



Department for  
Business, Energy  
& Industrial Strategy

# THE INDUSTRIAL ENERGY TRANSFORMATION FUND

Supporting industry on the path to net zero

Closing date: 21<sup>st</sup> November 2019

October 2019



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# Ministerial Foreword



The UK's industrial sector is a crucial part of the UK economy. The sector creates high-quality, skilled jobs with over 2.7 million people employed across every region of the UK. The industrial sector is helping to power the UK economy, generating exports worth nearly £300 billion in 2018 and is a driver of innovation, ingenuity and invention across the country.

As we leave the European Union, our future economic success as a country will continue to depend on the success of our industrial sector. That is why this Government is committed to supporting the sector to go from strength to strength through our modern Industrial Strategy.

A key pillar of our Industrial Strategy is delivering cleaner economic growth. As the first major economy to commit to reaching net zero emissions by 2050, we must take action to ensure that we cut emissions across all areas of the economy. This includes the business and industrial sector that currently makes up around a quarter of total UK greenhouse gas emissions.

I believe that action to deliver clean growth does not have to come at the expense of economic growth. The UK has already proved that we can break the historical link between economic growth and emissions: emissions have fallen 42 per cent since 1990, while the economy has grown by more than two thirds. Our approach to helping industry reduce its carbon footprint must follow this trend, with businesses able to grow while also playing their part in tackling global warming. This will require investment and rapid technological innovation. It will also require a strategic partnership between Government and industry.

We have already set out an ambitious target to help businesses improve their energy efficiency by at least 20% by 2030. But Government acknowledges that our industrial businesses will struggle to deliver this sort of transformation without Government working alongside them. Many businesses operate in highly competitive international markets where investment is driven by short payback periods and energy saving measures struggle to secure the necessary financing even where they make economic sense.

That is why we announced in 2018 that we would introduce a £315 million Industrial Energy Transformation Fund. This Fund is aimed at helping businesses to invest to cut their emissions, reduce their energy costs and boost their competitive edge. The Fund will support businesses who want to modernise the way they produce goods, deploy energy efficiency measures and even pilot innovate low-carbon technologies at scale.

This Consultation is the final step in helping to deliver the Fund, with initial projects able to apply for and secure funding in 2020. We are seeking views across industry and other stakeholders to refine the detailed parameters for the scheme before it is open to applications.

The Industrial Transformation Fund is just one example of what this Government is doing to support UK industry. Our modern Industrial Strategy is delivering over £2 billion worth of investment for UK industry as we seek to boost our industrial competitiveness while also tackling the threat posed by climate change.

A handwritten signature in black ink, appearing to read 'Kwasi Kwarteng', written in a cursive style.

**Rt Hon Kwasi Kwarteng MP, Minister of State for Business, Energy and Clean Growth**

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# General information

## Why we are consulting

The Industrial Energy Transformation Fund (IETF) is a new Fund worth up to £315 million to be delivered by 2024. It will support businesses with high energy use to transition to a low carbon future, and to cut their bills and emissions through increased energy efficiency. This scheme will help to transform an important part of the UK economy.

In spring 2019, we held an Informal Consultation on the overall objectives and design of the Fund. The responses are summarised in this document. They informed the more detailed proposals upon which we are now seeking views.

## Consultation details

**Issued:** 10/10/2019

**Respond by:** 21/11/2019

**Enquiries to:**

Industrial Energy Transformation Fund Team  
Department for Business, Energy and Industrial Strategy  
2<sup>nd</sup> Floor, Victoria 2  
1 Victoria Street  
London  
SW1H 0ET

Tel: 0207 215 5000

Email: [IETF@beis.gov.uk](mailto:IETF@beis.gov.uk)

**Consultation reference:** Industrial Energy Transformation Fund: Supporting industry on the path to net zero

**Audiences:**

This consultation is primarily aimed at:

- Businesses involved in the manufacturing of goods who are heavy energy users.
- Organisations and individuals involved in the management of energy and carbon.
- Other organisations such as trade associations, NGOs, consultants and academia and other bodies who have an interest in decarbonisation and energy use in the UK.
- Interested members of the public.

**Territorial extent:**

The IETF is worth up to £315 million on a UK-wide basis.

## How to respond

**Respond online at:** <https://beisgovuk.citizenspace.com/clean-growth/industrial-energy-transformation-fund>

or

**Email to:** IETF@beis.gov.uk

If responding by email, please include the following information:

- What type of organisation you represent:
  - Large business (over 250 employees), medium business (50 – 250 employees), small business (10 – 49 employees), Micro business (up to 9 employees), individual, lender, trade union, supply chain, local government, trade association, academic, consultancy or other.
- Which sector you operate in:
  - Manufacturing (please specify); agriculture, forestry and fishing; mining and quarrying; electricity, gas, steam; construction; wholesale and retail trade; financial and insurance activities; professional, scientific and technical activities; NGO; public sector or other.
- What region of the UK you or your organisation are primarily located in:
  - London, South East England, South West England, East of England, West Midlands, East Midlands, Yorkshire and the Humber, North West England, North East England, Scotland, Wales, Northern Ireland or other.
- If your business is a subsidiary of a company headquartered outside the UK, please specify where it is headquartered.

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

If responding by email please indicate if you are happy for your response to be published, happy for it to be published but without identifying information or would like your response to be treated as confidential.

### Enquiries to:

Industrial Energy Transformation Fund  
Department for Business, Energy and Industrial Strategy

2<sup>nd</sup> Floor, Victoria 2  
1 Victoria Street  
London  
SW1H 0ET

Tel: 0207 215 5000

A response form is available on the GOV.UK consultation page:

<https://www.gov.uk/government/consultations/industrial-energy-transformation-fund-finalising-the-design>

When responding, please state whether you are responding as an individual or representing the views of an organisation.

## Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018 and the Environmental Information Regulations 2004).

If you want the information that you provide to be treated as confidential please tell us, but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable data protection laws. See our [privacy policy](#).

We will summarise all responses and publish this summary on [GOV.UK](#). The summary will include a list of names or organisations that responded, but not people's personal names, addresses or other contact details.

## Quality assurance

This consultation has been carried out in accordance with the government's [consultation principles](#).

If you have any complaints about the way this consultation has been conducted, please email: [beis.bru@beis.gov.uk](mailto:beis.bru@beis.gov.uk).



# Executive Summary

## The Industrial Energy Transformation Fund

The Industrial Energy Transformation Fund (IETF) was announced in the 2018 Autumn Budget. The Fund is worth £315 million over the period to 2023/24. We intend to launch the first phase of the Fund with guidance for applications in spring 2020 and to open for applications in summer 2020. The second phase will commence in 2021.

The IETF will provide funding for capital investment in energy efficiency and deep decarbonisation projects. This investment will be guided by our objectives to:

- Reduce energy costs and emissions for industry, particularly for energy intensive companies in the near-term, and
- Bring down costs and risks of deep decarbonisation technologies by demonstrating those technologies, including in a cluster setting.

The funding will support deployment of energy efficiency and deep decarbonisation technologies, and demonstration at scale. We envisage an even split between funding for energy efficiency and deep decarbonisation projects. This will complement other Government programmes that offer innovation and early demonstration support, such as the Energy Innovation Programme and the Industrial Strategy Challenge Fund (ISCF). Funding will be provided for capital expenditure, not operational expenditure.

In addition to leveraging investment in decarbonisation, the IETF will have wider benefits including:

1. Lower energy bills;
2. Lower carbon emissions;
3. Reduced cost of production / increased competitiveness for firms;
4. De-risking of new energy efficiency and deep decarbonisation technologies;
5. Further air quality improvements.

## Our proposals for the Fund

We have engaged with industry extensively whilst designing the IETF, through our Informal Consultation and ongoing Market Intelligence exercise. This engagement has shaped the proposed design of the scheme. We received 57 responses to our Informal Consultation and the Market Intelligence exercise has gathered information on 185 potential projects.

## We propose to support the following activities:

- **Deployment of mature energy efficiency technologies** that improve industrial process energy efficiency and reduce energy demand across a system.
- **Deployment of deep decarbonisation technologies** such as industrial carbon capture, low-carbon fuel switching and material efficiency. These technologies need not be as mature as energy efficiency technologies; we will support some to be demonstrated at scale for the first time.
- **Feasibility and Front-End Engineering and Design (FEED) studies** for projects deploying mature energy efficiency technologies or deep decarbonisation technologies. These technical and economic assessments of potential projects reduce risks and provide

more accurate cost estimates, enabling decision-makers to make informed investment choices.

- **Capacity building** where companies lack the technical expertise required to conduct feasibility and FEED studies and deploy projects.

**The IETF will support technologies that reduce energy consumption and emissions in industrial processes. It will expect companies to propose appropriate technologies.**

- Firms will decide which technologies will best reduce the energy and/or carbon intensity of their industrial processes.
- The focus on processes excludes measures in transport (such as electric vehicles), building heating and cooling, and other electrical building measures (such as lighting).

Manufacturing sector organisations will be able to bid for funding for energy efficiency projects. If other organisations such as data centres or laundromats can demonstrate their energy intensity, they may be eligible for funding for energy efficiency projects. There will not be a limit on which sectors can apply for deep decarbonisation given the relative immaturity of such projects.

**Funding will primarily be awarded as grants through a competitive process. A small proportion of funding may be made available as loans for energy efficiency projects.**

- Awarding funding through a competitive grant process will help us fund the best projects and maximise value for money for the Fund.

To make sure the projects we fund are additional, we **will only fund projects that would not happen without Government support.**

**We propose to deliver the Fund in multiple phases**

- Phase 1 of the IETF will be worth up to £30 million and provide support for feasibility and FEED studies of energy efficiency and deep decarbonisation projects and support for the deployment of mature energy efficiency technologies.
- Phase 2 (worth around £285 million) will, in addition to supporting feasibility and FEED studies and deployment of energy efficiency measures, provide support for deployment of deep decarbonisation technologies.
  - Within Phase 2 we propose delivering the scheme in multiple windows, but we welcome views on delivering Phase 2 in one continuous window.

**Application Assistance**

- Potential applicants will have access to an **Applicant Advice Service** to answer questions about their applications or the IETF.
- We are considering providing a more intensive **Application Development Service** that could give applicants detailed advice and support to guide them through the application process.

## Evaluation, monitoring and reporting

- BEIS is committed to building an evidence base at all stages of the policy cycle in order to monitor the delivery of scheme benefits and progress against objectives.
- We propose that applicants provide BEIS with information when they bid for funding and at regular milestones.
- Lessons learned through monitoring and evaluation will be incorporated into future scheme design for Phase 2 and may be used for other policies.

We welcome your views on these proposals.

## Aims of this consultation

This document aims to:

- Seek views on our proposed design of the IETF;
- Summarise the responses to the Informal Consultation, “*Designing the Industrial Energy Transformation Fund*”, which closed on 31 May, and provide the Government Response;
- Seek views on how we deliver a phased approach to the Fund;
- Elicit feedback on whether IETF fits appropriately with other Government and Devolved Administration (DA) policies in this area.

## Next Steps

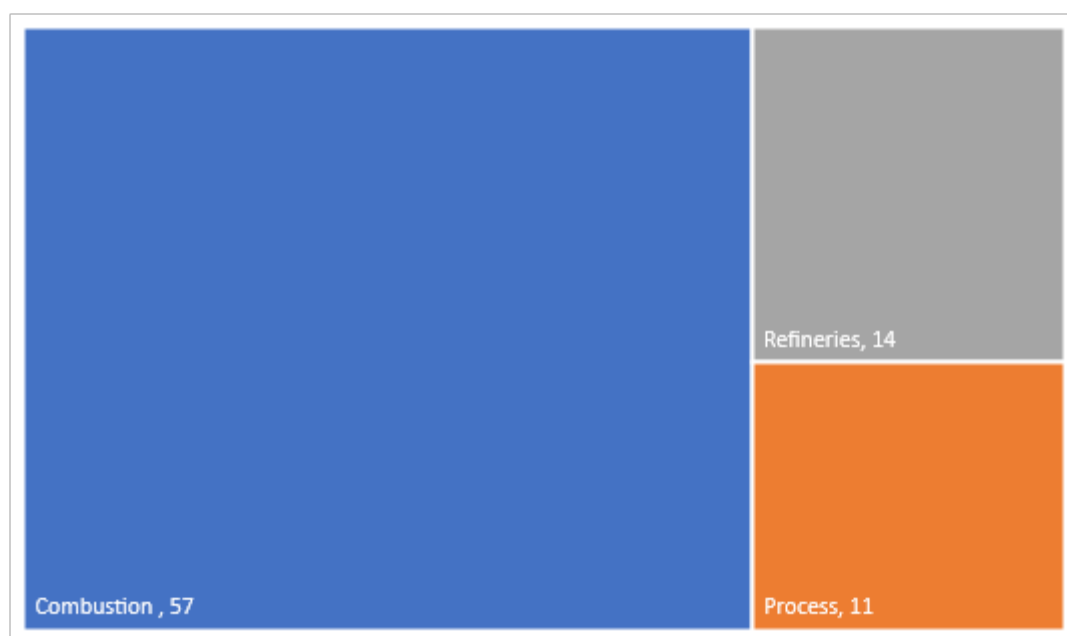
BEIS will review stakeholder responses to this consultation and will use them to inform the design of the scheme. This will be outlined in a Government Response to this consultation next year. Phase 1 of the IETF is expected to launch in spring 2020.

# 1. Context

The UK is at the forefront of tackling climate change and promoting clean growth. UK emissions were reduced by 42 per cent from 1990 to 2017<sup>1</sup>, while the economy grew by more than two thirds.<sup>2</sup> However, considering the Paris Agreement and the Intergovernmental Panel on Climate Change's recommendation to limit global warming to 1.5°C,<sup>3</sup> the UK is committed to going even further. The UK has recently committed in law to reach net zero greenhouse gas emissions by 2050, becoming the first major economy to pass legislation of this type.

The UK's business and industrial<sup>4</sup> sectors will be vital in delivering on this commitment, as they account for around a quarter of UK emissions.<sup>5</sup> Industry is also a crucial part of the economy, which employs approximately 2.7 million people,<sup>6</sup> contributes £182 billion in Gross Value Added and exports goods and services worth £297 billion.<sup>7</sup>

**Figure 1 - UK industry emissions by source in 2017, MtCO<sub>2</sub>e<sup>8</sup>**



We assume industrial emissions will need to be reduced to near-zero in order to achieve the UK's 2050 target. Industrial emissions have fallen significantly since 1990, but there is more to

<sup>1</sup> BEIS, 2019, Final UK Greenhouse Gas Emissions National Statistics. Available at:

<https://www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-national-statistics>

<sup>2</sup> ONS, 2019, Gross Domestic Product: chained volume measures. Available at:

<https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/abmi/pn2>

<sup>3</sup> IPCC, 2018, IPCC Special Report: Global Warming of 1.5°C. Available at: <https://www.ipcc.ch/sr15/>

<sup>4</sup> Manufacturing, Other energy supply (refining, other fuel manufacturing and extraction) and buildings emissions – excluding power sector emissions

<sup>5</sup> BEIS calculations based on GHG Inventory. Available at: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017>

<sup>6</sup> ONS, 2019, Workforce jobs by industry. Available at:

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/workforcejobsbyindustryjobs02>

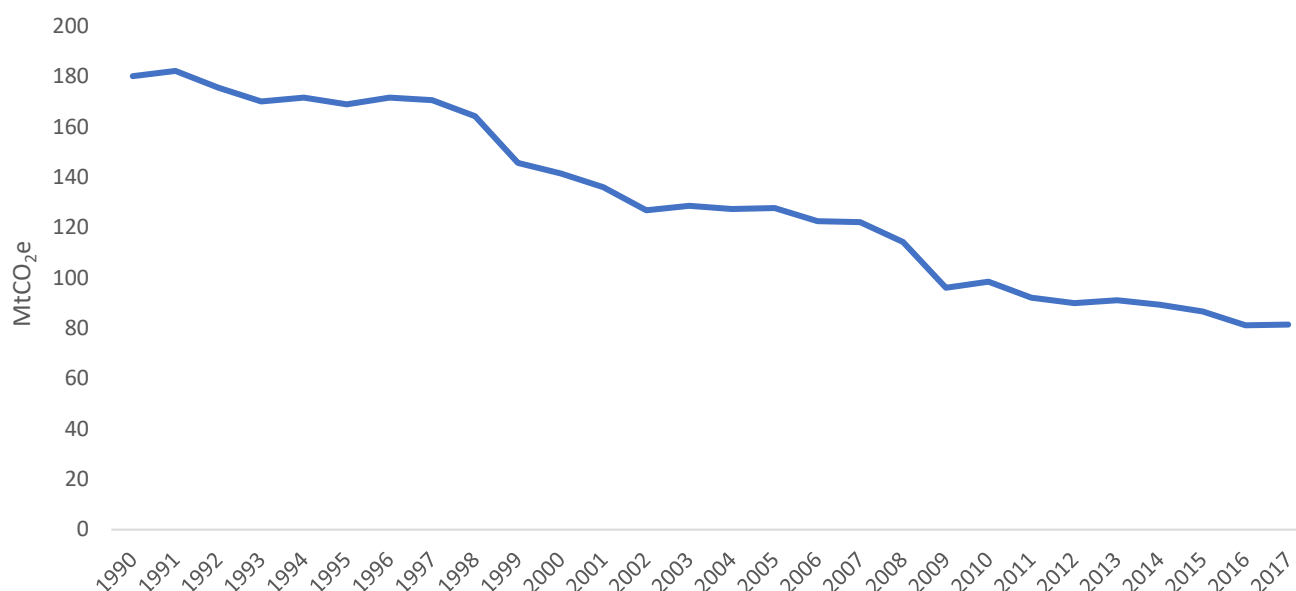
<sup>7</sup> BEIS analysis of: ONS, 2018, Annual Business Survey. Available at:

<https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/methodologies/annualbusinesssurveyabs>

<sup>8</sup> BEIS calculations based on GHG Inventory. Available at: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017>

do, as Figure 2 shows. At the same time, the competitiveness and job-creating potential of UK industries must be maintained, as laid out in the Industrial Strategy. This needs to be done without encouraging carbon leakage through offshoring of UK industry.

