ofgem Making a positive difference for energy consumers

UK Research and Innovation

CARBON TRUST

# RIIO-2 Strategic Innovation Fund

## Gathering feedback on possible Innovation Challenges for SIF round 1 in 2021 – presentation for stakeholders

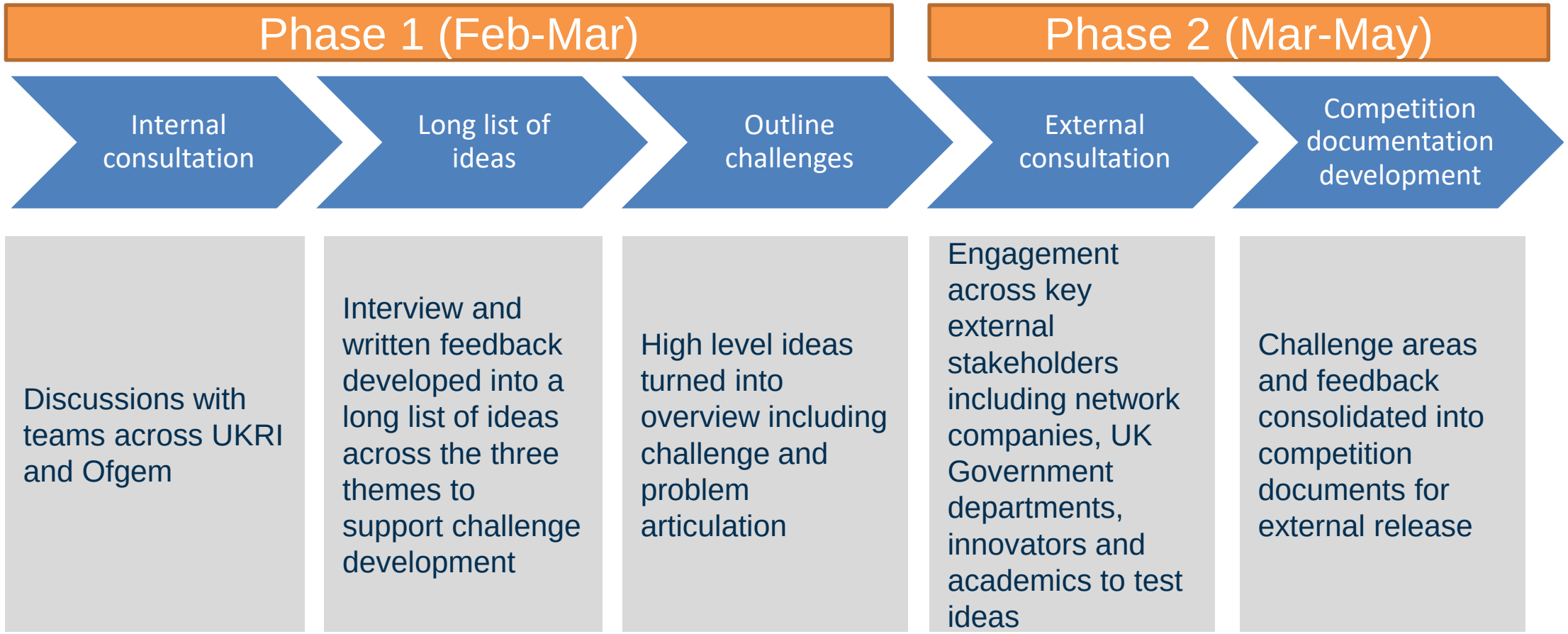
March 2021

OFG1161

- We recognise Ofgem's pivotal role in paving the way for the energy sector to decarbonise. We need to make sure that happens at the lowest cost to consumers.
- Our innovation narrative lays out wider ambitions for innovation within the energy sector and where Ofgem sees the need for innovation to meet net zero (this includes but is not limited to energy networks).
- As part of the networks price control, Ofgem has decided to introduce the Strategic Innovation Fund (SIF) - a new approach to funding network innovation. It aims to focus funding on strategic energy system transition-related areas, and to coordinate more closely with other public innovation funding bodies.
- As part of this, we will set the strategic direction (using Innovation Challenges) on what the SIF will fund. We will invite funding applications from network companies and the Electricity System Operator to address these Innovation Challenges, and seek to coordinate with other public funding bodies where appropriate.
- Ofgem is exploring a partnership with UKRI. Ofgem would be the decision maker on all challenges set and projects funded via the SIF, while UKRI would be responsible for the delivery.
- Application to the SIF in round 1 in 2021 is open to the ESO, an electricity or gas transmission network, or a gas distribution network. Electricity distribution network operators can still apply to Network Innovation Competition NIC funding in 2021 and 2022 (as governed by the NIC governance document), however they can participate in SIF projects as project partners.

