks. The Innovation Challenges are closely aligned with helping to achieve the objectives and priorities of Ofgem's strategic change programmes[1] and Innovation Vision.[2]

As the SIF develops, it is expected that new areas for Innovation Challenges will emerge. Furthermore, specific areas of focus within the current Innovation Challenges may be refined for future Innovation Challenges. We will continue to work with other public bodies and industry to identify and define future priorities for innovation, in order to maximise the opportunity for the benefits outlined in the SIF Governance Document.

[1] Details of Ofgem's strategic change programmes can be found in Ofgem's forward workplan 2021/22: https://www.ofgem.gov.uk/publications/forward-work-programme-202122

[2] https://www.ofgem.gov.uk/publications/ofgem-innovation-vision-2021-2025

Innovation Challenge 1: Whole system integration

Context: the problem we are trying to address

Achieving a net zero economy by 2050 is a system transformation challenge. As recently highlighted by the Council for Science and Technology, clearer understanding of the entirety of the system will enable the identification of multiple intervention points required to achieve this goal.

The energy system is made up of a complex range of activity across networks, markets, supply, and demand. A range of organisations play crucial roles in managing different parts of this system. Working across traditional boundaries can create opportunities for better integration of services to consumers, who typically experience the system as a whole. Innovative whole system solutions are required to optimise the system, reducing costs whilst enhancing the experience of consumers.

Taking a whole system approach to innovation means considering the full range of opportunities, risks, and interdependencies that exist across the full energy system to integrate and optimise them in a way that best serves the consumer. This can deliver greater benefits around cost, emissions, and services to consumers, whilst also maximising economic growth.

Networks can maximise outcomes by working collaboratively with each other and with a wide variety of system stakeholders to develop innovation which supports whole system approaches across energy supply, demand, markets and networks. Working in this way will enable new products, services, and processes to emerge for a wide range of consumers.

This whole system integration Innovation Challenge aims to:

- improve coordination between networks and other system participants
- reduce duplication and excessive variation of products, processes or services.
- reduce complexity, bureaucracy and barriers to entry
- improve coordination of emerging innovations across networks, generators, market participants, investors, local & national policy makers, consumers, and other key stakeholders
- understand consumers' preferences to inform future market designs which will help to optimise across networks and infrastructures.

Innovation Challenge-specific requirements

In addition to meeting the requirements within the SIF Governance Document (which will be published shortly), projects put forward under the whole system integration Innovation Challenge must meet the below requirements.

Scope of projects

Networks should consider all the below points within their project development, but as a minimum your proposal must directly address at least two of these as the primary focus of the proposed project.

1. Current and future needs for energy provision for heat, power, and transport
2. Coordinating energy transmission, distribution and system operation across gas and electricity
3. Complementary and competing priorities between local, national, and international energy systems
4. Evaluating the costs and opportunities of repurposing or decommissioning existing infrastructure and/or assets
5. Assess the costs of potential energy demand reduction activities against alternative interventions
6. Utilisation of data and development of new approaches which harness greater value from data across organisations
7. Future policy and regulatory conditions as well as market designs to support whole system approaches
    a. Integrated network planning and whole system operation
8. Novel approaches to infrastructure investment, such as:
    a. How to maximise efficiency in large scale network and system investments by taking systems view across generation and demand side changes linked to decarbonisation
    b. Coordinating approaches to siting assets to deliver more efficient capital investment on the system
    c. Determining the economic investment required for network resilience and reliability through and beyond the transition.

Project partners

Projects must include:

1. At least one generator, energy supplier, or consumer group
2. At least one energy network licensee in addition to the project lead. The partner network must hold a different category of network licence than the licensee leading the project (i.e. gas transporter licence, electricity transmission licence etc.).

Innovation Challenge 2: Data and digitalisation

Context: the problem we are trying to address

The complexity and scale of achieving net zero will require greater provision of reliable information across parties for system planning, operation and integration of technologies. The government's Energy White Paper emphasised the need for a modern digital infrastructure to underpin energy markets and optimise physical networks.

As the move towards a net zero energy system accelerates, network customers and consumers will require simplified and accessible digital products, processes and services that can improve their user experience. Data and digital initiatives are already beginning to show the potential to improve the efficiency of energy networks whilst making it easier for third parties to interact with and innovate for the energy system.

Digitalisation of energy network activities will contribute to better coordination, planning and network optimisation. These will be required for a smarter, more flexible energy system which is underpinned by a larger proportion of intermittent renewables, alongside low carbon fuels.

Greater quality, interoperability, and availability of information from across the energy system is increasingly needed to support digital innovation. Delivering the digital infrastructure which improves the provision of information across the energy system will act as a key enabler to delivering strategic outcomes posed in other challenges. These include, but are not limited to, decarbonising heat and transport, and integrating a greater proportion of flexible demand and generation.

This data and digitalisation Innovation Challenge aims to:

- Deliver the next generation of user driven digital products, services and processes which span within and across transmission and distribution as well as Government, generators, suppliers, Local Authorities, and other organisations.
- Deliver the enabling digital technologies required to accelerate progress in other challenge areas.
- Improve data monitoring, availability, quality, collection, interoperability, access and insights to third parties in order to increase consumer choices and improve the efficiency, security and resilience of networks.

Innovation Challenge-specific requirements

In addition to meeting the requirements within the SIF Governance Document (which will be published shortly), projects put forward under the data and digitalisation Innovation Challenge must meet the below requirements.

Scope of projects

Networks should consider all the below points within their project development, but as a minimum your proposal must directly address at least one as the primary focus of the proposed project.