**Figure 2 – UK Industry Emissions 1990-2017, MtCO<sub>2</sub>e<sup>9</sup>**



The UK carbon budgets require the equivalent of a 57 per cent cut in emissions by 2032 from a 1990 baseline.<sup>10</sup> The first (2008-12) and second (2013-17) carbon budgets have been met, and current projections show that the UK is on track to meet the third (2018-22). However, further action will need to be undertaken to meet the fourth and fifth carbon budgets. The Clean Growth Strategy is the Government's plan to help the whole economy decarbonise further.

The Clean Growth Strategy promised ambitious measures to support businesses to improve their energy efficiency by at least 20 per cent by 2030, and to support clean innovation in industry.<sup>11</sup> The Government Response to the Committee on Climate Change's (CCC) progress report which will be published shortly, will set out the policies, including the IETF, which will help to deliver on that 20 per cent commitment.

Local Enterprise Partnerships, Local Authorities and Mayoral Combined Authorities in England are increasingly considering their role in convening local stakeholders and business communities towards the shared goal of increased energy efficiency and reduced industrial emissions whilst supporting local economic growth.

<sup>9</sup> BEIS calculation including refineries. Data source: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2017>

<sup>10</sup> CCC, 2019, Progress report. Available at: <https://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/how-the-uk-is-progressing/>

<sup>11</sup> BEIS, 2018, Clean Growth Strategy. Available at: <https://www.gov.uk/government/publications/clean-growth-strategy>

## 1.1 Policies to reduce industrial emissions

Several existing Government policies support energy efficiency and deep decarbonisation.<sup>14</sup>

**The EU Emissions Trading System (ETS)** – A cap is set on the total amount of certain greenhouse gases that can be emitted by installations in the system. Companies receive or buy emissions allowances which they can trade with one another. After each year companies must surrender enough allowances to cover all its emissions, or face fines. The Government is looking at options to replace the EU ETS after the UK leaves the EU. Any domestic carbon pricing policy will aim to be at least as ambitious as the EU ETS.<sup>12</sup>

**Climate Change Agreements (CCAs)** – These agreements between the Government and firms encourage improvements in energy efficiency across 53 industrial sectors, in return for significant discounts on the Climate Change Levy (CCL), a tax on non-domestic energy use.

**Industrial Heat Recovery Support Programme (IHRS)** – This is a grant funding programme designed to encourage and support investment in heat recovery technologies. It helps businesses in the manufacturing sector to identify and invest in opportunities for recovering and reusing heat that would otherwise be wasted. (It is not available in Scotland or Northern Ireland).

**Industrial Energy Efficiency Accelerator (IEEA)** – This helps to identify new energy efficient technologies and accelerate their deployment in UK industry. Targets include all industrial and manufacturing sectors in the UK.

**Industrial fuel switching competition** – This identifies and tests the processes and technologies required for industries in the UK to switch to low-carbon fuels.

**Clean power and heat generation** – A number of policies incentivise the deployment of efficient Combined Heat & Power (CHP). These include tax exemptions from the Climate Change Levy and Carbon Price Support and subsidies for biomass-fuelled CHP such as the Renewable Heat Incentive (RHI) and Contracts for Difference.<sup>13</sup> The RHI also funds biomass heat-only plants (for example, biomass boilers). The RHI is available in England, Scotland and Wales. It is no longer open to new applications in Northern Ireland.

**Industrial Clusters Mission** – The £170 million Mission will establish the world's first net zero carbon industrial cluster by 2040 and at least one low-carbon cluster by 2030.

**Clean Steel Fund** – This new £250 million fund will help support the steel industry onto a pathway to decarbonisation. A call for evidence has been issued to understand the needs of the steel sector and to help develop the design of the Fund.

**Low Carbon Hydrogen Production Fund** – This new £100 million fund will support the commercial scale demonstration and deployment of low carbon hydrogen production at scale.

<sup>12</sup> BEIS, 2019, The Future of UK Carbon Pricing. Available at: <https://www.gov.uk/government/consultations/the-future-of-uk-carbon-pricing>

<sup>13</sup> BEIS, 2019, Guidance: Combined Heat and Power Incentives. Available at: <https://www.gov.uk/guidance/combined-heat-and-power-incentives>

<sup>14</sup> See Chapter 6 (Interactions with other Government policies) for further detail

### 1.1.1 Devolved schemes

Schemes in the Devolved Administrations also support energy efficiency and deep decarbonisation by industry.

#### Scotland

Resource Efficient Scotland provides free, on-site, specialist advice to business, enabling them to realise the economic, social and environmental benefits of using their resources efficiently. It also provides advice on suppliers and relevant finance, and in some cases helps develop full business cases. Projects can be identified via Energy Measurement and Quantification (EMQ) to enable a better understanding of energy flows in Scottish industrial sites, or via Energy Savings Opportunity Scheme (ESOS) audits.

Scotland's enterprise agencies provide bespoke support, such as feasibility studies, to industrial companies to progress energy efficiency or decarbonisation projects.

Industrial projects can bid for match-funding from the Low Carbon Infrastructure Transition Programme (LCITP). This has an open call for low-carbon heat projects until late 2019.

#### Wales

The Welsh Government provides financial support to business through a number of routes, including the Economy Futures Fund which has the potential to fund energy efficiency. To qualify for funding through the Economy Futures Fund, businesses must demonstrate commitment to the four requirements of the Welsh Government Economic Contract, namely growth potential, fair work, promotion of health, skills and learning in the workplace and progress in reducing carbon footprint. In addition, any investment proposal for which funding is being sought must respond to at least one of five Calls to Action:

- Decarbonisation;
- Innovation, Entrepreneurship and Headquarters;
- Exports and Trade;
- High Quality Employment, Skills Development and Fair Work;
- R&D, Automation and Digitisation.

The Carbon Trust helps small and medium-sized enterprises (SMEs) through the Energy Efficiency Loan Fund, which provides interest-free loans of between £3,000 and £200,000 for energy efficiency and renewable energy projects in Wales. This Fund has helped over 700 businesses in Wales save over £9 million per year on their fuel costs.<sup>15</sup>

#### Northern Ireland

Invest Northern Ireland (NI) provides Technical Consultancy support to businesses with an annual energy and resource spend in excess of £30,000. This support consists of fully funded technical audits, feasibility studies and advice, complete with a report and recommendations to help participating businesses identify cost savings.

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<sup>15</sup> Carbon Trust, Energy Efficiency Loan Fund: Interest free Interest-free loans for energy efficiency and renewable energy projects in Wales. Available at: <https://www.carbontrust.com/client-services/programmes/finance/interest-free-loans-wales/>

The Resource Efficiency Capital Grant provides grants to Invest NI client companies to invest in resource efficiency technologies. Currently, grants of up to 40% of project costs, capped at £40,000, are available to help with the purchasing of new equipment, which will reduce waste and the consumption of water and raw materials.

The Northern Ireland Sustainable Energy Programme (NISEP) is an annual programme of energy efficiency schemes, funded by all electricity consumers through a flat per kilowatt hour charge on electricity bills. Funding is split 80% to priority (vulnerable) domestic customers, and 20% to non-priority domestic and business customers. Support for business customers typically takes the form of a grant of around 20% towards a specific energy efficiency measure.

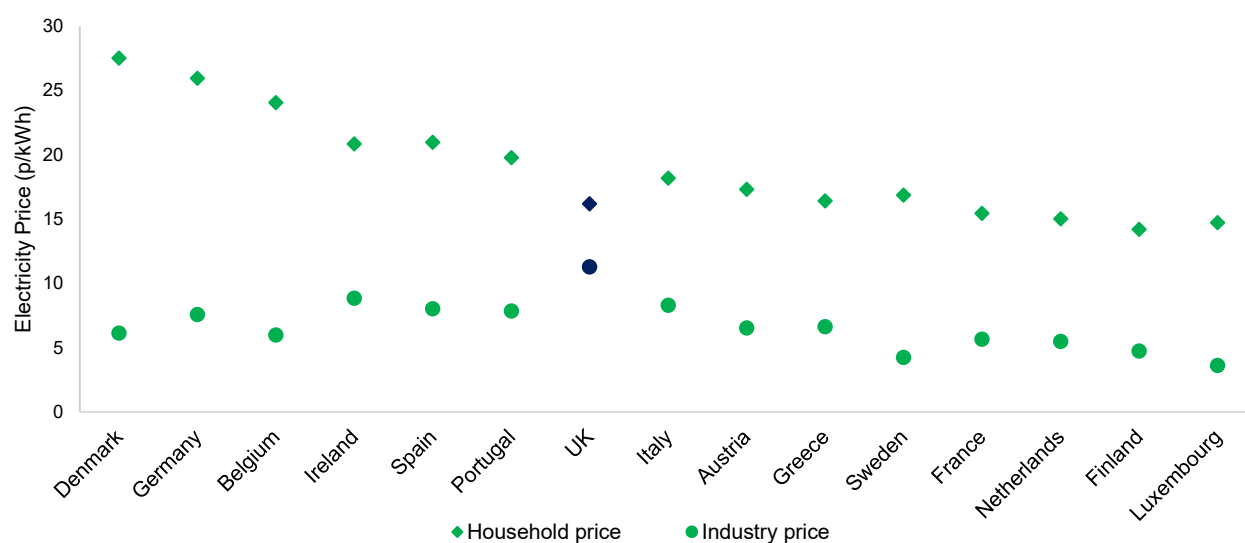
Invest NI also funds the Industrial Symbiosis Service which is a resource matching service that identifies business opportunities to turn the unwanted materials of one business into a resource for another business, for example materials, energy, water, capacity, expertise and assets.



## 1.2 Rationale for the IETF

There are several reasons why companies do not invest enough in decarbonisation. In the IETF Informal Consultation we noted that many UK businesses operate in a highly competitive international environment.<sup>16</sup> Industrial electricity prices in the UK are higher than in other European countries, while gas prices are relatively low.<sup>17</sup> Many respondents mentioned this as a challenge for decarbonisation.

**Figure 3 – Industrial and household electricity prices in selected EU member states in 2018, including taxes**



**Figure 4 – Industrial and household gas prices in selected EU member states in 2018, including taxes**



<sup>16</sup> BEIS, 2019, Designing the Industrial Energy Transformation Fund. Available at:

<https://www.gov.uk/government/consultations/designing-the-industrial-energy-transformation-fund>

<sup>17</sup> BEIS, 2019, International Industrial Energy Prices. Data available at: <https://www.gov.uk/government/statistical-data-sets/international-industrial-energy-prices>

The following barriers to investment in energy efficiency and deep decarbonisation technologies were identified in the 2050 Roadmaps<sup>18</sup> and our Informal Consultation.<sup>19</sup>

**Table 1 - Barriers to investment identified in the 2050 Roadmaps and Informal Consultation<sup>20</sup>**

Barriers to energy efficiency	Barriers to deep decarbonisation	General barriers
Lengthy payback periods for some technologies, a particular problem for multi-national companies	Risks of many unproven technologies are too high	Short-term investment horizons
Internal competition for corporate finance	First-mover disadvantage	Shortage of technical and managerial resources and (perceived) technical and commercial risks to manufacturing process
Lack of capacity and knowledge, particularly among small firms, to identify available projects and make investible business cases	High capital costs of (some) projects	Policy uncertainty and carbon price may not enable private investment on its own
Lack of a reliable source of recycled content for some processes	Some technologies impose additional operational costs	Long-term investment cycles
	Private sector funding typically unavailable	Challenges of business rates, uncertainty relating to EU exit, international competitiveness
	Need for a long-term, consistent energy policy – difficulty to commit to investment in decarbonisation infrastructure without this	High (international) competition resulting in low profit margins
	Lack of long-term funding support given the time needed to deploy decarbonisation technologies at scale	The cost of energy (including rising costs as a result of policies on renewables)
	Limits to growth due to constraints, or isolated thinking, on network infrastructure	

<sup>18</sup> BEIS, 2015, Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050. Available at:

<https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050>

<sup>19</sup> BEIS, 2019, Designing the Industrial Energy Transformation Fund. Available at:

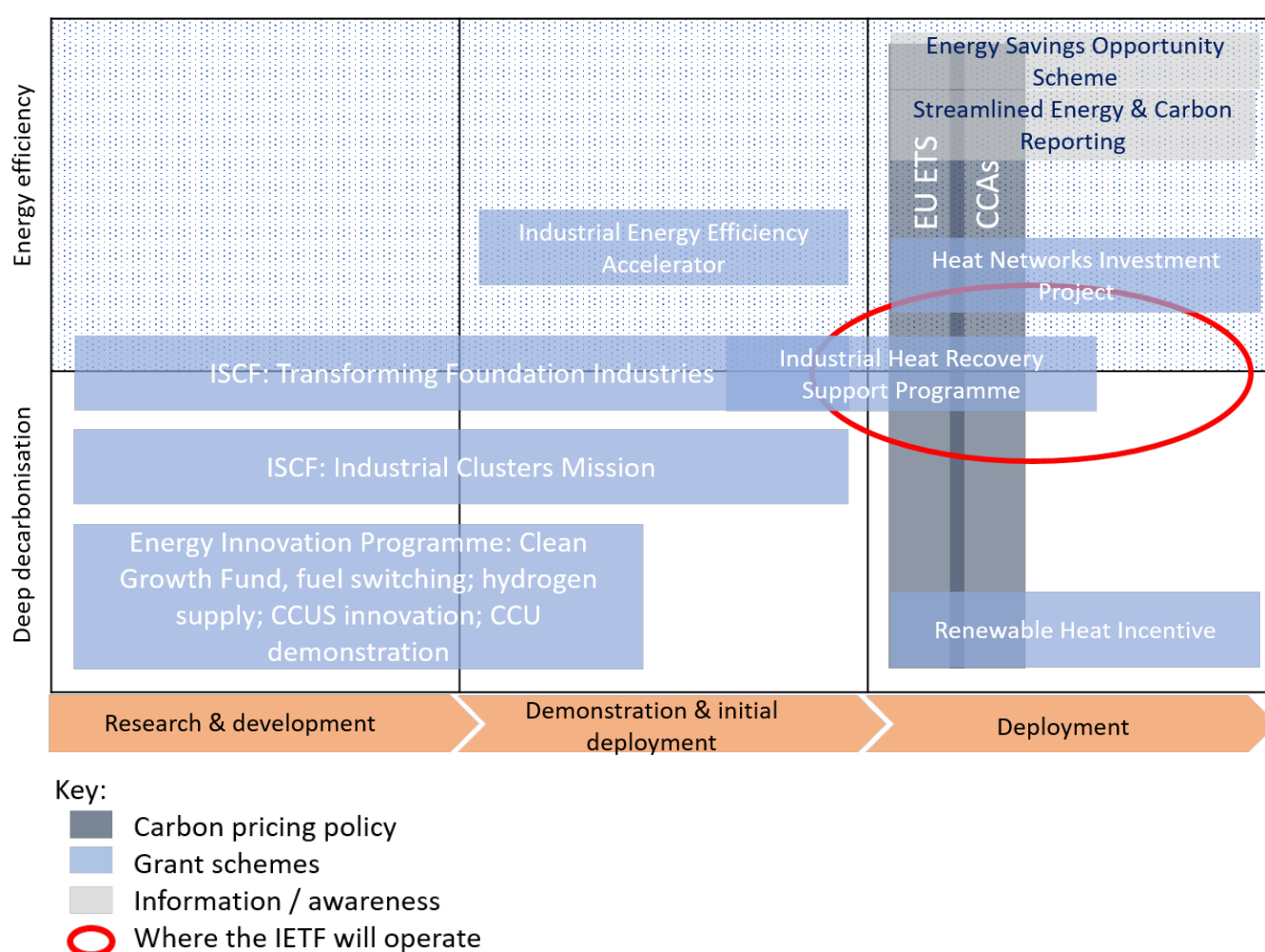
<https://www.gov.uk/government/consultations/designing-the-industrial-energy-transformation-fund>

<sup>20</sup> Some barriers were identified in Scottish Government, 2019, Decarbonising Scotland's industrial sectors and sites. Available at: <https://www.gov.scot/publications/decarbonising-scotlands-industrial-sectors-sites-paper-discussion-scottish-energy-intensive-industries/>

## 1.3 Where are the policy gaps for industry?

Several government policies already incentivise businesses to invest in energy efficiency and deep decarbonisation. However, in order to reach net zero climate change goals, businesses need to go faster, and Government policy needs to facilitate that acceleration. The figure below maps existing support for industry and identifies a gap at the deployment stage for energy efficiency and deep decarbonisation projects, where projects are technologically proven but not yet economically or commercially viable. The IETF will help to fill this gap. There are other policies which support deployment of specific technologies (such as the Heat Networks Investment Project and Industrial Heat Recovery Scheme) but these are much narrower in scope than the IETF, and HNIP and IHRS are expected to close in 2022.