- **The purpose of this slide deck is to summarise and gather feedback on the priority themes for network innovation identified and refined through internal engagement for round 1 of the SIF in 2021.**

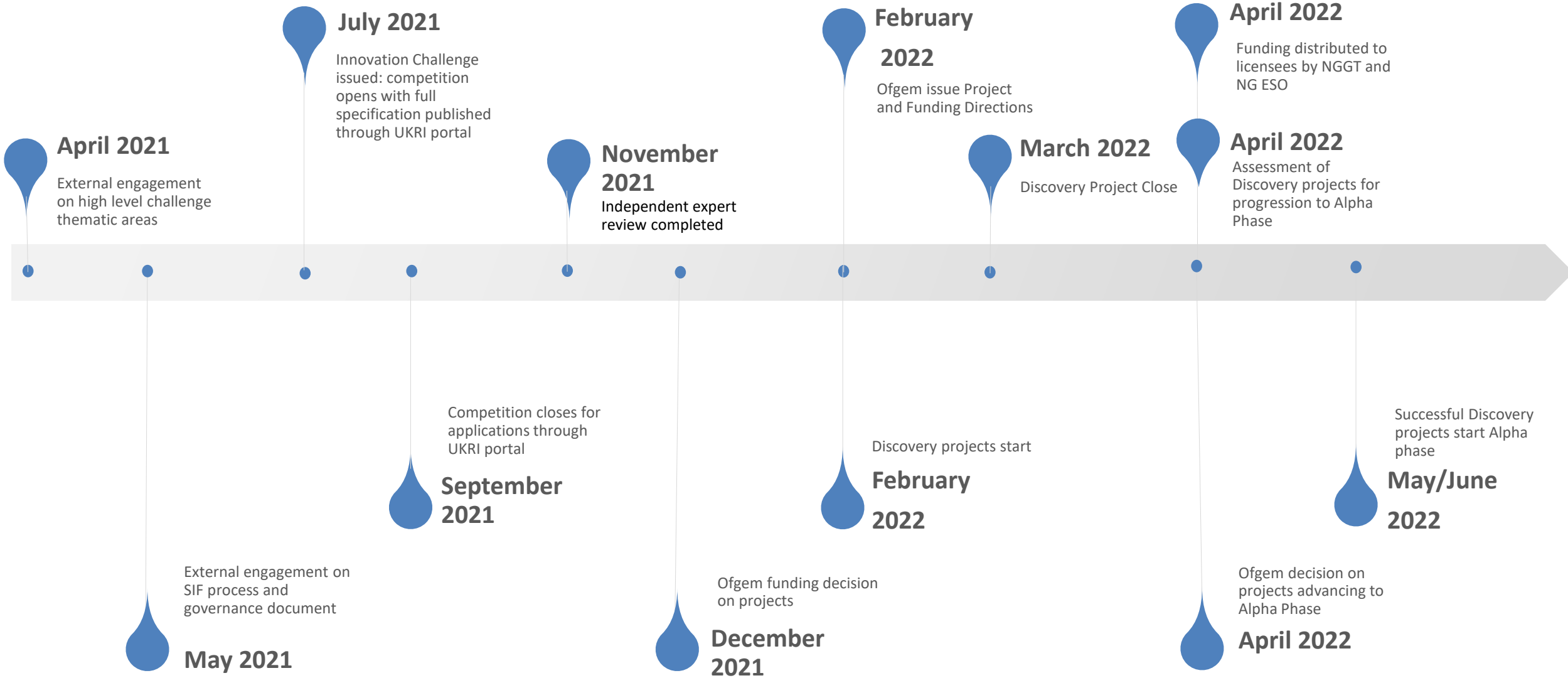
# Approach to generating Innovation Challenges