1. More transparent and effective pricing and allocation of reinforcement costs in relation to new connections.
2. How you will work in the open and utilise open-source approaches wherever appropriate.
3. Publishing searchable metadata of datasets produced through the project
4. Enterprise and business processes which facilitate the flow of data within and between organisations
5. Enabling consumers to use their data to engage in energy system innovation whilst maintaining privacy and security
6. How interconnected assets can help network customers and consumers to interact with and support the energy networks
7. How to improve the visibility of infrastructure and assets, for instance new digital infrastructure or novel uses of senor and communications technologies
8. The interoperability of software platforms and data with other infrastructure sectors
9. How novel uses of data and digital platforms can significantly improve network planning, modelling and forecasting capabilities.

Project partners

Projects must include:

1. Researchers and/or private sector organisations with technical capabilities in data and digital technologies; and
2. The relevant data owners, controllers and processors.

Additionally, to ensure interoperability of solutions, projects must also include at least one energy network licensee in addition to the project lead. The partner network must hold a

different category of network licence than the licensee leading the project (i.e. gas transporter licence, electricity transmission licence, etc.).

Innovation Challenge 3: Zero Emission Transport

Context: the problem we are trying to address

Consumers need reliable, cost-effective transportation that is readily available when demanded. Personal transportation preferences are shifting as new trends emerge in transport. These include e-mobility, new public transportation links, as well as national and international changes in supply chains for goods.

Alongside these consumer needs, there are also strategic targets for deep decarbonisation of the transport sector which will have significant implications for the electricity networks and may have implications for the gas networks.

Preparing the networks to enable large scale deployment of battery electric vehicles (EVs) while keeping costs to consumers affordable and equitable is critical. The introduction of hydrogen-fuelled heavy goods vehicles is likely to create novel technical challenges across roads, rail, and ports, such as effectively managing integration of electrolysis across the electricity networks and hydrogen transportation infrastructure.

This zero-emission transport Innovation Challenge aims to:

- Develop the technologies, infrastructure, and processes required to support and accelerate at-scale up take of zero emission transport options
- Investigate the services that could be provided from electrified transport infrastructure and users to reduce system costs and the means of delivery
- Maximise the opportunities of integrating zero emission transport energy provision with the energy sector, for instance for constraint management or maximising use of renewables
- Coordinate strategic energy networks decisions with the transport sector, to ensure delivery of an efficient energy system which also meets the needs of transport users
- Provide greater certainty on the options, costs, and timelines for energy network infrastructure availability which supports zero emission transportation.

Innovation Challenge-specific requirements

In addition to meeting the requirements within the SIF Governance Document (which will be published shortly), projects put forward under the zero emission transport Innovation Challenge must meet the below requirements.

Scope of projects

Networks should consider all the below points within their project development, but as a minimum your proposal must directly address at least one as the primary focus of the proposed project.

1. How the project will directly support the growth of zero emission transport options
2. Maximising the opportunities that electric vehicles create to deliver a smarter energy system, whilst ensuring that energy networks are prepared for accelerating uptake
3. How energy networks can support integrated multi-model transport services in local areas
4. Energy supply requirements for long haul aviation, shipping, or rail.

Project partners

Projects must include:

1. A mobility technology or infrastructure provider. As examples, this could include, but is not limited to:
    - Electric vehicle charge point providers
    - Network Rail
    - Port authorities.

Innovation Challenge 4: Heat

Context: the problem we are trying to address

This challenge is focused upon energy network innovation to support decarbonisation of heat. Consumers need improved accessibility to low carbon heating options which remains reliable and affordable in comparison to existing solutions. For many domestic, commercial, and industrial end consumers, heat comprises a significant proportion of their energy bills.

Heating accounts for over a third of the UK's overall greenhouse gas emissions and to date has proved to be a challenging aspect of the energy system to decarbonise. Presently most heating requirements are served by natural gas, or oil.

There are a variety of technologies with potential to contribute to the heat transformation necessary to meet national 2030 and 2050 emissions targets. These include heat networks, electric and hybrid heat pumps, hydrogen, biofuels and others.

It is likely that the best low carbon heat choices will be dependent on local characteristics (such as local heat sources, or infrastructure capacity) and consumer preferences. In all scenarios, the energy networks will play a crucial role in delivering the infrastructure required to support the decarbonisation of heat.

This heat Innovation Challenge aims to:

- Develop innovative products, processes and services for the planning, operation and delivery of energy networks that support low carbon heating solutions
- Produce insights and findings which facilitate decision making for low carbon heating by energy networks, industry, and government
- Demonstrate how low carbon heating can be intelligently managed during operation to improve efficiency and reduce overall energy system costs.

Innovation Challenge-specific requirements

In addition to meeting the requirements within the SIF Governance Document (which will be published shortly), projects put forward under the heat Innovation Challenge must meet the below requirements.

Scope of projects

Networks should consider all the below points within their project development, but as a minimum your proposal must directly address at least one as the primary focus of the proposed project.

1. Using smart approaches to manage large-scale electrified heat deployment in a local area, reducing the need for network reinforcement
2. Using smart meters with heat pumps to optimise usage and energy system flexibility
3. Inclusion of a work package which focuses upon the commercial and investment case for financing heating technologies alongside energy network innovation
4. Working with partners on how deployment of low carbon heating solutions can be better coordinated to minimise gas and electricity network constraints at lowest economic cost.

Project partners

Projects must include:

1. A heat technology, service or infrastructure provider, such as
    - heat network providers
    - heat pump manufacturers
    - waste-to-energy site developers.