**Figure 5 – Current UK Decarbonisation Policy Landscape**



## 1.4 Role of the IETF

The IETF aims to address barriers that prevent companies from reducing emissions and increasing energy efficiency. These include relatively long payback periods on energy efficiency measures and the fact that some deep decarbonisation technologies have not been demonstrated at scale. The objectives of the scheme are to:

- 1. Reduce energy costs and emissions for industry, particularly for energy intensive companies in the near term, and**
- 2. Bring down costs and risks of deep decarbonisation technologies by demonstrating those technologies, including in a cluster setting.**

Cutting energy costs and emissions in the near term will help UK industry across the country to remain competitive. Bringing down costs and risks of deep decarbonisation technologies will help achieve our net zero emissions target.

Some technologies, such as industrial carbon capture and fuel-switching to low carbon hydrogen are not yet ready for deployment at scale on a commercial basis. These may benefit from economies of scale from deployment in a cluster setting. Funding the demonstration and early deployment of these technologies will bring deep decarbonisation within reach for the wider UK industry, so it can take advantage of the economic opportunities arising from clean growth.

### Deep Decarbonisation

In this document, “deep decarbonisation” refers to measures beyond efficiency that reduce industrial process emissions, using:

- Industrial carbon capture
- Fuel switching:
  - Low carbon hydrogen
  - Electrification
  - Biomass
- Material efficiency

### 1.4.1 Scope

The IETF will focus on emissions from industrial processes in the UK. The Fund will help industry to save energy costs and carbon in the near term, and fully decarbonise in the longer term. It will be a competitive scheme, with grant funding offered to successful applicants. We are considering the option of providing a small proportion of funding through loans in Phase 2.

### Energy Efficiency

We intend to support energy efficiency technologies that improve industrial process energy efficiency and those that reduce energy demand across a system.

The Fund will support energy efficiency technologies that are ready for deployment. This part of the scheme will be open to all companies in industrial manufacturing as set out in the Standard Industrial Classification (SIC) codes 10-33.<sup>21</sup> A list of SIC codes is provided on page 75.

Deep decarbonisation projects will be supported from demonstration in an operational environment/demonstration at scale, through to full commercial deployment (TRL 7 – 9). Eligibility will not be restricted.

<sup>21</sup> Including manufacturing of vehicles and technology

Feasibility and FEED studies will also be funded. Technical capacity at application stage will be assessed and support may be provided, subject to that assessment.

The scheme will be delivered in two phases. Phase 1 will launch in spring 2020, open for applications in summer 2020 and support a small number of projects worth up to £30 million in total. Phase 2 will deliver the full scheme from 2021 to 2024 and will be worth around £285 million.

We envisage an even split between funding for energy efficiency and deep decarbonisation projects. This will be subject to review after the first waves of the Fund, with scope for adjustment if required, for example due to the number and quality of bids, or technological developments.

#### 1.4.2 Activities the Fund will cover

In our Informal Consultation we asked for views on the activities the IETF should cover. Having received feedback from stakeholders and reviewed the existing policy landscape, we propose that the IETF provide funding for capital expenditure for:

- Deployment of projects implementing mature energy efficiency technologies;
- Deployment and demonstration at scale of deep decarbonisation technologies with the aim of de-risking these technologies and making them affordable to companies;
- Feasibility and FEED studies into energy efficiency and deep decarbonisation to mobilise private sector funding and build a pipeline of projects supporting our net zero ambition; and,
- Capacity building support to help companies develop and deliver projects that are funded by the IETF.

See sections 3.3 and 3.4 for further detail.

The IETF will not provide funding for operational expenditure.

#### Technology Readiness Levels (TRL)

Technology Readiness Levels indicate the maturity of a given technology, as it is developed for a particular application or product. TRL ranges from 1 – 9.

The IETF will support:

- TRL 7 (demonstration in an operational environment)
- TRL 8 (pre-commercial deployment)
- TRL 9 (full commercial deployment)

See Annex B for a comprehensive list and descriptions of TRL 1 – 9.

## 2. Our Informal Consultation

We are grateful to all those who responded to our Informal Consultation which closed on 31<sup>st</sup> May 2019. We received 57 responses. The majority were from trade associations and large businesses, with the remainder being SMEs, private individuals, academics and special interest groups. Around a third of responses were from Energy Intensive Industries (EIIs) or their trade associations.

Alongside our Informal Consultation, we engaged with 131 stakeholders and further spread our message by working with trade associations. We engaged with stakeholders across parts of the UK, including at two events organised with the Scottish Government. We worked with our colleagues in the Devolved Administrations to seek their feedback and solicit responses from stakeholders across the UK.

The responses to the Informal Consultation have informed our policy development for the IETF as they have given us a clearer idea of what industry needs. We have used these responses, the Market Intelligence gathering, and further engagement with stakeholders to inform the proposed scheme design set out within this consultation document.

A full summary of the responses to our Informal Consultation can be found in Annex A.

### 2.1 Market Intelligence exercise

As part of the process of engaging with industry and gathering input from businesses, we carried out a Market Intelligence gathering exercise during summer 2019.

This exercise aimed to improve our understanding of the potential pipeline of energy efficiency and industrial decarbonisation projects that might apply to the Fund for support. The information gathered informed the design of the Fund, as it helped us to understand what industry needed.

Businesses were invited to provide information on projects which they had considered but were unable to implement. Information was gathered through interviews with individual businesses, and by partnering with trade associations to request their members to provide project data.

The responses showed that businesses are keen to implement both mature energy efficiency and deep decarbonisation projects. Information was received about projects from across the energy intense sectors and from other sectors as well. The data indicated a wide range of projects that could potentially be eligible for support from the Fund, in terms of size and technology type. It also revealed many ideas for emissions reductions and energy savings projects that could be developed into project applications if the Fund supported feasibility or FEED studies. Businesses asked BEIS to provide an 'eligible in principle' letter about projects that they could show their boards or executives when seeking internal funding.

We will continue to analyse the market and gather information about projects that are potentially suitable to apply to the IETF for support, encouraging firms to prepare their ideas.

We will continue our engagement with industry on the opportunities that the IETF presents, particularly with the largest emitters and energy users.

## 3. Eligibility and Scope

### 3.1 Summary of consultation questions

Respondents should give their views on any of the issues raised in this document, but the consultation particularly seeks views on the proposals set out in the following sections:

3.2 Who can apply?

3.3 What technologies should the Fund support?

3.4 Should the Fund support feasibility and FEED studies and capacity building?

3.5 What type of funding support should we offer?

4.0 How should the Fund be delivered?

4.4 Evaluation, monitoring and reporting

**Table 2 - Summary of the consultation questions and proposals**

Decisions required	Design proposals	Key consultation questions
3.2 Who can apply?	<p>For energy efficiency projects: eligibility will be restricted to manufacturing firms covered by SIC codes 10-33<sup>22,23</sup></p> <p>For deep decarbonisation projects: eligibility will not be restricted to manufacturing SIC codes 10-33</p>	For energy efficiency projects, should eligibility be broadened to additional sectors other than those in manufacturing SIC codes 10-33 if they can demonstrate their energy intensity?
3.3 What technologies should the Fund support?	<p>Energy efficiency technologies ready for deployment at either TRL 8 or TRL 9</p> <p>Deep decarbonisation technologies from demonstration in an operational environment through to full commercial deployment</p>	<p>Where do you see opportunities for energy efficiency within your sector?</p> <p>Do you think that the IETF should require applicants to use technologies from the Energy Technologies List (ETL), unless the applicant can demonstrate that their technology performs to a better or equivalent standard?</p>

<sup>22</sup> See Page 75 for a comprehensive list of manufacturing sectors covered by SIC codes 10-33

<sup>23</sup> Including manufacturing of vehicles and technology



3.4 Should the Fund support feasibility and FEED studies, and capacity building?	<p>Competitive grant funding for feasibility and FEED studies for energy efficiency and decarbonisation projects</p> <p>Technical capacity assessment at application. If companies lack expertise and resources, then support could be provided</p>	Do you agree with the proposed maximum feasibility and FEED study durations?
3.5 What type of funding support should we offer?	Competitive grant funding is offered to eligible applicants for capital investment within permitted State Aid limits	<p>Should a portion of the Fund be set aside for a funding mechanism other than grants?</p> <p>Are there circumstances in which organisations would take loans for energy efficiency measures?</p>
4.0 How should the Fund be delivered?	<p>A phased approach</p> <p>A single application window for Phase 1</p> <p>Separate assessment criteria for energy efficiency and decarbonisation projects</p>	Would applicants use an Application Development Service?
4.4 Evaluation, monitoring and reporting	<p>Successful applicants will provide information on projects at project milestones</p> <p>Research projects will be used to understand patterns observed through monitoring</p> <p>This data, alongside analysis of scheme delivery will be used to carry out evaluation of scheme and its impacts</p>	Do you have views on how the IETF can encourage the sharing of knowledge of energy efficiency and deep decarbonisation measures between organisations?



## 3.2 Who can apply?

This section of the consultation discusses which organisations can apply to the IETF.

Responses to the Informal Consultation showed there were mixed views on eligibility, depending on the respondent and sector. Some respondents (predominantly those representing EIs) recommended funding only EIs, others recommended having a sector neutral approach, and those representing non-energy intensives argued that funding should not rule out companies based on energy intensity.

A strong message from most respondents was for a clear and simple application process and criteria. When designing scheme eligibility proposals, we have ensured these views have been reflected where possible.

In response to the Informal Consultation, stakeholders (particularly EIs) raised concerns about international competitiveness, especially given high UK electricity prices. Where goods and services are traded internationally, it may be more difficult for a producer to pass on their costs to customers. Trade intensity will not be an eligibility criterion, but in seeking views on whether eligibility might be expanded beyond manufacturing sectors SIC codes 10-33, we welcome additional evidence on both energy intensity and trade intensity.

### 3.2.1 Our proposal

The following principles apply to both energy efficiency and deep decarbonisation projects:

- The application must be made by a **legal entity established in the UK**. This does not exclude partnership with legal entities not established in the UK. The project is compliant with the relevant **State Aid requirements**. Sources of match funding are clearly identified and are from non-public funding sources.
- The investment project must be located on a manufacturing site in the UK. Firms headquartered elsewhere will be eligible to apply, provided it is to support an energy efficiency or deep decarbonisation investment made on a manufacturing site in the UK.

In addition, we propose that there should be some different eligibility requirements for energy efficiency and deep decarbonisation projects.

### 3.2.2 Energy efficiency projects

For energy efficiency projects, we propose that all manufacturing firms, as covered by SIC codes 10-33 should be able to apply. Applications from all sizes of firm will be eligible.

Third parties will be eligible to apply as the main applicant, on the behalf of sites operated by companies within the eligible SIC codes. We seek views on whether eligibility should be expanded to firms outside manufacturing SIC codes 10-33 if they can demonstrate their energy intensity.

We will consider allowing firms to aggregate their bids, in particular from the same sector or in a cluster or geographical setting. This could involve a firm bundling a limited number of similar projects at different sites into one application. We envisage restrictions on aggregation will be in place to ensure effective delivery. This could include a maximum number of projects per bid.

### 3.2.3 Minimum award for energy efficiency projects

Funding will be provided in line with State Aid rules (see Section 8 for details).

We propose that Phase 1 provide a minimum award per project of £1 million for deployment of energy efficiency technologies. This will allow a range of larger-scale projects of different sizes to be funded by Phase 1.

We propose that Phase 1 fund feasibility study/FEED studies for capital expenditure (capex) projects which could potentially meet the £1 million minimum threshold for capex grants later. Studies for ambitious projects over this threshold will be welcomed.

These thresholds will be reviewed for Phase 2 of the IETF, given the larger budget and expansion to deep decarbonisation technologies. We will draw on feedback from Phase 1.

#### Manufacturing Sectors

Manufacturing is generally defined to include the physical or chemical transformation of materials, substances, or components into new products, although this cannot be used as the single universal criterion for defining manufacturing, as other sectors such as processing of waste are also included within these SIC codes.

Source: UK SIC, 2007, Explanatory Notes, 71. Available at: <https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007>

### 3.2.4 Deep decarbonisation projects

Given the relative immaturity of deep decarbonisation projects, these projects might involve research organisations alongside private sector organisations. For example, we expect that consortia, or local collaborations representing business may be best placed to submit bids.

We propose that, for deep decarbonisation, private companies from any sector would be eligible to apply as sole applicants or as part of a consortium with other companies, or in a consortium with academic, research or public sector organisations. To be eligible, applicants from outside the private sector would need to be in a project consortium with one or more private sector organisations and not be sole applicants. Bids from all sizes of organisation will be eligible.

#### Questions

1. Do you agree with our proposal to restrict eligibility for energy efficiency projects to organisations in manufacturing sectors as covered by SIC codes 10-33?
2. Do you agree that additional sectors should be eligible for funding for energy efficiency projects if they can demonstrate their energy intensity?
3. Do you think that the IETF should allow firms to aggregate their bids?
4. If you think firms should be allowed to aggregate their bids, what restrictions could be put in place to prevent misuse of the aggregation system?
5. Do you agree with the proposed minimum value of grant awards of £1 million in Phase 1 for energy efficiency project?
6. What other methods could be used to determine a minimum threshold for feasibility/FEED study support?
7. Please give us your views on our proposals for eligibility for deep decarbonisation projects.