## We now want to gather stakeholder feedback

- These slides present our emerging view on the innovation challenges for round 1 of the SIF in 2021.
- In the summer, we are looking to issue Innovation Challenges which we propose will consist of
  - Innovation challenge themes that spell out a problem for innovation projects to address
  - eligibility requirements projects will have to meet
  - 'areas of interest' which indicate where we see a need for network innovation. We are still considering whether projects that fall within the challenge themes but outside of these areas of interest would be eligible for funding under SIF round 1.
- We are looking for stakeholders' feedback to help us develop our proposals. For instance, we would like to know:
  - Have we identified strategic priority areas and are we addressing gaps? Is there an R&D gap or has there been already been sufficient research, development, and demonstration? Are these challenges timely? Have we missed important areas?
  - Do the draft innovation challenges provide the opportunity for strategic energy system transition-related alignment with other public R&D funding bodies?
  - What is your view of our approach to discovery, alpha, and beta rounds?
- We welcome written feedback until 19 April 2021.
- Although these slides provide a broad overview of our emerging thinking on the SIF process and what's eligible for funding, we plan for fuller engagement and consultation on this over coming months.

# Draft forward plan refining Innovation Challenges and receiving bids for funding

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# Overview of what's eligible for SIF funding and the SIF process

# What sort of projects are in scope? (eligibility criteria for SIF projects)

1. Projects should be in line with Innovation Challenges set by Ofgem (please see next slides for draft for round 1).
2. Projects should have potential to deliver a real net benefit to consumers (i.e. those who have contributed to the innovation from their network payments) including vulnerable network consumers
   - Under current legislation, projects paid for by electricity network customers, for example, must deliver a net benefit to electricity network consumers. Such projects may also deliver a benefit to gas consumers and consumers of other sectors, allowing them to participate in and benefit from the energy transition. This could include benefits to vulnerable consumers from the removal of barriers which prevent their participation in the market and promoting access for them to participate in smart systems and the energy transition.
   - Learning from SIF funded projects must be disseminated amongst other network licensees.
3. Projects should focus on network innovation and related areas*
   - Funding is designed to reduce costs of networks (now and in the future), improve access and support for vulnerable consumers and/or improve the services and products provided by network companies for consumers. Innovation that is not designed to do this should be funded by Government or the private sector.
   - Where Ofgem has vires to do so, it could fund non-network activities such as generation, storage or in-home services, if they have the potential to deliver real net benefits to network customers, and would not happen but for the provision of SIF funding. In these cases, we expect projects to involve funding contributions from other sources (such as Government or the private sector), as benefits will accrue not only to network consumers, but more widely across the supply chain.
4. Projects should not undermine the development of competitive markets.
   - However, we will apply proportionality criteria, so that complex contractual arrangements between network companies and third parties can be avoided if necessary (e.g. if there is no contractual precedent because an activity is very novel, or the cost of the non-network activity is low as compared to overall project value).
5. Projects should be innovative, novel and/or risky.
   - Projects should entail a degree of risk so that they would not otherwise be taken forward as BAU activities by companies (or via NIA).
6. Projects should have third-party involvement.**
   - Project partners should not be limited to network companies, but should include an appropriate range of third party innovators such as academics, independent researchers and disruptors.
7. Treatment of data within projects follows Data Best Practice Guidance here. Projects should include an action plan for how to gather and publicise insights, data and impact metrics, both between network companies and Government, but also wider industry.

* *Network innovation could include investment in network assets (not itself an innovative activity) which contribute to sector-wide innovation projects.*

** *Third party involvement depends on network companies partnering with third party innovators. However state aid constraints mean that we can only provide funding to third parties where the innovation would not happen but for the provision of SIF funding.*

# Proposed procedural features of the SIF

## Network Innovation Competition

1. Linear, bottom-up process done in a silo from other innovation funding bodies
2. Network companies bid in their own innovation ideas
3. Project-based funding: individual projects were funded based on whether or not they passed a set of criteria
4. Initial Screening Process (ISP)
5. Long, in depth screening by Expert Panel prior to funding decision
6. Winners largely left to proceed with projects on their own