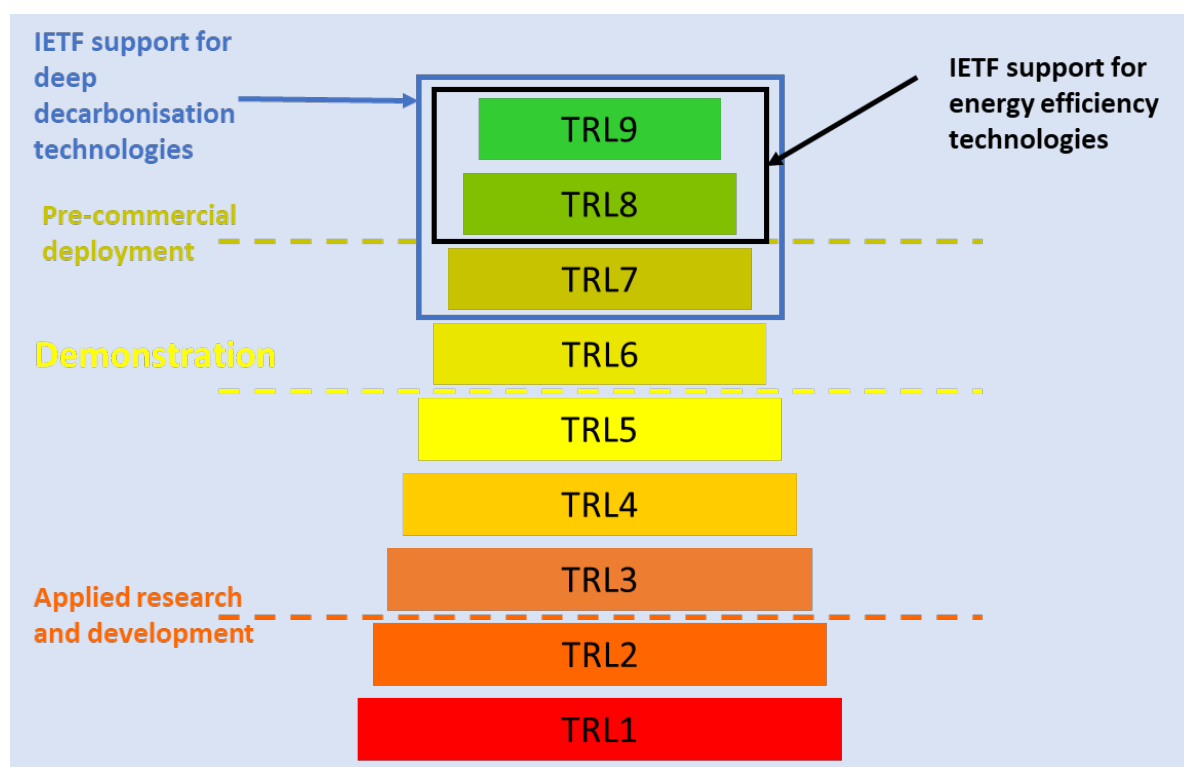
### 3.3 What technologies should the Fund support?

There are a broad range of technologies that the IETF could support to help industry improve its energy efficiency and transition to net zero.

Respondents to our Informal Consultation supported the idea that the IETF should fund both deep decarbonisation and energy efficiency projects. Many respondents were in favour of supporting the deployment of less-developed decarbonisation technologies such as low carbon hydrogen or industrial carbon capture to help them to achieve commercial viability. It was suggested that these projects follow on from existing FEED/feasibility studies.

To help identify which technologies we should support, the IETF plans to use technology readiness levels (TRL) which assess technology maturity (see Annex B for more detail).

**Figure 6 – Technology Readiness Levels**



#### 3.3.1 Energy efficiency technologies the IETF will support

We intend to support energy efficiency technologies that improve industrial process energy efficiency and those that reduce energy demand across a system.

This would rule out energy efficiency measures in transport, building heating and cooling, and other electrical building measures such as lighting.

The IETF will support energy efficiency technologies that are ready for deployment, at either TRL 8 or TRL 9. The IETF will remain open on the exact technology solution for a project, judging applications according to their cost-effectiveness, technical feasibility, project costs, deliverability and risk.<sup>24</sup>

<sup>24</sup> See Section 4.3 (Project assessment criteria) for further details.

We are seeking views on whether applicants should be required to use the Energy Technology List (ETL)<sup>25</sup> where a project proposes, at a component level, using a technology type already covered by the ETL. Where projects do not plan to use a listed piece of equipment, alternative products should meet or exceed the performance requirements specified in the Energy Technology Criteria List.

Using products already on the ETL has the advantage of making the application process easier for these technology types since these products already offer the best carbon and bill savings. The ETL criteria are set to exceed the minimum energy efficiency standards set out in State Aid guidelines.

Table 3 below provides examples of the kinds of energy efficiency projects the IETF could fund in different sectors.

**Table 3 – Energy efficiency opportunities by sector**

Sector	Appropriate technologies & project examples
Iron & Steel	Waste heat recovery, process optimisation (for example, exhaust emissions feedback systems)
Refining	Replace heat exchangers with higher efficiency heat exchangers, air pre-heat, electricity generation from steam let down (high pressure to low pressure)
Chemicals	Electricity generation from steam let down (high pressure to low pressure), process optimisation, waste heat recovery
Cement	Waste heat recovery, optimise kiln oxygen levels, optimise burner flame temperature/ shape/ temperature
Food & drink	Improvements to compressed air systems, improvements to refrigeration and storage, process optimisation
Glass/ Ceramics/ Non-metallic minerals	Waste heat recovery, temperature reduction programme
Paper & pulp	Improving efficiency in drying processes, waste heat recovery

#### Questions:

- 8. Please give us your views on our proposals for which technologies would be supported to improve energy efficiency.**
- 9. Should applicants be required to use products already listed on the ETL, unless the applicant can demonstrate that their preferred product choice performs to a better or equivalent standard?**

### 3.3.2 Deep decarbonisation technologies the IETF will support

We propose that the IETF support deep decarbonisation projects beyond the research and innovation stage during Phase 2 of the Fund. This creates a joined-up approach with other

<sup>25</sup> See Annex C

government funds that currently offer innovation and demonstration support, such as the Energy Innovation Programme<sup>26</sup> and the Industrial Strategy Challenge Fund.<sup>27</sup>

This approach will see the IETF provide support to technologies that are either ready for demonstration in an operational environment or ready for deployment (at TRL 7 or higher) during Phase 2. This keeps in scope industrial carbon capture, fuel-switching options (low carbon hydrogen, biomass, and electrification), and material efficiency. Projects will be assessed on cost-effectiveness, technical concept and feasibility, and transformation criteria, among others.<sup>28</sup>

The following activities offer examples of where the IETF could co-ordinate its support for deep decarbonisation technologies, ensuring it complements the work of other funds:

- Provide match-funding for FEED studies;<sup>29</sup>
- Provide deployment funding following the completion of FEED studies for deep decarbonisation projects, and/or
- Provide capital support for initial deployment or large-scale demonstration, helping de-risk the technology in industrial settings.

The aim is to show that the technology can be proven to work in industrial settings and that any associated risks can be managed. This will be done by funding projects that help deep decarbonisation technologies bridge the gap between research, innovation and commercial deployment.

This will exclude IETF support solely for standalone production projects (for example, hydrogen electrolysis) or transport and infrastructure projects (for example, building piping alone), as we consider these out of scope. There are also other Government funds and schemes operating in these areas such as the newly announced Low Carbon Hydrogen Production Fund.

Similarly, the IETF will not support power generation projects as these are already supported by other Government policies. If power generation uses waste heat from industrial processes, these projects may still be eligible for IETF funding.

The IETF is particularly interested in projects which can be easily replicated by others, can bring benefits across the lifecycle of the technology through future carbon savings, and contribute to a trajectory to net zero.<sup>30</sup>

To avoid cases where public investment would not provide value for money, technology-specific criteria will be used. For example, where a project is proposing the use of solid biomass as a feedstock in industry, these projects will need to use the Biomass Suppliers List, or an equivalent.<sup>31</sup> This will ensure that projects are compliant with the Government's biomass sustainability criteria, including land use and greenhouse gas (GHG) criteria.

### Resource Efficiency

There is high potential to reduce industrial emissions related to UK consumption and production through a resource efficiency circular economy approach. This would involve supporting greater use of secondary materials in production as well as diversification of industry into reuse and recycling sectors.

<sup>26</sup> BEIS, 2017, Guidance: Energy Innovation, BEIS energy innovation programme. Available at:

<https://www.gov.uk/guidance/energy-innovation#beis-energy-innovation-programme>

<sup>27</sup> UKRI, Industrial Strategy Challenge Fund. Available at: <https://www.ukri.org/innovation/industrial-strategy-challenge-fund/>

<sup>28</sup> See Section 4.3 (Project assessment criteria) for further details.

<sup>29</sup> See Section 3.4 (feasibility studies, FEED studies and capacity building) for further details.

<sup>30</sup> See Section 4.3 (Project assessment criteria) for further details.

<sup>31</sup> Approved by the Secretary of State for BEIS in Regulation 51 of the Renewable Heat Incentive Scheme Regulations 2018

## Questions:

10. Do you agree with the kind of deep decarbonisation activities the IETF is looking to support?
11. Please give us your views on our approach towards deep decarbonisation technologies.

## 3.4 Should the Fund support feasibility studies and FEED studies, and capacity building?

Improving the energy efficiency of companies, as well as implementing deep decarbonisation technologies, will require changes to operational processes. Typically, before such changes are made, a company will evaluate the feasibility and potential impact of a project. This is often done by conducting feasibility and FEED studies. These studies reduce risks and provide more accurate cost estimates, which enable decision-makers to make informed investment decisions.

Companies face both financial and technical barriers to undertaking feasibility and FEED studies. These include difficulties raising the internal capital and reluctance to access third party finance to fund them. Many companies also lack the technical staff needed to conduct studies or to oversee the deployment of projects in-house.<sup>32</sup> This means they need to employ external consultants, increasing costs. We recognise that some companies will require support to address these barriers.

We propose to offer grant funding, allocated on a competitive basis, to companies conducting feasibility and FEED studies. Providing grant funding for feasibility studies will allow companies to conduct preliminary technical and financial analysis of the energy efficiency and deep decarbonisation projects the IETF supports. Support for FEED studies will allow further, specific, detailed engineering plans for projects to be developed.

Additionally, depending on our assessment of an applicant company's ability to deliver a project, we may provide additional grant funding to build capacity. This will be specifically for companies to procure the specialist support they need to conduct feasibility and FEED studies and deploy projects. This may be engineering and technical consultant support, or project management expertise.

Findings from our Informal Consultation show support from a range of stakeholders for Government support for capacity building, feasibility and FEED studies to help advance key energy efficiency and deep decarbonisation projects. In light of this, we are seeking views on our proposed approach to providing this support.

### Feasibility and FEED

#### Feasibility Study

An engineering and financial analysis of a project, identifying strengths, weaknesses and resources required.

#### FEED Study

A highly detailed engineering plan identifying the specific technical requirements for a project.

Source: BEIS, 2018, Call for CCUS Innovation, Guidance Notes. Available at: <https://www.gov.uk/government/publications/call-for-ccus-innovation>

<sup>32</sup> BEIS, 2015, Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050: Cross-sector summary. Available at: <https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050>



### 3.4.1 Proposed eligibility and assessment criteria

We propose to apply similar eligibility criteria for energy efficiency and deep decarbonisation feasibility and FEED study project proposals. We also propose to apply similar assessment criteria to evaluate energy efficiency and deep decarbonisation feasibility and FEED study applications. The assessment criteria will be used to test a project's appropriateness for IETF funding and provide a means for competitive ranking.

**Table 4 – Proposed eligibility criteria**

Proposed criteria	
Minimum feasibility and FEED study content	<p>Feasibility study: the deliverable will be a feasibility study that will include:</p> <ul style="list-style-type: none"> <li>➤ Technical concept.</li> <li>➤ Commercial information.</li> </ul> <p>FEED study: the deliverable will be a FEED study report.</p>
Maximum feasibility and FEED study duration	<p>We propose that a feasibility study must be completed within 12 months of notification that the application is successful.</p> <p>We propose that a FEED study must be completed within 24 months of notification that the application is successful.</p>
Size of feasibility and FEED study awards	<p>We propose that Phase 1 feasibility study/FEED support provides funding only for studies for those capex projects which could meet the £1 million minimum threshold for capex grants in Phase 1.</p>

**Table 5 – Proposed assessment criteria**

Proposed criteria	
Replicability for the sector	Whether the project could be replicated by others in the sector and is scalable.
Technical feasibility	Is the proposal realistic? Is the technological concept scientifically sound?
Project costs	Benchmarking of project costs against industry standard. Consideration for the source of costing, for example, quotes or estimates. Evidence of competitive quoting where appropriate.
Deliverability and risk	Reasonable delivery schedule. Appropriate risk assessment including mitigating actions. Applicant/contractor previous experience in delivering projects. Appropriate project governance in place and buy-in at required level (for example, Board).

#### Questions

12. Do you agree with the proposal to support feasibility studies and FEED studies into energy efficiency and deep decarbonisation technologies?
13. Do you agree with the proposed maximum feasibility study duration?
14. Do you agree with the proposed maximum FEED study duration?
15. Do you agree with the proposed assessment criteria for feasibility and FEED study applications?

### 3.5 What type of funding support should we offer?

A significant barrier identified by stakeholders in the Informal Consultation was lengthy payback periods, particularly for multinational companies with many different projects competing for the same internal funding. Length of payback period and return on investment (ROI) were the key factors determining investment selection: a sizable number commented that companies will usually only consider projects with payback periods of 2-3 years or less.

Other key barriers identified included the initial capital outlay (particularly for small firms), the fact that investments in energy efficiency were not central to the company's strategic purpose, and the disruption and cost associated with infrastructure replacement.

Based on this evidence, we considered the following funding mechanisms for the IETF:

- **Grants:** funding without any expectation it would be repaid.
- **Soft loans:** funding which is repaid over a set period. The specified interest rate and/or other aspects of the loan agreement would be on more favourable terms than that provided by the market.
- **Guarantees:** assurances, such as a sovereign guarantee, to institutions providing finance which may be called on in the event of a default on the loan repayments.
- **Equity:** Government could take a share in a Special Purpose Vehicle or Joint Venture for a specific project or provide funding to a fund manager to operate a venture capital fund with private match funding.

Table 6 considers the main advantages and disadvantages of each approach.

**Table 6 - Funding mechanisms**

Option	Advantages	Disadvantages
Grants	<p>Will address identified barriers to private investment of payback times and risks to deployment of new decarbonisation technologies</p> <p>By requiring industry match funding and by awarding funding through competition, the grant funding can promote added value</p>	<p>Do not demonstrate to investors that there is an ongoing sustainable market in energy efficiency and deep decarbonisation</p> <p>Do not return funding to government and hence cannot be used to support further projects as in a revolving fund</p>
Loans	<p>Can help demonstrate a self-sustaining market, particularly for industrial energy efficiency investments, by showing potential private investors that recipients can pay back a loan</p> <p>Government can use the funds paid back to make new investments if the Fund would be made revolving, thus magnifying the effect of the IETF</p> <p>Can help to tackle the initial outlay barrier that is experienced particularly by SMEs</p>	<p>There is little evidence that loans would be able to reduce payback periods or de-risk projects due to their relatively low economic impact compared to a grant, and to the reluctance of companies to add external debt to their balance sheets</p> <p>Some large private organisations have internal treasury functions which would provide loans for their projects, and so may not normally take loans from external sources</p>



		<p>Loan offers may take longer to be accepted by organisations than grants if they require additional approvals, for example, by boards.</p> <p>Stakeholders, in our Informal Consultation and other engagement, have not indicated that they would be willing to take a loan under the IETF, leading to a risk of low take-up</p>
Guarantees	<p>Could help underwrite some of the risks for industry when they borrow money to demonstrate new technologies</p> <p>Could help promote a sustainable private capital market for deep decarbonisation technologies through engaging third-party investors and unlocking third-party funding, improving the confidence in investing</p>	<p>Like loans, guarantees do not overcome fundamental barriers such as reducing payback periods</p> <p>Guarantees do not fit the spending profile of the IETF (to 2024). Guarantees are normally provided for long periods of time, usually 15-20 years</p>
Equity	<p>A Special Purpose Vehicle could make a difference in terms of whether a major project goes ahead or not: it can take some risk away from industry, lower the costs, leverage in private capital, and shows a strong government commitment to the success of the project</p> <p>Could lead to returns to government in the form of a dividend, or through sale of the stake</p>	<p>The IETF does not fit the investment profile of equity (start-up companies who need equity injections to demonstrate new technologies): mature companies at later investment stages tend not to look for equity from government as a means of support</p> <p>Early stage SMEs looking to demonstrate clean technologies and in need of pre-series A or series A investment will be able to engage with the Clean Growth Fund</p>

### 3.5.1 Our Proposal

We propose that the IETF offer grant funding for both energy efficiency and deep decarbonisation projects. This approach was supported by many stakeholders in the Informal Consultation. It is also supported by evidence from stakeholders and other evidence on the nature of barriers to investment, such as surveys of businesses' perceptions of barriers.

We propose that Phase 1 is delivered exclusively through grants to ensure simplicity and quick implementation. For Phase 2, we plan mainly to offer grants, but are considering offering a small proportion as loans. The IETF could offer low-to-zero interest loans on a pay-as-you-save basis to certain energy efficiency projects that could pay back relatively quickly. Using loans would help with building a sustainable market for debt financing of energy efficiency investments and ensure maximum value for money. Examples of BEIS using loans in this policy area include the Salix Energy Efficiency Loan Scheme, which provides interest-free Government funding to the public sector to install energy efficient technologies, and HNIP, which provides a proportion of its finance for new heat networks in the form of loans.

This approach is unlikely to work for deep decarbonisation projects. This type of investment generally faces higher operational costs (for example, carbon capture or replacing natural gas as a fuel with hydrogen), which makes it difficult to create a revenue stream allowing the loan to be paid back.

We would like to better understand if, and under what circumstances, energy efficiency investments could benefit from a loan, and whether a loan scheme could provide any added value above existing provision in the private financing market.

We would also like to understand how specific projects could benefit from the combination of different Government support schemes, including the IETF. For example, certain projects could look for a guarantee from government to help underwrite some of the risks when they borrow money to demonstrate new technologies, through existing government programmes such as the UK Guarantee Scheme. We welcome views on how IETF support could work in conjunction with existing Government programmes to maximise the effectiveness of support for specific projects.

## **Questions**

- 16. Which of the funding mechanisms above do you prefer for energy efficiency projects?**
- 17. Would you like us to consider other potential funding mechanisms for energy efficiency projects?**
- 18. Which of the funding mechanisms above do you prefer for deep decarbonisation projects?**
- 19. Would you like us to consider other potential funding mechanisms for deep decarbonisation projects?**
- 20. What type of energy efficiency projects would be suitable for a Government loan?**
- 21. What value could an IETF loan scheme add to private provision of loans?**

## 4. Delivery of the Fund

### 4.1 Phasing of the scheme

We plan to deliver the IETF in two phases. A small portion of the Fund will be delivered in the first phase (up to £30 million), while the rest of the Fund will be delivered in the second.

By delivering the IETF in multiple phases we will be able to launch a first round of funding quickly, reflecting the Government's understanding that industry needs immediate support with energy efficiency projects and developing deep decarbonisation measures.

Phase 1 will provide us with lessons so we can deliver the main scheme through Phase 2 as effectively as possible.

#### Phase 1

We are planning to launch the first phase of the IETF with application guidance in spring 2020 and open for applications in summer 2020 with a budget of up to £30 million. We will support a small number of energy efficiency projects and feasibility/FEED studies for both energy efficiency and deep decarbonisation projects. The timeline for launching Phase 1 reflects stakeholder feedback showing a desire for the IETF to launch as soon as possible. Furthermore, deep decarbonisation technologies are not as mature as energy efficiency and responses to our Informal Consultation suggested that the development of these projects takes longer. We believe there are several benefits to this approach:

- We could start supporting energy efficiency projects quickly whilst also supporting the early development of deep decarbonisation measures (for example, hydrogen fuel-switching or carbon capture usage and storage). This is in-line with our overall Fund objectives.
- Early deployment of energy efficiency measures will deliver bill and carbon savings quickly.
- Running the IETF in multiple phases and funding feasibility/FEED studies will allow industry and stakeholders to prepare for the main scheme and familiarise themselves with our application guidance and processes.
- We will be able to test the processes, procedures and criteria that we use to manage the Fund. We learn from this for the second phase of the IETF. Given the limited amount of time between Phase 1 and Phase 2, we envisage that the learning will largely be about the processes, particularly the application process, that we use in the running of the Fund.

We actively encourage bids for feasibility and FEED studies. As well as delivering benefits by deploying energy efficiency technologies, we wish Phase 1 to develop the pipeline of projects for Phase 2.

#### Question:

- 22. Do you agree with the proposal for Phase 1 to fund energy efficiency projects and feasibility/FEED studies for both energy efficiency and deep decarbonisation?**

#### Phase 2

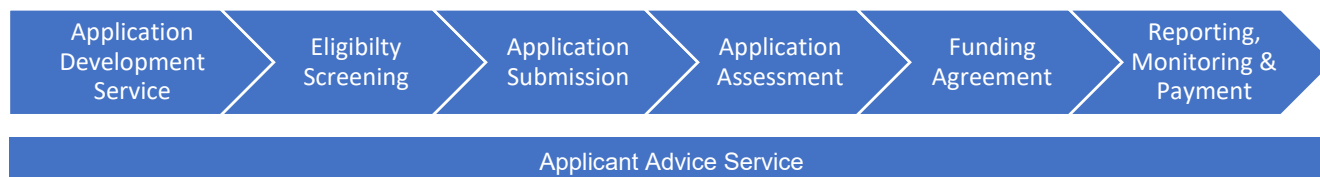
The second phase over the period 2021 to 2024 will be worth around £285 million. Support will be provided for energy efficiency projects, feasibility/FEED studies and deep decarbonisation projects. See Sections 4.2 and 4.3 for further detail on Phase 2.

## 4.2 Application process

We are aiming to keep the application and award process as simple as possible, while also ensuring that the IETF delivers value for money.

The process will be similar to that used by many other funding programmes run by BEIS and the Devolved Administrations (see Figure 7).

**Figure 7 - An overview of the proposed IETF application and funding process**



Potential applicants will have access to an advice service to answer any questions they may have about their applications or the IETF. Successful applicants will continue to have access to an advice service for the duration of their funding agreement. BEIS may also appoint a delivery body to carry out functions on its behalf.

### Application Development Service

We are also considering providing a more intensive application development service that could give applicants more detailed advice and support to guide them through the application process and to improve the quality of their applications. Individuals involved in providing this support would not be involved in making final decisions on the eligibility of applications or in assessing applications.

### Eligibility screening

This step will identify projects that are eligible for IETF funding. By ensuring that ineligible projects are identified prior to submitting a full application, we will minimise unnecessary work for applicants and IETF assessors.

The precise form of this process will depend on the final eligibility criteria that are adopted (as discussed in Section 3.2). We intend it to be either:

1. A self-assessment tool to be completed by potential applicants, with little or no direct intervention by an IETF assessor.
2. An IETF assessor determining whether the project is eligible, judging basic information about projects submitted by applicants.

### Application submission

Applicants who pass the eligibility screening will be invited to submit a full application for IETF funding.

The format and content of the application form may vary depending on the type of project that the IETF is being asked to fund and/or the amount of funding that is being requested.

An Application Guidance document will be published well in advance of the IETF opening for applications. A support service will be available to answer questions from potential applicants, and a list of Frequently Asked Questions (FAQs) will be published on the IETF webpage.

## Application assessment

All eligible applications will be scored and ranked based on a set of pre-determined criteria (see Section 4.3). These assessments will be undertaken by individuals with appropriate qualifications and experience.

The final assessment criteria will be published in the Application Guidance document.

The assessors will prepare reports with their assessment and scoring of each application, along with their recommendations for which projects should be funded. These reports will be submitted to an investment panel, which will make the final judgment as to which projects will receive IETF funding, how much funding they should receive (this may differ from the amount applied for), and other terms and conditions attached to the funding.

The composition of the panel will be determined later and will depend partly on which organisation is responsible for delivering the IETF, though it will contain at least one BEIS representative.

Unsuccessful applicants will be notified of the panel's decision and receive feedback on their applications.

There will be a decision review process whereby unsuccessful applicants can request a review of the assessment and decision-making process.

## Grant Funding Agreement

Successful applicants will receive a Grant Award Letter and be asked to sign a Grant Funding Agreement. The latter will include the detailed terms and conditions attached to this funding, including eligible expenditure, monitoring and reporting requirements, and milestones to be achieved in order to receive payment of grant instalments.

## Monitoring & reporting

Successful applicants will be required to submit regular reports to BEIS or the delivery body. This information will be subject to financial and techno-economic assessment. Applicants will need to demonstrate that their project has met certain conditions, including compliance with the Grant Funding Agreement, project milestones, and that it remains on track to deliver the intended benefits.

Grants will be paid in instalments. The terms and conditions that need to be met for instalments to be paid will be included in the Grant Funding Agreement. BEIS and/or any delivery body will determine whether a project is compliant with these terms and conditions and whether to approve the release of funds. Failure to comply with the terms of the Grant Agreement could result in grant instalments being withheld and/or initiate a process to recoup any payments already made.

## Application windows for Phase 1 and Phase 2

We propose having distinct application windows for Phase 1 and Phase 2 of the IETF.

Phase 1 will likely have a single application window, **opening in summer 2020** and closing a few months later.

For Phase 2 we propose either:

1. A single continuous application window opening in **2021** that will remain open until all funds have been allocated. Applications would be batched and assessed at regular intervals throughout this period.
2. Multiple application windows lasting several months each, with the first one opening in **2021**.

## Questions

- 23. Do you support the proposal to have an Application Development Service to provide potential applicants with detailed advice and support? Please outline your reasons for your answer and, if you agree, outline specific issues on which you think potential applicants would require such support.**
- 24. Do you support Phase 2 having a single application window or multiple application windows?**
- 25. If you support multiple application windows, how long do you think each window should be, and why?**

## Funding allocation

We propose to award funding to projects on a competitive basis.

For Phase 1, all applications will be assessed, scored, and ranked against each other at the end of the application window.

For Phase 2, if there are multiple application windows, all applications received within a window will be assessed, scored, and ranked against each other at the end of that window. If there is a single application window, firms will be able to apply at any time, and submitted applications will be periodically batched and assessed, scored, and ranked against each other.

In both phases, the highest ranked applications within each application window or assessment batch will be awarded funding. The cut-off point for projects that will receive funding may vary between application windows depending on the quality of applications received, the amount of funding available during that period, and the amount of funding requested by applicants. Applications which fail to make the cut-off for funding during an application window may re-apply to be considered in the next one.

## 4.3 Project assessment criteria

The assessment criteria will be used to score applications, to determine which applications will be successful for funding.

Our recommendations for detailed assessment criteria for energy efficiency projects are outlined in Table 7 below:

**Table 7 - Proposed assessment criteria for Phase 1 and Phase 2 energy efficiency projects**

Assessment criteria	Description
<b>Additionality and cost-effectiveness</b>	<ul style="list-style-type: none"> <li>• Proportional assessment based on costs / benefits of the project</li> <li>• Costs including capital, operational and ongoing maintenance</li> <li>• Benefits including the reduction in energy bills and GHG emissions due to increased efficiency</li> <li>• Evidence that the project would not have gone ahead without support of the IETF</li> </ul>
<b>Project overview and technical feasibility</b>	<ul style="list-style-type: none"> <li>• Overview of the project / technology</li> <li>• Assessment of the clarity of the technical feasibility of the project</li> <li>• Robustness of estimated financial / GHG emissions savings</li> <li>• Energy saving monitoring plan</li> <li>• Whether the project could be replicated by others in the sector and is scalable</li> <li>• Project(s) are compatible with and contribute to a trajectory to net zero</li> </ul>
<b>Project costs</b>	<ul style="list-style-type: none"> <li>• Benchmarking of project costs against industry standard for the sector</li> <li>• Consideration for the source of costing, for example, quotes or estimates</li> <li>• Evidence of competitive quoting where appropriate</li> </ul>
<b>Deliverability and risk</b>	<ul style="list-style-type: none"> <li>• Appropriate project delivery schedule and key milestones</li> <li>• Assessment of risk including mitigating actions</li> <li>• Applicant / contractor previous experience in delivering projects</li> <li>• Appropriate project governance in place and buy-in at required level (for example, Board)</li> </ul>

Proposed assessment criteria for Phase 2 deep decarbonisation projects are outlined below:

**Table 8 - Proposed assessment criteria for Phase 2 deep decarbonisation projects**

Assessment criteria	Description
<b>Additionality and cost-effectiveness</b>	<ul style="list-style-type: none"> <li>• Proportional assessment based on costs / benefits of the project.</li> <li>• Costs including capital, operational and ongoing maintenance.</li> <li>• Reduction in GHG emissions and carbon intensity</li> <li>• Evidence that the project would not have gone ahead without support of the IETF</li> </ul>
<b>Technical concept and feasibility</b>	<ul style="list-style-type: none"> <li>• Engineering concept and commercialisation</li> <li>• Overview of the project / technology</li> <li>• Assessment of the clarity of the technical feasibility of the project</li> <li>• Robustness of estimated GHG emissions savings</li> <li>• Whether the project could be replicated by others in the sector and is scalable</li> </ul>
<b>Deliverability and risk</b>	<ul style="list-style-type: none"> <li>• Reasonable project delivery schedule</li> <li>• Appropriate risk assessment including mitigating actions</li> <li>• Applicant / contractor previous experience in delivering projects</li> <li>• Appropriate project governance in place and buy-in at required level (for example, Board)</li> </ul>
<b>Transformational</b>	<ul style="list-style-type: none"> <li>• Whether the project could be replicated by others in the sector and is scalable</li> <li>• Resilience of the project to different industrial decarbonisation pathways</li> <li>• Project(s) are compatible with and contribute to a trajectory to net zero</li> </ul>



In addition to the above assessment criteria, applicants will be asked to provide evidence that State Aid rules are met.

Applications will be required to meet minimum 'pass' scores for each of the assessment criteria. Weighting factors may be applied to key assessment criteria, such as deliverability and risk and cost-effectiveness.

We seek feedback on the initial assessment criteria set out in Table 7 and Table 8. The final assessment criteria for Phase 1 will be set out in the guidance for Phase 1, which will be published in spring 2020.

Because of the complex technical and commercial nature of industrial decarbonisation projects, we recognise it may be necessary to further review and refine these criteria ahead and during Phase 2, to incorporate lessons from Phase 1 and ensure we are giving fair treatment to all projects that could help meet the objectives of the IETF. We will ensure all interested parties are made aware of any changes to the criteria and we encourage stakeholders to engage with us on how they could be improved.

## **Additionality**

Additionality is the extent to which an activity is undertaken on a larger scale, takes place at all, or earlier, or within a given geographical area as a result of the intervention. Thus, an impact arising from an intervention is additional if it would not have occurred in the absence of the intervention.

An intervention is defined as being any project, programme or policy that is implemented or supported by the public sector in order to achieve its objectives.

Source: English Partnerships, Additionality Guide, 2014. Available at:

<https://www.gov.uk/government/publications/additionality-guide>

## **Questions**

- 26. Do you agree with the proposed assessment criteria for energy efficiency projects?**
- 27. Do you agree with the proposed assessment criteria for deep decarbonisation projects?**
- 28. Please suggest the types of evidence that would help to prove the additionality of a given project at application stage.**

## 4.4 Evaluation, monitoring and reporting

BEIS is committed to building an evidence base at all stages of the policy cycle in order to monitor the delivery of scheme benefits and progress against objectives.

Lessons learned through monitoring and evaluation will be incorporated into future scheme design and may be used for other policies.

Our evidence base will incorporate:

- Regular data collection and analysis to establish what the scheme is delivering.
- Research to establish how and why patterns observed through monitoring occur.
- Evaluation of scheme impacts.

We are proposing that applicants provide BEIS with information when they bid for funding and at regular milestones, so that BEIS can understand the impacts of the scheme on participants and industry as a whole. We propose that we use this data as part of our monitoring and evaluation workstream and to inform future relevant policies, as well as in assessing eligibility and compliance.

### Questions

- 29. What topics would you find it useful for BEIS to investigate through any monitoring and evaluation, to develop more effective policy to deliver the objectives of the IETF?**
- 30. Do you have any views on how the IETF can encourage the sharing of knowledge of energy efficiency and deep decarbonisation measures between organisations?**

## 5. Analysis of potential impacts of the IETF

### 5.1 Introduction

There are a broad range of potential impacts that the IETF could have whilst supporting industry to improve its energy efficiency and transition to net zero.

Respondents to our Informal Consultation supported the idea that the IETF should fund both deep decarbonisation and energy efficiency projects. There are a variety of benefits associated with supporting each type of project. We have conducted analysis on this, presented below.