## Strategic Innovation Fund

1. Focused on the energy system transition and aligned with Ofgem's Strategic Change Programmes; strategically organised with other funding bodies; more flexibly, fluid and responsive
2. Ofgem, with UKRI's help, scans the landscape and engages with stakeholders to understand problems that network innovation can help solve; Ofgem then sets the innovation challenge
3. Solution-based funding: with top-down definition of the innovation challenge, the focus shifts funding the best solution(s) to a problem
4. ISP removed and replaced with detailed briefing and ongoing support prior to bid submission
5. Shorter funding evaluation; rigour retained and shifted to discovery stage
6. Post funding decision, Ofgem, with UKRI's help, remains involved through stage-gating, governance and advisory
    - Independent of Ofgem's SIF funding, UKRI may consider ongoing support to embed innovation and promote economic growth

# Potentially using a Discovery, Alpha and Beta approach when funding projects

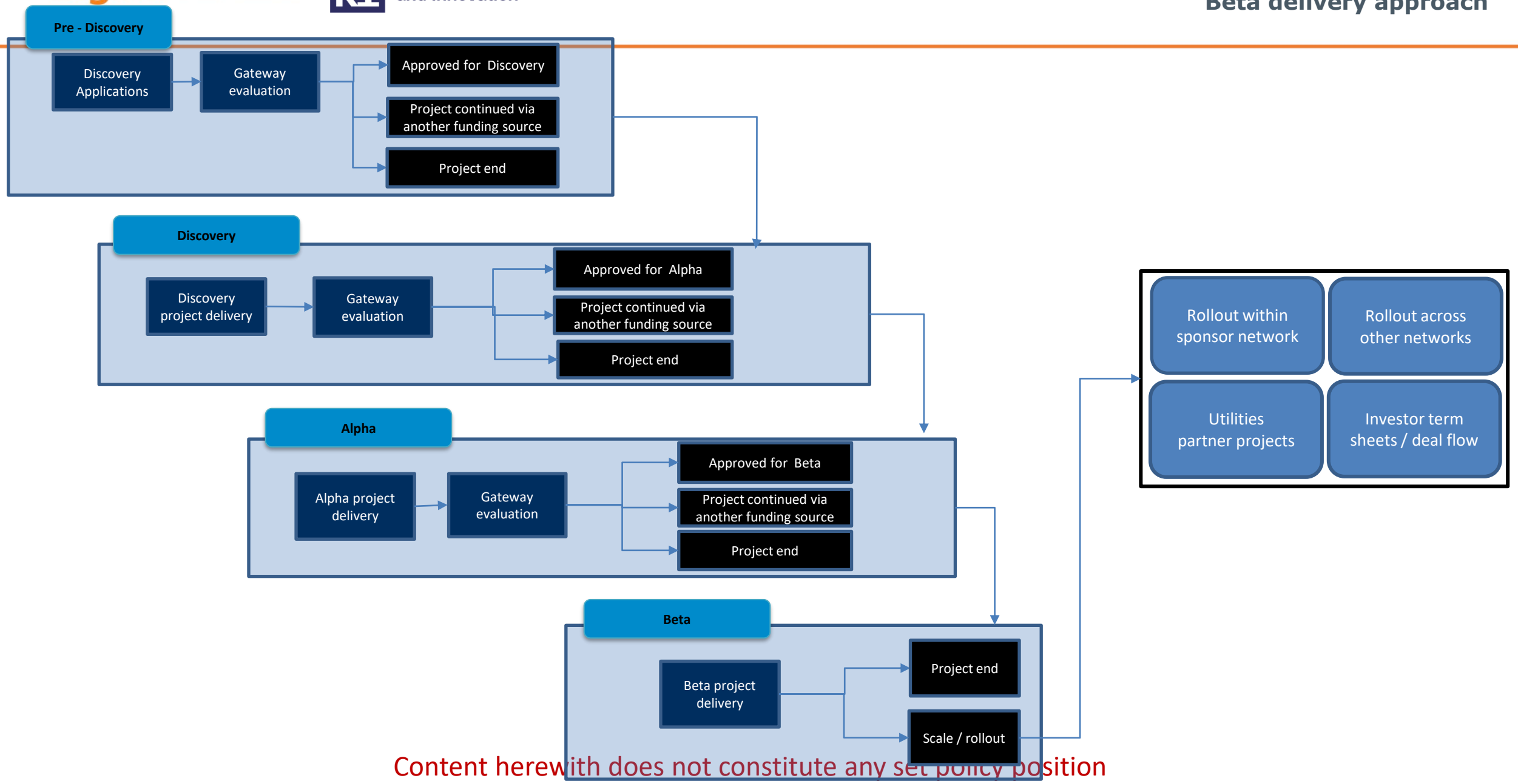
- We are considering using a Discovery, Alpha and Beta approach across all challenges themes.
- The intention would be that all projects will start at the Discovery phase.
- Where significant work equivalent to the Discovery or Alpha phases has already taken place, we will encourage applicants to demonstrate that moving to Alpha or Beta phase directly is justified.