#### Benefits

The projects supported by the IETF could be capital spending or feasibility/FEED studies for energy efficiency or decarbonisation projects. Each type of project will have a different mix of benefits, some of which are quantifiable and some of which need qualitative assessment. Table 9 summarises the types of benefits associated with each type of project.

**Table 9 - Summary of benefits associated with each type of project**

Type of project supported	Direct effect	Direct benefits	Future benefits
<b>Energy efficiency technology deployment</b>	Greater investment in energy efficiency of industrial processes	Lower energy bills & emissions  Air quality benefits  Productivity improvements  Health	Reduced cost of production / increased competitiveness for supported firms
<b>Energy efficiency feasibility/FEED studies</b>	Greater number of energy efficiency feasibility/FEED studies conducted	More energy efficiency projects in the pipeline  De-risking of energy efficiency investments	Greater future investment in industrial energy efficiency  Lower energy bills & emissions
<b>Deep decarbonisation technology deployment</b>	Greater investment in decarbonisation of industrial processes	Lower carbon emissions  De-risking of decarbonisation technology	Reduced cost of decarbonisation technology  Greater future investment in decarbonisation

<b>Deep decarbonisation feasibility/FEED studies</b>	Greater number of deep decarbonisation feasibility/FEED studies conducted	More deep decarbonisation projects in the pipeline  De-risking of future decarbonisation projects	Greater future investment in decarbonisation  Lower carbon emissions
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We can assess the benefits of energy efficiency deployment projects quantitatively, by valuing reductions in energy bills, carbon emissions and air pollutants to provide a monetary value for the impact of investment. The other types of projects have different benefits, which are better expressed qualitatively. There are wider benefits in delivering feasibility and FEED studies, not least securing a good quality project pipeline for deployment. In future, this should translate into increased investment in industrial energy efficiency, lower energy bills and lower carbon emissions.

The most important benefit of deep decarbonisation projects is the overall reduction in carbon emissions. In addition, funding more decarbonisation deployment projects will help to reduce the risk to further investment in the future, as it increases knowledge of how these technologies work on site and reduces the overall future risk and cost of the investments. This should result in more decarbonisation investment, and lower carbon emissions. Delivering feasibility and FEED studies for decarbonisation projects will help secure a good quality pipeline for future deployment. This should increase decarbonisation investment in the future and result in fewer industrial emissions.

## 5.2 Decarbonisation technology impacts

Moving to net zero greenhouse gas emissions for the UK requires transformation across all sectors of the economy and unprecedented levels of investment in green and low carbon technologies. This transition can transform existing industries and provide opportunities for new ones. Whilst cutting energy costs and emissions in the near-term will help UK industry to remain competitive, bringing down the costs and risks of deep decarbonisation technologies is essential to help achieve our net zero emissions target by 2050.

There are a large variety of decarbonisation projects which IETF could support, these could involve hydrogen, carbon capture, electrification and bio-energy projects. The costs and benefits of these projects vary significantly depending on the decarbonisation technology chosen, the specific conditions of the site and the available local sources of energy.

### **Box 1: Fuel Switching Potential in the Food and Drink Sector**

The Food & Drink sector is a key UK industry sector, accounting for £28 billion of UK GVA and 400,000 direct jobs in 2016. It is also highly diverse with significant numbers of SMEs, which are widely distributed across the UK.

This sector uses energy for a diverse set of processes, including drying, baking, chilling, pasteurisation and distillation. Many of these can be categorised as ‘low temperature heat’ or ‘drying’ processes, both often driven by low pressure steam. 66% of energy use in the food and drink sector is natural gas. Of the energy consumed by the sector, 54% of the demand is from boilers and 27% from direct heating.

The primary option for switching the fuels for low temperature heat and drying processes is replacing the natural gas in boilers with a low carbon alternative. Using heat pumps could also support the decarbonising of low temperature processes. The IETF could help companies to install these technologies to reduce their carbon emissions.

Carbon savings could be delivered from bio-energy projects in this sector, providing it is sustainably sourced or heat pumps deliver appropriate performance levels. Projects could deliver bill savings, provided companies can source low cost fuel, and/or deliver technologies with high levels of performance.

Alternative decarbonisation projects the IETF could support in this sector include electric ovens for drying, boiling and baking; mechanical vapour recompression; and ultraviolet pasteurisation or sterilisation and infrared for heating.

Further detailed analysis of technologies and illustrative impacts can be found in the report by Element Energy and Jacobs on “Industrial Fuel Switching, Phase 1”.

Source: <https://www.gov.uk/government/publications/industrial-fuel-switching-to-low-carbon-alternatives>

The IETF may also fund some technologies which are not yet ready for deployment at scale on a commercial basis, such as industrial carbon capture and fuel-switching to low-carbon hydrogen. These may benefit from economies of scale through deployment in a cluster setting. Funding the demonstration at scale and early deployment of these technologies will bring deep decarbonisation within reach for the wider UK industry, so it can take advantage of the economic opportunities arising from clean growth.

## **5.3 Energy efficiency capital deployment cost benefit analysis**

This section outlines a quantitative analysis of the benefits associated with Government investment in the deployment of capital for industrial energy efficiency. The analysis presents an illustrative scenario of IETF investment in energy efficiency capital and compares the benefits with costs to provide an overview of the overall impact to society.

This analysis is conducted on a social basis, so costs and benefits to the Government, the public, and business are considered.

## Overview of Method

We have conducted modelling using BEIS Industrial Pathway Models (IPMs)<sup>33</sup> outputs to establish a package of energy efficiency projects that would create energy and carbon savings across a range of different fuels. These projects should be additional to energy efficiency measures that are forecast to be completed without additional Government support in the Energy and Emissions Projections (EEP) forecast model.<sup>34</sup> The largest three sectors in terms of TWh savings are: Other Manufacturing Industries (including manufacture of vehicles and textiles),<sup>35</sup> Paper & Pulp, and Iron & Steel.

There remains a decision to be made on the amount of capital attributed to each type of project. A certain amount of funding will be for energy efficiency deployment projects in Phase 1 of the scheme, whilst the remainder will be split between energy efficiency and decarbonisation projects in Phase 2.

## Illustrative Scenario Analysis

There are several benefits from supporting the deployment of capital on energy efficiency that can be quantified through economic modelling. As an exact funding split for the IETF has not been settled, this analysis will outline the range of likely benefits that BEIS could achieve by funding £150 million worth of projects, quantifying where these benefits would accrue. This information could be used to help inform any decisions to split funding between the different categories of project.

The illustrative scenario assumes a project mix across all industrial sectors. Summarising the average impacts of projects across these sectors provides us with a central estimate of ~£100 million capital investment saving 1TWh of energy. However, there would be some subsequent *increases* in energy use due to increases in output because of lower total energy requirements (the 'rebound' effect). Also, switching from high carbon fuels to lower carbon fuels such as natural gas could cause changes to net energy savings whilst producing significant bill savings for the business concerned.

The IETF will support energy efficiency projects additional to the EEP baseline. One effect will be to bring some deployment projects forward, in some cases significantly, as well as projects which would never have been taken forward without IETF investment. IETF funding will bring forward the benefits achieved by energy efficiency projects, both energy and carbon savings, enabling beneficiary firms to increase their competitiveness and decarbonise more quickly.

For the purposes of this analysis, it has been assumed that IETF funding support will represent around 30% of the total capital expenditure on supported energy efficiency projects, that is, it will leverage another ~£230 million capital expenditure for every £100 million of IETF funding.<sup>36</sup> It has also been assumed that as they save money through energy efficiency measures, firms will opt to increase their production.<sup>37</sup>

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<sup>33</sup> Evidence from the Government's 2050 Industrial Decarbonisation and Energy Efficiency Roadmaps, published in 2015, was incorporated into the modelling; in particular the timing and extent of technologies deployed before 2025. Available at: <https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050>

<sup>34</sup> BEIS, Energy and Emissions Projections. Available at: <https://www.gov.uk/government/collections/energy-and-emissions-projections>

<sup>35</sup> Other industry consists of variety of sectors including but not limited to plastics, vehicle manufacturing and textiles.

<sup>36</sup> EU State aid regulation generally restricts Government grant support to a maximum of 30% for technology deployment projects. The illustrative scenario assumes the remaining 70% is leveraged private investment.

<sup>37</sup> BEIS illustrative rebound effect – derived from internal calculations.

The results of the lifetime cost-benefit analysis corresponding to the illustrative scenario are presented below in Table 10. The social NPV is £1.7 billion using the central estimates for fuel and carbon prices outlined in the Green Book supplementary guidance for valuing energy use and greenhouse gas emissions.<sup>38</sup>

**Table 10 - Summary of Cost Benefit Analysis**

Summary of Cost Benefit Analysis	
Social NPV (£bn)	£1.7bn
Non-Traded Carbon Cost Effectiveness (£/t)	-£363/t

Table 11 shows a breakdown of the CBA results for every £150 million spent on energy efficiency capital deployment, illustrating potential costs and benefits, and briefly describes each impact. The costs and benefits have been discounted to take account of social time preference and additionality using standard Green Book methodology.<sup>39</sup> While increasing energy efficiency funding would increase total quantified benefits, it would also decrease the qualitative benefits discussed in Table 9 from Feasibility/FEED studies and decarbonisation projects.

Carbon savings are derived from fuel savings using BEIS Green Book emissions factors. These are valued differently dependent on whether they are part of the EU Emissions Trading System (EU ETS) or not.<sup>40</sup> Emissions in the traded sector (those covered by the EU Emission Trading System) are valued using traded carbon values, whereas changes in emissions in the non-traded sector (those outside the EU ETS) are valued using non-traded carbon values.

<sup>38</sup> BEIS, 2019, Valuation of Energy Use and Greenhouse Gas. Available at:

<https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

<sup>39</sup> HMT, 2018, The Green Book. Available at: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

<sup>40</sup> BEIS, 2019, Guidance: Participating in the EU ETS. Available at: <https://www.gov.uk/guidance/participating-in-the-eu-ets>

**Table 11 - Central Scenario CBA - Breakdown**

2019 prices, discounted to 2020	Brief Description	Illustrative impact
Capital cost (£m)	Government and private spending on capital measures	-£220m
Running Costs Savings (£m)	Reduction in running costs (including fuel bill savings)	£710m
'Rebound Effect' (£m)	Increase in societal gain from increased production enabled by reduction in energy bills	£470m
Traded Carbon Savings (£m)	Quantified carbon savings that can be traded in the EU ETS	£270m
Non-Traded Carbon Savings (£m)	Quantified carbon savings that cannot be traded in the EU ETS	£280m
Air Quality Improvements (£m)	Quantified air quality improvements through less use of polluting fuels	£230m
<b>Total (£bn)</b>	<b>Sum of costs and benefits</b>	<b>£1.7bn</b>

Table 12 displays the potential Carbon Budget 5 savings that can be achieved through IETF funding £150 million of industrial energy efficiency deployment projects.

**Table 12 - Carbon Savings<sup>41</sup>**

	Carbon Budget 5 period (MtCO <sub>2</sub> e, 2028 to 2032)
Traded Savings (MtCO <sub>2</sub> e)	0.9
Non-Traded Savings (MtCO <sub>2</sub> e)	0.8
Carbon Budget 5 – Total Savings (MtCO <sub>2</sub> e)	<b>1.7</b>

Energy efficiency projects within scope of the IETF (for example, waste heat recovery, improvements to refrigeration, and high efficiency heat exchangers) could pay back within 3.4 years without support. The presence of support from IETF could reduce this to 2.4 years, meaning that they pay back more quickly, making them more attractive for companies who have competing priorities for investment.

<sup>41</sup> Figures may not exactly sum to total due to rounding.



**Table 13 - Key Industry Impacts**

Key Industry Impacts (undiscounted 2019 prices)	
Industry Bill Savings (£m)	£180m
Government Capital Expenditure (£m)	£150m
Private Capital Expenditure (£m)	£350m
Average Payback in 2030 <sup>42</sup> (years)	3.4
Average Industry Payback in 2030 <sup>43</sup> (years)	2.4

In addition to the quantified costs and benefits from energy efficiency deployment projects outlined above, the IETF will also generate substantial non-monetised benefits. Funding FEED/feasibility studies will increase the number of energy efficiency projects in the pipeline, leading to greater future energy efficiency investment and lower future energy bills and carbon emissions. Funding decarbonisation projects will increase the number of decarbonisation projects in the pipeline, reduce the risk associated with decarbonisation projects, increase industrial decarbonisation investment, and lower carbon emissions.

## 5.4 Sensitivity analysis of key assumptions

The amount of carbon and bill savings supported by the IETF will depend heavily on the types of project that apply for IETF funding. We will closely monitor the impact of funding projects (see Section 4.4), to ensure that the programme meets its objectives, and delivers the types of benefits outlined above.

There are several key assumptions regarding the delivery of the scheme and the wider technical and economic context which will affect the costs and benefits. Table 14 illustrates the key areas of uncertainty and some plausible ranges of action which could occur. Figure 8 summarises the impact which this has on the Net Present Value of the scheme. The project mix sensitivity illustrates the change in benefits from narrowing sector eligibility. A wider scheme (allowing bids from both energy-intensive and other companies) shows higher benefits. This is because less energy-intensive companies have faced less pressure to become more energy efficient, and evidence suggests there is greater potential for low-cost improvements in these sectors.

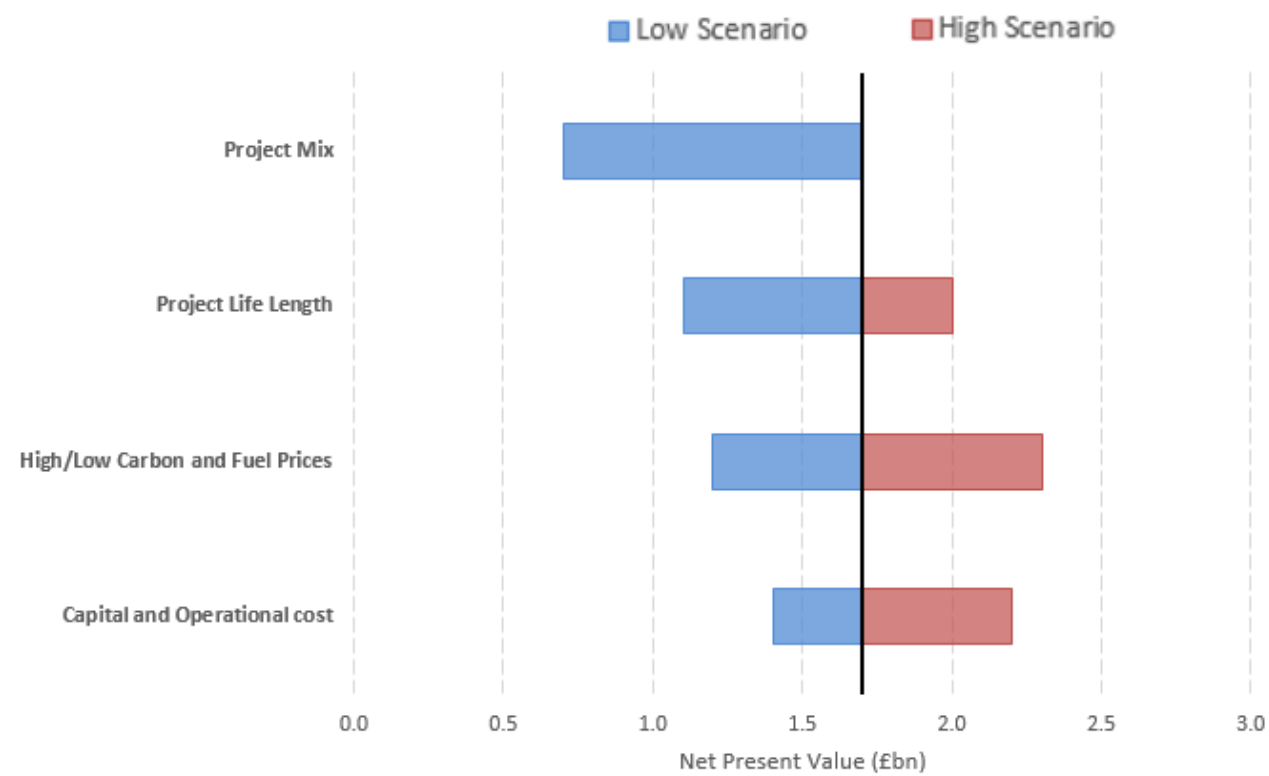
<sup>42</sup> Simple payback = [total capex spent / (total bill savings - operational expenditure)] in 2030.