| Phase | Description |
|---|---|
| **Discovery**/Feasibility studies | The **Discovery** phase enhances the understanding of the problem to be solved. It typically takes 6 – 12 weeks and is focused on learning about;<br>• Users and their context<br>• Constraints affecting the problem and/or wider context<br>• Opportunities to improve things |
| **Alpha**/Experimental development | The **Alpha** phase is for trying out different solutions to the problems identified during the Discovery phase. It typically takes 10 – 20 weeks and includes;<br>• Testing key assumptions<br>• Solving a whole user problem<br>• Using learnings to decide if moving to Beta is warranted |
| **Beta**/Industrial research | The **Beta** phase is deploying the solution in a real life environment while continuing to make improvements and the duration depends on the scale and complexity of the solution deployed. SIF Beta phases will likely be the longest duration and largest scale phases (in terms of both deployment and duration). |

The following hyperlink describes the Discovery, Alpha, Beta format (this is an illustrative example, not the exact format): GOV.UK

Content herewith does not constitute any set policy position

# High-level overview of a Discovery, Alpha and Beta delivery approach



# Emerging view of possible Innovation Challenges for SIF round 1

| Theme | Overview |
|---|---|
| **Heat** | The decarbonisation of heat presents many challenges which must be overcome to achieve net zero. The UK Government expects a wide-spread take-up of heat pumps, and hydrogen may offer opportunities for heat decarbonisation which need to be tested. |
| **Data and Digitalisation** | Data and digitalisation will be key enablers to a flexible, decarbonised energy system. From the perspective of the networks, there are many potential options to embed these resources into processes and enhancing operations and alignment with other networks across vectors. The early stage of many of these opportunities means innovation is required to identify and implement them. |
| **Zero Emissions Transport** | Transport decarbonisation has made great strides, particularly with regards to battery electric passenger vehicles. Alongside electrification, there may also be a role for hydrogen as a transport fuel. The effects of these changes on the network are still to be seen and network innovation will be required to gain a deeper understanding of the impacts and necessary adjustments to be made. |
| **Whole systems** | With increased heat and transport electrification and developments in hydrogen production and use, there is greater integration within and across networks. There is a significant opportunity to leverage this by taking a systems approach to deliver a smarter, more flexible and cost-effective energy system. |

**Theme overview**: Gas and electricity network innovation to support strategic decisions around the future of heat and enable deployment of proven low carbon heating technologies at lowest cost

**Background**

The pathway to decarbonising heat across GB to meet net zero is uncertain. Innovation activities are needed to help understand the implications for energy networks of electrification, hybrid, and hydrogen heating solutions. Creating the evidence will generate the confidence necessary to move forward at pace. Where technologies are already being adopted, network companies need to find ways to enable their up-take at lowest cost to consumers, and there are a number of questions for network companies and the ESO on how best to enable this transition.

**Potential areas of interest include the network aspects of…**

1. Understanding and managing the network effect of large-scale electrified heat deployment via smart approaches

| Areas of interest – the network aspects of… | Problem statement |
|---|---|
| 1. Understanding and managing network effect of large-scale electrified heat deployment via smart approaches* | Building on our focus on the "built environment: electrification of heat" within our innovation narrative: electrification of heat at scale will significantly raise the demand on the electricity networks. These demand increases will drive significant network reinforcements which would both slow down heat decarbonisation efforts and potentially raise costs for consumers. The current rate of heat electrification is not yet at a scale to trigger such significant reinforcements but could serve as a barrier to scale up the effort in the short-medium term. Novel ways of managing the demand using flexibility whilst meeting the heat demand of consumers effectively could help in managing costs and meet the electrified heat demand. Network innovation should be related to procuring services from, and locating assets such that they provide maximum system benefit, i.e. minimise need for network reinforcements, and provide services to the network and a real net benefit to relevant consumers. There may be opportunities to manage various types of electric heating systems – for instance electric storage heaters and heat pumps. |

** Note that SIF projects in SIF round 1 need to led by the ESO, an electricity or gas transmission network, or a gas distribution company. Electricity distribution network operators can only participate as project partners, or they can use the 2021 NIC (subject to compatibility with the RIIO-1 NIC governance arrangements).*

**Theme overview**: Network innovation to enable accelerated deployment of zero emissions transport solutions towards net zero

**Background**

Deep decarbonisation of the transport sector will have significant implications for the electricity networks and may have implications for the gas networks, although their future is uncertain.

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 vehicles will create novel technical challenges across roads, rail and ports, such as effectively managing integration of electrolysis across the electricity and gas networks and supporting hydrogen refuelling stations.

**Potential areas of interest include the network aspects of…**

1. Maximising the opportunities that EVs create to deliver a smarter energy system, taking advantage of the opportunities for full-chain flexibility
2. Ensuring that electricity system/network operators are prepared for EV uptake
3. Managing effective integration of electric super charging hubs to reduce network impact and cost to consumers
4. Localised multi-modal/vector transport networks

| Potential areas of interest – the network aspects of… | Problem statement |
|---|---|
| 1. Maximising the opportunities that EVs create to deliver a smarter energy system, taking advantage of the opportunities for full-chain flexibility | Building on our focus on "full chain flexibility - EVs" within our innovation narrative: to enable an efficient low carbon, energy system, the opportunities that EVs create to deliver a smarter, more flexible energy system must be maximised. It is important that network and system operators explore flexible alternatives to traditional network builds, understand where/when EV flexibility may be able to meet system needs and that EVs are able to meet these flexibility needs (eg ensuring that EV drivers can participate in flexibility markets and services). Innovation projects could also help us better understand the extent to which EV users are willing, and able, to be flexible with their energy use, and could help support the uptake of 'vehicle-to-grid solutions. This includes exploring the opportunities that vehicle to grid services could provide to reduce system costs. |
| 2. Ensuring that electricity system/network operators are prepared for EV uptake | Building on our focus on "full chain flexibility: EVs" within our innovation narrative: EV uptake will have huge impacts on the electricity system and network operators. Whilst the effects of this are starting to become visible, they have not yet been demonstrated at scale. Dynamics between ESOs, DNOs and TOs will shift and upgrades will be made in order to serve demand profiles of a new shape and magnitude. Understanding what this could look like and what's needed will support the ESOs, DNOs and TOs with futureproofing strategies, whilst protecting consumers by facilitating the required activities to happen at the lowest-cost through coordination. |
| 3. Managing effective integration of electric super charging hubs to reduce network impact and cost to consumers | Building on our focus on "full chain flexibility: EVs" within our innovation narrative: the use of superchargers will cause highly-localised, significant and sudden changes to the demand profile. This could impact voltage stability and reliability at high costs to the consumer. There is an additional risk that superchargers aren't installed in optimal locations for the networks, further exacerbating the aforementioned issues. Consequently, there is therefore value in network coordination to better understand the impacts of fast charging, particularly on the demand profile. There are many innovation opportunities available, particularly in identifying locations where fast charging could be used with excess generation along with flexibility in areas prone to constraints. |
| 4. Localised multi-modal/vector transport networks | Building on our focus on "full chain flexibility: Evs" and "low carbon infrastructure: gas & hydrogen" within our innovation narrative: Historically, the various sectors within the UK energy system (electricity, gas, transport, etc) have generally been operated as independent functions, with limited interactions. To support the low carbon transition there are new opportunities to enhance the interaction and integration between the constituent parts of the energy system, such that new services and value streams can be realised across these historic boundaries. The integration of these sectors may help deliver value for energy consumers. |

**Theme overview**: Data and digitalisation innovation for gas and electricity network to support heat, transport and whole system challenges toward achieving net zero

**Background**

As we move to an increasingly smart and data driven economy, innovation will be required across the networks to identify, develop, and effectively implement and embed suitable solutions. There is a vast array of opportunities available for the networks to leverage data and digitalisation related advancements to enhance operations, planning, innovation collaboration and consumer engagement. Improved data availability and interoperability will enable greater coordination across networks and vectors, whilst unlocking new market designs and business models in energy and across other sectors. Due to the wide scale and range of available possibilities, third-party partnerships will be crucial to fully realising the opportunities in the most appropriate way.