<sup>43</sup> Industry payback = [industry capex spent / (total bill savings - operational expenditure)] in 2030.

**Table 14 - Key Assumptions and Net Present Value (£bn) Sensitivities**

Assumption type	Criteria	Low Scenario	High Scenario
Capital and Operational cost	Low = 20% higher costs  Central = No adjustments made to capital and operational cost  High = 20% lower costs	£1.4bn	£2.2bn
High and Low Carbon and Fuel Prices	Low = “Low” carbon and fuel price estimates used  Central = “Central” carbon and fuel prices used  High = “High” carbon and fuel price estimates used	£1.2bn	£2.3bn
Project Life Length	Low = 15-year average project life length  Central = 25-year average project life length  High = 30-year average project life length	£1.1bn	£2.0bn
Project Mix	Low = Project sector mix narrowed to exclude ‘Other Manufacturing Industries’  Central = All sectors included in project mix	£0.7bn	

Figure 8 - Net Present Value (£bn) Sensitivity to Scenarios



## 6. Interactions with other BEIS decarbonisation policies

Under existing law, State Aid provided by Government funds or policies may not breach maximum aid intensities. Any grant from the Fund must therefore take account of aid already provided through other schemes.<sup>44</sup> The Fund aims to provide grants for projects that would not otherwise happen, ensuring additionality and value for money.

**Table 15 – IETF interaction with BEIS decarbonisation policies<sup>45</sup>**

Policy	Proposed interaction with the IETF
<p><b>The EU Emissions Trading System (EU ETS)</b> – EU wide scheme for trading greenhouse gas emissions allowances. There is a cap on the total emissions allowed within the scheme, and companies regulated by the scheme are provided with allowances that add up to the cap.</p> <p>The UK Government is currently looking at options to replace the EU ETS after the UK leaves the EU. The successor scheme will aim to be as ambitious as the EU ETS.<sup>46</sup></p>	<p>The ETS and IETF will work in tandem to incentivise companies to invest in energy efficiency and decarbonisation projects.</p> <p>Energy efficiency and decarbonisation projects could reduce the number of ETS allowances that companies need to purchase in order to comply with the scheme.</p>
<p><b>Industrial Clusters Mission</b> - Aims to establish the world's first net zero carbon industrial cluster by 2040 and at least one low-carbon cluster by 2030.</p>	<p>The IETF will support the Mission and may provide funding for deployment of decarbonisation technologies in a cluster setting.</p>
<p><b>Industrial Decarbonisation Challenge</b> – Up to £170 million of ISCF funding has been allocated to kick-start the delivery of the Industrial Clusters Mission. This will support the delivery of projects that can help to decarbonise an industrial cluster, as well as planning and research activity.</p>	<p>The IETF will work closely with the ISCF and UK Research and Innovation (UKRI), which is developing a competition for this funding. Both funds are currently in the design phase and need to coordinate as plans develop. If feasible, the funds could potentially jointly fund strategically significant decarbonisation projects.</p>
<p><b>Climate Change Agreements (CCAs)</b> – encourages improvements in energy efficiency across 53 industrial sectors, in return for significant discounts on the Climate Change Levy (CCL), a tax on non-domestic energy use.</p>	<p>The scheme provides discounts to March 2023, based on meeting scheme obligations to December 2020. IETF projects are unlikely to affect firms' performance against current targets, as they will not begin until the second half of 2020. BEIS will aim to avoid overlaps between the IETF and any future CCA incentives, which will be informed by an ongoing evaluation.</p>

<sup>44</sup> See Chapter 8 (State Aid) for further information

<sup>45</sup> Policies have different geographical scopes within the UK

<sup>46</sup> BEIS, 2019, The Future of UK Carbon Pricing. Available at: <https://www.gov.uk/government/consultations/the-future-of-uk-carbon-pricing>

<p><b>Industrial Heat Recovery Support Programme (IHRS)</b> – The IHRS programme is an £18 million grant funding programme designed to encourage and support investment in heat recovery technologies in the manufacturing sector and data centres.</p>	<p>The IETF could support similar technologies to the IHRS.<sup>47</sup> The IHRS is smaller scale and due to finish spending in March 2022. Companies seeking support for larger industrial heat recovery technologies or support after this date could apply to the IETF.</p>
<p><b>BEIS Innovation Funds for Low Carbon Industry</b><sup>48</sup> (including the Industrial Energy Efficiency Accelerator and the Industrial Fuel Switching competition).</p>	<p>As these funds offer support for decarbonisation technologies at a lower TRL level,<sup>49</sup> successful projects could help to form a pipeline of projects that might apply to the IETF for additional funding.</p>
<p><b>Heat Networks Investment Project (HNIP)</b><sup>50</sup> - HNIP is a BEIS scheme designed to create the conditions for a self-sustaining heat networks market that contributes to the decarbonisation of the UK energy system by 2050.</p>	<p>Technologies developed with the support of IETF may be of benefit to heat networks in the longer term. For example, by facilitating carbon reductions in energy centres or industrial heat loads.</p>
<p><b>Hydrogen and Carbon Capture Usage and Storage (CCUS) Business Models</b> – According to the CCC, development of hydrogen and CCUS is likely to be integral to the delivery of the Department's strategic priorities and long-term climate goals.</p>	<p>BEIS has a consultation seeking views on potential new business models for CCUS open until 16<sup>th</sup> September 2019. IETF could look to de-risk these technologies as they form a key part of the net zero pathway set out by the CCC.<sup>51</sup></p>
<p><b>Policy support to incentivise the deployment of efficient Combined Heat &amp; Power (CHP).</b> These include tax exemptions from the Climate Change Levy and Carbon Price Support and subsidies for biomass-fuelled CHP such as the Renewable Heat Incentive (RHI) and Contracts for Difference.<sup>52</sup></p>	<p>Funding biomass and bioenergy projects will be in scope for the IETF.<sup>53</sup> However, RHI rules do not allow RHI recipients to receive public grants from other sources unless the other grant is paid back first. Therefore, biomass and CHP projects which receive IETF grants will not be eligible for the RHI unless they pay back the IETF grant.</p>
<p><b>Clean Steel Fund</b> – This new £250 million Fund will help support the steel industry onto a pathway to decarbonisation. A call for evidence has been issued to understand</p>	<p>The Clean Steel Fund is likely to launch later in the 2020s and will look to coordinate support with the IETF. The Clean Steel Fund could support decarbonisation, energy and material efficiency projects. Responses to</p>

<sup>47</sup> See Section 3.3 (Technologies the Fund should support) for further detail

<sup>48</sup> The various BEIS funds set up to support low carbon industrial innovation can be found here:

<https://www.gov.uk/government/collections/funding-for-low-carbon-industry>

<sup>49</sup> See Section 3.3 (Technologies the Fund should support) for further detail

<sup>50</sup> BEIS, 2019, HNIP overview and how to apply. Available at: <https://www.gov.uk/government/collections/heat-networks-investment-project-hnip-overview-and-how-to-apply>

<sup>51</sup> See Section 3.3 (Technologies the Fund should support) for further detail

<sup>52</sup> BEIS, 2019, Guidance: Combined Heat and Power Incentives. Available at: <https://www.gov.uk/guidance/combined-heat-and-power-incentives>

<sup>53</sup> See Section 3.3 (Technologies the Fund should support) for further detail

the needs of the steel sector and to help develop the design of the IETF.	<p>the BEIS call for evidence will help shape what the Fund focuses on.</p> <p>Steel companies will still be able to apply to the IETF.</p>
<b>Low Carbon Hydrogen Production (LCHP) Fund</b> - This new £100 million Fund will support the commercial scale demonstration and deployment of LCHP at scale. BEIS intends to consult on the design of this fund in 2020.	If feasible, the IETF and the Low Carbon Hydrogen Production Fund could jointly fund strategically significant projects that extend across the whole hydrogen chain e.g. the LCHP Fund would support Hydrogen production while the IETF would support its use in industrial processes. Responses to the planned consultation will help shape the focus of the LCHP Fund.

## Questions

31. Do you agree with the proposed interactions between other decarbonisation policies and the IETF?
32. Is your organisation affected by any decarbonisation policies not covered here? If so, what policies?

## 7. Geographic coverage of the Fund

The UK Government and Devolved Administrations have a shared interest in encouraging sustainable economic growth. Industrial activity takes place throughout the UK and plays an important role in the economy of the whole country:

- There is significant industrial activity in **Wales** accounting for approximately 14 MtCO<sub>2e</sub>, around 29% of Welsh emissions;<sup>54</sup>
- In 2016, **Scotland's** industrial sector was responsible for 11 MtCO<sub>2e</sub> (around 30% of Scottish net CO<sub>2e</sub> emissions), highlighting that investment to decarbonise industry could contribute significantly to overall climate change targets;<sup>55</sup>
- In **Northern Ireland**, emissions for industrial processes accounted for 1% (0.2 MtCO<sub>2e</sub>) share of the total, and for the business sector a 12% (2.4 MtCO<sub>2e</sub>)<sup>56</sup> share of the total in 2017.<sup>57</sup>

The Devolved Administrations are part of the governance that has overseen the development of proposals for the Fund. At this stage it is anticipated that the Fund will take applications from across the UK and assess each project on its own merits. If the proposed Fund operates outside of reserved powers, the UK Government will seek the consent of Devolved Administrations.

The geographical coverage of projects will be monitored to check whether all regions of the UK are benefitting. We will indicate to our assessment panel that we would like a good spread of geographical projects. Also, in partnership with the DAs, we will review whether our application process, assessment criteria and stakeholder outreach are generating a satisfactory breadth of projects. If any nation is under-represented, BEIS will work with the DAs to adjust the marketing and design of the Fund as necessary.

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<sup>54</sup> Welsh Government, 2019, Prosperity for all: a low carbon Wales: Industry Sector Emission Pathway. Available at: <https://gov.wales/sites/default/files/publications/2019-06/industry-sector-emission-pathway-factsheet.pdf>

<sup>55</sup> Scottish Government, 2019, Decarbonising Scotland's Industrial Sectors and Sites. Available at: <https://www.gov.scot/publications/decarbonising-scotlands-industrial-sectors-sites-paper-discussion-scottish-energy-intensive-industries/>

<sup>56</sup> NI Department of Agriculture, Environment and Rural Affairs, 2017, Northern Ireland Greenhouse Gas Emissions, 2017. Available at: <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/ghg-inventory-statistical-bulletin-2017.pdf>

<sup>57</sup> There is no combined total for industrial processes and the business sector

## 8. State Aid

### 8.1 State Aid regulation that applies to the IETF

The IETF provides financial assistance to companies which is State Aid. There are several State Aid guidelines that apply to the Fund: The General Block Exemption Regulation (GBER),<sup>58</sup> the Guidelines on State Aid for Environmental protection and Energy 2014-2020 (commonly abbreviated to EEAG)<sup>59</sup> and the Research, Development and Innovation Guidelines (R&D&I).<sup>60</sup> These guidelines set certain conditions and limits on grants provided from the Fund.

Under GBER, the Government can provide financial assistance without seeking prior approval of the scheme. The regulation covers policy areas such as energy efficiency and renewable energy. Support must comply with a number of rules, including maximum support levels per undertaking and eligible costs.<sup>61</sup> For financial assistance to companies that goes beyond the scope of the GBER, prior approval must be obtained under the EEAG or the R&D&I.

The Government will set out its position on State Aid if the UK leaves the EU without a withdrawal agreement in due course.

#### 8.1.1 State Aid implications for phased delivery of the IETF

For Phase 1 of the IETF the Government will design the scheme in accordance with the provisions of GBER. For example, the Fund will focus on technologies in scope such as industrial energy efficiency and include a maximum of €15 million per undertaking for deployment support, of €7.5 million for feasibility studies and of €15-20m for FEED studies.

For Phase 2 of the IETF the Government will seek prior approval via a formal State Aid notification. The GBER is less suitable for projects that cover deployment of deep decarbonisation technologies using CCUS, low-carbon hydrogen and electrification technologies. Subject to approval, there may be more flexibility in terms of funding levels (see Table 16) and provisions such as eligible costs and maximum Government contribution.

Aid intensities under GBER vary between 25-80% depending on activity and technology supported. The baseline aid intensities may be increased by 10 or 20 percentage points, depending on business size. There is also an uplift for assisted areas. Aid intensities may be increased by a bonus of 5 or 15 percentage points in regions recognised in State Aid regulation as being less economically advantaged that would benefit from additional support for development. For example, in the UK these Assisted Areas include parts of Wales, Northern Ireland, Cornwall, parts of North East England and North West Scotland.<sup>62</sup> Furthermore, under the EEAG, aid intensities can be increased to 100% if a competitive

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<sup>58</sup> European Commission, 2014, Commission Regulation (EU) No 651/20154. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02014R0651-20170710>

<sup>59</sup> European Commission, 2014, Guidelines on State aid for environmental protection and energy 2014-2020. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014XC0628%2801%29>

<sup>60</sup> European Commission, 2014, Framework for State aid research and development and innovation. Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52014XC0627\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52014XC0627(01))

<sup>61</sup> European Commission, 2014, Commission Regulation (EU) No 651/20154. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02014R0651-20170710>

<sup>62</sup> BIS, 2014, Introduction to Assisted Areas. Available at: <https://www.gov.uk/government/publications/state-aid-assisted-areas-introduction>



bidding process on the basis of clear, transparent and non-discriminatory criteria is undertaken.

**Table 16 – Aid intensities for different activities under GBER and EEAG/R&D&I**

Activities	Relevant State Aid framework	Baseline aid intensity	Company size uplift	Other uplifts
Feasibility and FEED studies	GBER (Article 25)	Up to 50% of eligible costs	Medium enterprises: up to an additional 10% points	Effective collaboration or wide dissemination of research results: up to an additional 15% points
	R&D&I (Paragraph 1.2)	Up to 50% of eligible costs	Small enterprises: up to an additional 20% points	
Energy efficiency projects	GBER (Article 38)	Up to 30% of eligible costs	Medium enterprises: up to an additional 10% points	Assisted areas receive up to an additional 5 or 15% depending on project location
	EEAG (Paragraph 3.4)	Up to 100% of eligible costs (1)		
- Of which Combined Heat and Power	EEAG (Paragraph 3.4)	Up to 100% of eligible costs (1)	Small enterprises: up to an additional 20% points	
Deep decarbonisation projects				
- Of which switching to biomass	GBER (Article 41)	Up to 45% of eligible costs (3)	Medium enterprises up to an additional 10% points	Assisted areas receive up to an additional 5 or 15% points depending on project location
	EEAG (Paragraph 3.3)	Up to 100% of eligible costs (1)		
- Of which switching to a lower carbon fuel (hydrogen/ electrification) (2)	EEAG (Paragraph 1.2)	Up to 100% of eligible costs (1)	Small enterprises up to an additional 20% points	
- Of which industrial carbon capture (2)	EEAG (Paragraph 3.6)	Up to 100% of eligible costs		

- (1) Up to 100% only applies for schemes with a competitive bidding process on the basis of clear, transparent and non-discriminatory criteria, approved by the State Aid regulator. Lower percentages could apply, depending on scope notification and State Aid regulator decision.
- (2) Will be part of the notification process for Phase 2.
- (3) GBER allows up to 100% for schemes with a competitive bidding process on the basis of clear, transparent and non-discriminatory criteria.
- (4) Falls within the definition of experimental development of article 25 in so far as it relates to developing new and improved processes.

### 8.1.2 Eligible costs and minimum standards

Governments cannot grant aid to help companies comply with existing EU standards, even if they are not yet in force. Support can only be provided towards the extra costs needed to go beyond the minimum standards.

When providing support to energy intensive industries, aid has to go beyond minimum standards for carbon emissions and energy efficiency of manufacturing equipment, as set out in so-called Best Available Techniques Reference documents (BREFs).<sup>63</sup> All major energy intensive industries currently have a BREF specific for energy efficiency.<sup>64</sup>

### 8.1.3 Monitoring of awarded State Aid

Individual awards of aid over €500,000 must be registered on a publicly accessible database called the Transparency Aid Module. Any such aid provided by the IETF will be logged onto the database no later than six months from the time at which it was awarded.