**Potential areas of interest include the network aspects of…**

1. Joining data across sectors for new energy system service improvements / cross-sector public benefits
2. Improving domestic consumers' engagement to assist energy networks.

| Potential areas of interest – the network aspects of… | Problem statement |
|---|---|
| 1. Joining data across sectors for new energy system service improvements / cross-sector public benefits | Building on our focus on "energy data: innovation" within our innovation narrative: there is scope for creating new cross-sectoral services that, for example, enable opportunities such as cross sector flexibility markets between electricity and gas, water and transport or that provide services that apply energy data as a tool for monitoring peoples' health. |
| 2. Improving domestic consumers' engagement to assist energy networks | Building on our focus on "energy data: innovation" within our innovation narrative: consumers can provide services to the network, but there is scope for innovation that improves consumer engagement, including through better engagement with their own energy data. Innovation could promote better services to consumers that are targeted and adaptable, built on, e.g., portable consumer data. |

**Theme overview**: Whole system innovation to support the net zero transition

**Background:**
Gas and electricity networks are in the middle of significant disruption both up and down stream and there are challenges that networks face across vectors. Moreover, there is greater integration within and across networks and vectors. There is a significant opportunity to leverage this integration by taking a whole systems approach to delivering a smarter, flexible energy system that delivers net zero at lowest cost to consumers.

**Potential areas of interest include the network aspects of…**

1. Enabling integrated network planning and operation across the whole system. Maximising efficiency in large scale network and system investments by taking a systems view across generation and demand side changes linked to decarbonisation.
2. Enabling connected equipment/assets to interact with and support the energy system (those of producers, consumers, service providers)
3. Enabling technology for integrated offshore transmission networks
4. Reducing greenhouse gas emissions from electricity and gas network operations

# Annex

**Why has the Discovery, Alpha, Beta approach been proposed for SIF?**

This approach is seen to be an effective way of de-risking large-scale innovation investments, improving the quality of at-scale projects that come through the pipeline, and attracting a larger diversity of ideas and approaches to identifying solutions to challenges. In line with Ofgem's ambition to design a more flexible, fluid and responsive competition, we will consult on introducing the Discovery, Alpha, Beta approach in the consultation on the SIF governance document in May 2021.

**Can projects be fast-tracked to Alpha/Beta phase? What are the requirements for this?**

This is still being considered, and we seek stakeholders' views on this.

**What is the value of projects in each phase of the Discovery, Alpha, Beta approach?**

The SIF governance document will indicate the value and duration of projects which we will consult on in May 2021. We propose this could increase with each phase. Guide figures for each phase could be, for example, up to £150,000 for Discovery-phase projects of around 6 – 8 weeks, between £150,000 - £500,000 for Alpha-phase projects of up to 6 months, and £1m or more for Beta-phase projects up to several years in duration.

**Will projects focused on technologies beyond the network be eligible for SIF?**

SIF is focused on network innovation activity. We are not prescriptive about what these activities are, so long as projects deliver benefits to network consumers. The purpose of SIF is to reduce the costs of networks (now and in the future), improve access and support for vulnerable consumers, and/or improve the services and products provided by network companies for consumers, including delivering environmental benefits. Innovation activities that are not designed to do this should be funded by Government or the private sector. Projects are encouraged to take a systems approach and consider wider system implications, particularly in their early stages. Projects are also encouraged to make use of opportunities to partner with other innovation programmes. Where Ofgem has vires to do so, it could fund non-network activities such as generation, storage or in-home services, if they have the potential to deliver real net benefits to network customers, and would not happen but for the provision of SIF funding. In these cases, we expect projects to involve funding contributions from other sources (such as Government or the private sector), as benefits will accrue not only to network consumers, but more widely across the supply chain. Applicants should leverage existing assets where possible.

**Will assessment criteria vary depending on the theme?**

Assessment questions will be consistent across themes where possible, particularly for projects in the Discovery phase. There may be challenge-specific assessment and/or eligibility criteria where appropriate (where 'eligibility criteria' refers to criteria that must be met in order for a project proposal to be considered, and 'assessment criteria' refers to criteria used to make decisions on eligible projects).

**What information is required to submit a project proposal application to SIF?**

Information on the project team, a project summary, a public description and the details on the project's alignment with SIF will be required. Additional details such as the project title, timescales and research category will also be required. There will likely also be a number of application questions to be answered. An indicative representation of these is available to view on the following slide. The final application process will be consulted on in the coming months.

**What are the success criteria necessary to move up to the next phase?**
The success criteria are being currently defined and will be consulted upon in the coming months. Please note that success in the discovery/alpha phase we propose would not be a guarantee of progression to the next phase. It may be expected that a solution developed within a project would be funded by other mechanisms (including other innovation funds, private sector funding, or other elements of the network price control) where appropriate

**How much funding is available?**
£450 million will be made available for RIIO-ET2, RIIO-GT2 and RIIO-GD2 over 5 years, with scope to increase if necessary. We will consult upon whether there should be annual caps, caps for projects within one challenge, and whether SIF funding made available will need to increase to accommodate RIIO-ED2 innovation at a later stage.

**Will SIF still fund 90% of costs?**
We will expect a minimum of 10% of the costs to be funded from other sources. In some instances, we may specify in the challenge documentation a requirement for a higher share of funding from other sources.

**Will SIF be able to fund third-party innovators directly?**
For the first year of the SIF, network licensees only can lead consortia and receive SIF funding directly. Project partners can be indirect recipients of funds managed by network licensees. Pending consultation responses and legal powers, we may in later years amend the SIF during RIIO-2 to enable third party direct access to funds to allow third parties to become "primary" innovators

**Who will be the contracting party?**
Ofgem will be the contracting party with the network licensee. This will be reviewed if and when third party innovators are able to receive direct funding.

**Will projects be funded by phase or duration?**
We propose funding will be awarded by project phase.

**Will there be a requirement to include certain types of third-party collaborators?**
We may specific requirements for diverse consortia in the challenge documentation.

**What proportion of SIF funds can be used by third parties?**
We are proposing not to set a limit. Although the networks will receive the funding, we are not proposing a cap on the number of contracts they can enter with third party collaborators.

**What is timeline for submitting bids for the challenges under round 1 of SIF?**
The indicative timeline we have proposed allows for bid submission between July and September of 2021.

**How frequently will challenges be issued?**
A set frequency hasn't been determined, challenges will be issued as needed on a rolling basis.

**Will you consult on each innovation challenge question?**
No, we won't. This is to ensure we have the flexibility required to evolve innovation priorities and questions over time as learnings and evidence emerge, and as decisions are made.

# Possible Application Questions

Discovery | Alpha | Beta

| 1.Need or Challenge | 2.Scientific and technical evidence | 3.Innovation | 4.Technical approach | 5.Freedom to operate | 6. Exploitation | 7.Risks | 8.Project team | 9. Funding and added value | 10. Costs and value for money |
|---|---|---|---|---|---|---|---|---|---|
| Identify the need ( market, business etc.) behind the innovation | Set out the approach to the project | General description of the innovation | Identify what markets are being targeted | Are there any restrictions on taking forward the innovation | Overview of how the innovation will be exploited | Overview of the project risks | Overview of the project team | Level and impact of the funding | Outline of project costs and outline the value for money |
| High priority Qualitative | High priority Qualitative and quantitative | High priority Qualitative | High priority Qualitative | Low priority Qualitative | Low priority Qualitative | Low priority Qualitative | Medium priority Qualitative | High priority Qualitative and quantitative | Low priority Qualitative |
| Medium priority Qualitative | High priority Qualitative and quantitative | Low priority Qualitative | High priority Qualitative | Low priority Qualitative | Low priority Qualitative | Medium priority Qualitative | Medium priority Qualitative | High priority Qualitative and quantitative | Medium priority Qualitative |
| Low priority Qualitative | Low priority Qualitative | Low priority Qualitative | High priority Qualitative | High priority Qualitative | High priority Qualitative and quantitative | High priority Qualitative and quantitative (if relevant) | Medium priority Qualitative | High priority Qualitative and quantitative | High priority Qualitative and quantitative |

**Detailed Guidance Available on IFS**

****Note: These are draft application questions and are subject to change**

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