### 8.1.4 Overlaps with other public funding

Under State Aid regulations, aid provided must not exceed the maximum aid intensity set out in the relevant guidelines (Article 8 of the GBER, paragraph 81 and 82 of the EEAG and paragraph 83, 84 and 85 of the R&D&I).

This means that any grant from the IETF for a project needs to consider aid already provided through other policies to avoid exceeding the limits. Also, providing support to a project that also benefits from other policy incentives reduce the additionality and value-for-money of the funding.

We propose that projects incentivised by other policies should not be excluded from the Fund, but that the value of the support they receive should be declared by applicants and included under the cap of Government support permitted by State Aid regulations.

We also propose that it should be the duty of the company to assess whether they are compliant with State Aid rules when applying for the Fund, as is usual for other funds of this type.

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<sup>63</sup> European Commission, Industrial Emissions Directive. Available at: <https://eippcb.jrc.ec.europa.eu/reference/>

<sup>64</sup> European Commission, 2009, Reference Document for Best Available Techniques for Energy Efficiency. Available at: [https://eippcb.jrc.ec.europa.eu/reference/BREF/ENE\\_Adopted\\_02-2009.pdf](https://eippcb.jrc.ec.europa.eu/reference/BREF/ENE_Adopted_02-2009.pdf)

## 9. Next steps

The responses from this consultation will be considered and will further inform the scheme design.

We will publish a Government Response to this consultation next year which will set out our consideration of stakeholder feedback in relation to Phase 1, along with scheme rules and timings for that Phase.

## 10. Question list summary

1. Do you agree with our proposal to restrict eligibility for energy efficiency projects to organisations in manufacturing sectors as covered by SIC codes 10-33?
2. Do you agree that additional sectors should be eligible for funding for energy efficiency projects if they can demonstrate their energy intensity?
3. Do you think that the IETF should allow firms to aggregate their bids?
4. If you think firms should be allowed to aggregate their bids, what restrictions could be put in place to prevent misuse of the aggregation system?
5. Do you agree with the proposed minimum value of grant awards of £1 million in Phase 1 for energy efficiency project?
6. What other methods could be used to determine a minimum threshold for feasibility/FEED study support?
7. Please give us your views on our proposals for eligibility for deep decarbonisation projects.
8. Please give us your views on our proposals for which technologies would be supported to improve energy efficiency.
9. Should applicants be required to use products already listed on the ETL, unless the applicant can demonstrate that their preferred product choice performs to a better or equivalent standard?
10. Do you agree with the kind of deep decarbonisation activities the IETF is looking to support?
11. Please give us your views on our approach towards deep decarbonisation technologies.
12. Do you agree with the proposal to support feasibility studies and FEED studies into energy efficiency and deep decarbonisation technologies?
13. Do you agree with the proposed maximum feasibility study duration?
14. Do you agree with the proposed maximum FEED study duration?
15. Do you agree with the proposed assessment criteria for feasibility and FEED study applications?
16. Which of the funding mechanisms above do you prefer for energy efficiency projects?
17. Would you like us to consider other potential funding mechanisms for energy efficiency projects?
18. Which of the funding mechanisms above do you prefer for deep decarbonisation projects?
19. Would you like us to consider other potential funding mechanisms for deep decarbonisation projects?
20. What type of energy efficiency projects would be suitable for a government loan?
21. What value could an IETF loan scheme add above existing provision in the private financing market for energy efficiency loans?
22. Do you agree with the proposal for Phase 1 to fund energy efficiency projects and feasibility/FEED studies for both energy efficiency and deep decarbonisation?
23. Do you support the proposal to have an Application Development Service to provide potential applicants with detailed advice and support? Please outline your reasons for your answer and, if you agree, outline specific issues on which you think potential applicants would require such support.
24. Do you support Phase 2 having a single application window or multiple application windows?

- 25.If you support multiple application windows, how long do you think each window should be, and why?**
- 26.Do you agree with the proposed assessment criteria for energy efficiency projects?**
- 27.Do you agree with the proposed assessment criteria for deep decarbonisation projects?**
- 28.Please suggest the types of evidence that would help to prove the additionality of a given project at application stage.**
- 29.What topics would you find it useful for BEIS to investigate through any monitoring and evaluation, to develop more effective policy to deliver the objectives of the IETF?**
- 30.Do you have any views on how the IETF can encourage the sharing of knowledge of energy efficiency and deep decarbonisation measures between organisations?**
- 31.Do you agree with the proposed interactions between other decarbonisation policies and the IETF?**
- 32.Is your organisation affected by any decarbonisation policies not covered here? If so, what policies?**

# 11. Glossary of abbreviations

BEIS	Department for Business, Energy and Industrial Strategy
BREF	Best Available Technologies Reference Documents
CCA	Climate Change Agreements
CCL	Climate Change Levy
CCUS	Carbon Capture Usage and Storage
CHP	Combined Heat and Power
CMA	Competition and Market Authority
CO <sub>2</sub>	Carbon dioxide
CO <sub>2e</sub>	Carbon dioxide equivalent
EEAG	Guidelines on State Aid for Environment Protection and Energy 2014-2020
EEP	Energy and Emissions Projections
EII	Energy Intensive Industry
EMQ	Energy Measurement and Quantification
ESOS	Energy Savings Opportunity Scheme
ETL	Energy Technology List
ETS	Emissions Trading System
FAQs	Frequently Asked Questions
FEED	Front-End Engineering Design
GBER	General Block Exemption Regulation
GHG	Green House Gas
GVA	Gross Value Added
HNIP	Heat Networks Investment Project
IEEA	Industrial Energy Efficiency Accelerator
IETF	Industrial Energy Transformation Fund
IHRS	Industrial Heat Recovery Support Programme

ISCF	Industrial Strategy Challenge Fund
LCHP	Low Carbon Hydrogen Production
LCITP	Low Carbon Infrastructure Transition Programme
MtCO <sub>2</sub> e	Million Tonnes of Carbon Dioxide equivalent
NGO	Non-Governmental Organisation
NI	Northern Ireland
NISEP	Northern Ireland Sustainable Energy Programme
R&D	Research and Development
R&D&I	Research, Development and Innovation Guidelines
RHI	Renewable Heat incentive
ROI	Return on Investment
SIC	Standard Industrial Classification
SMEs	Small and Medium-sized Enterprises
TRL	Technology Readiness Level
TWh	Terrawatt-hour
UKRI	UK Research and Innovation
WTO	World Trade Organization

# Annex A - Informal Consultation summary and analysis

## Introduction

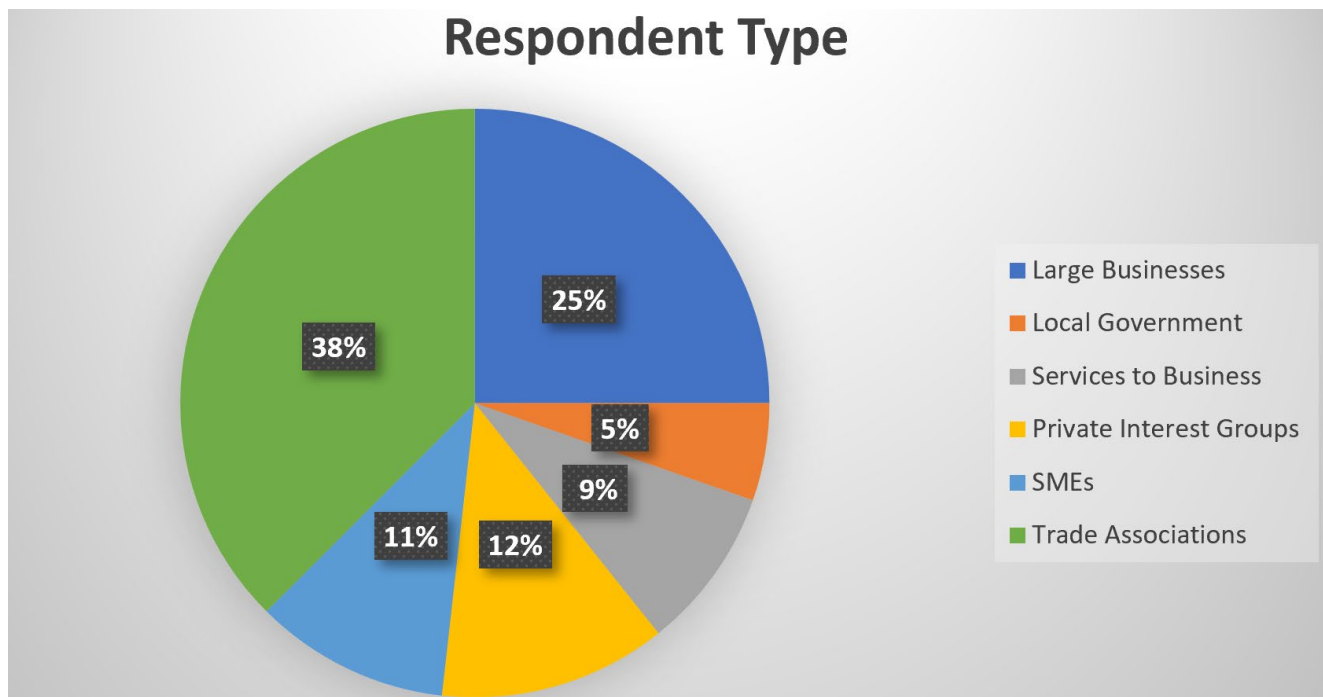
This paper analyses the responses to the IETF Informal Consultation and summarises our engagement.

This analysis is not intended to capture all the responses to our Informal Consultation, but rather to give a summary of those views that came up most often. The summary contains views that were submitted to us as part of the response to the Informal Consultation, and views that we collected through meetings and workshops with various representatives from industry and academia.

## Part A: Informal Consultation Analysis

### Overall Response

- We received 57 formal responses to the consultation. The majority were from trade associations and large businesses, with the remainder being SMEs, Local Government organisations, academics and special interest groups.
- We received responses from across the UK, including representatives connected to several industrial clusters as well as Scottish industry.
- Around a third of responses were from EILs or trade associations representing EILs.





## How the analysis is being used

- The responses to our Informal Consultation are informing the design of the IETF as they give us a clearer idea of what industry needs. The results should not be considered as proving overall stakeholder support for any one position. This is because the questions do not lend themselves to quantitative analysis and due to the relatively limited response.

## Key points

- The most common request from industry was that Government bring forward a clear, long-term policy framework for decarbonisation that will allow them to make investment decisions.
- Related to this, some highlighted the limited timeframe of the Fund, and the need for longer funding mechanisms, particularly given the time needed to deploy decarbonisation technologies at scale.
- Most respondents supported the idea that the Fund should support both deep decarbonisation and energy efficiency projects. There was a recurring comment highlighting that energy efficiency and deep decarbonisation go hand in hand, and projects that further both objectives should be funded.
- On eligibility, most respondents requested a clear and simple application process and criteria.
- On targeting, most preferred a focus on demonstration and deployment projects, which would support technologically ready projects to achieve commercial viability. There were a few requests for support for engineering studies.

## Balance of objectives

- Most respondents supported the idea that we should fund both deep decarbonisation and energy efficiency projects. There was a recurring comment highlighting that energy efficiency and deep decarbonisation go hand in hand, and projects that further both objectives should be funded.
- There were mixed views on whether the Fund should be split to support the different objectives - some in favour, others not. A challenge for the IETF is to balance the demands for the Fund to be flexible, whilst also ensuring that we support both our objectives and all our target industries.
- Some stakeholders argued (particularly some EIs) that the Fund should concentrate just on energy efficiency projects. This was for a variety of reasons including:
  - Concerns about international competitiveness, especially given high UK electricity prices
  - The short-term nature and relatively small financial scope of the fund.
- EI trade associations made the point that most of the 'low-hanging fruit' energy efficiency projects have already been done in their sectors.
- A small minority supported funding only one or two large scale decarbonisation projects. This argument came predominantly from environmental pressure groups.
- Of those that supported decarbonisation, the majority were in favour of supporting less-developed decarbonisation technologies such as hydrogen or CCUS

## Eligibility criteria

- There were mixed views on eligibility, depending on the respondent and sector. Some respondents (predominantly those representing EIs) recommended funding only EIs, others recommended having a sector neutral approach, and those representing non-energy intensives argued that funding should be for non-energy intensive companies only.
- EIs argued that if we spread the Fund too thinly, then it would have less impact.
- The counterpoint was that the Fund would get the best ‘bang for buck’ by targeting the whole of industry.
- A few EI stakeholders appreciated the argument for the Fund to be spread more widely but suggested that we ringfence part of it for just EIs, potentially by sector.
- Most respondents requested a clear and simple application process and criteria. This was a key demand throughout the engagement process.

## Targeting of funding: innovation vs demonstration vs deployment

- On targeting, most preferred a focus on demonstration and deployment projects, which would support technologically ready projects to achieve commercial viability. There were a few requests for support for engineering studies. There was little interest in support for innovation projects.
- A few respondents suggested that some of the Fund should be used for ‘capacity building’, such as training and technical support. This was particularly the case for smaller businesses and non-energy intensives.
- Many suggested the IETF should fund **follow up support** to already existing FEED/feasibility studies to get projects moving. Respondents stated that this might help overcome financial barriers by providing support to technologies that were not yet commercially ready. It was pointed out that even where pilot and demonstration projects fail this can offer valuable lessons learnt.

## Barriers to investment

- A significant number of the respondents highlighted the need for long term, consistent energy policy, stating that without this it is difficult to commit to investing in decarbonisation infrastructure. This point was also raised consistently in our direct engagement with stakeholders.
- As expected, lengthy payback periods were a significant barrier to investment, particularly for multinational companies with many different projects competing for the same internal pot of money.
  - A sizeable minority commented that companies would usually only consider projects with payback periods of 2-3 years or less.
  - Among multinationals, a key point was that energy efficiency/industrial decarbonisation projects did not just compete against other green projects, but against all types of projects. These were primarily judged on only the length of payback period and ROI.
- Some highlighted the issues associated with the limited timeframe of the Fund, and the need for longer term funding mechanisms – particularly given the time needed to deploy decarbonisation technologies at scale.
- Several respondents noted challenges of business rates, the UK’s exit from the EU, and international competitiveness.
- Lack of capacity to identify available projects and make investible business cases was also mentioned, particularly among small firms.

- One large firm pointed out that the requirement to bid for government funding with internal funding already secured is a barrier to a project – the company won't guarantee the money until they are sure the government will contribute.

### **Other factors that affect investment decisions**

- Whether the investment is strategic for the firm. For example, allowing them to de-risk the core business, or improve environmental performance.
- Disruption and cost associated with infrastructure replacement.
- Initial capital outlay, particularly for small firms.
- Some other key metrics for energy efficiency projects included the size of the energy saving, resource efficiency, group corporate profitability, and Rates of Return.

### **Market creation/private sector finance**

- A significant proportion of respondents indicated a willingness to at least consider third party external financing. Only a few respondents ruled out using it entirely.
- Many stakeholders felt the IETF would not crowd out the private sector market for energy efficiency project finance, feeling it far more likely the Fund would give the market a boost by demonstrating that these investments could be successful.
- In terms of market creation, it was suggested that the market would be boosted by:
  - More stringent energy efficiency regulation to provide a clear direction for the market. It is also critical to building an investment case internally for projects.
  - Improved standards across the economy to boost zero carbon products.

### **Interaction with other BEIS programmes**

- Many respondents emphasised the need for collaboration between different BEIS programmes, such as the Industrial Clusters Mission, Energy Saving Opportunities Scheme (ESOS) and Streamlined Energy and Carbon Reporting.
- There were some concerns that companies eligible for the Enhanced Capital Allowances (ECA) scheme would lose out under the IETF (which they saw as its replacement).
- A significant number of respondents had some link to companies in industrial clusters, for example, a trade body representing companies in clusters, local government bodies with interests in the clusters or businesses that themselves are part of clusters. Collaboration with the Industrial Clusters Mission team will be needed.
- Some respondents have already received BEIS funding for other projects.

## **Part B: Summary of engagement**

Almost 60% of responses to the consultation (33 out of 57) were from stakeholders that we engaged (both directly and indirectly) during the Informal Consultation phase.

We engaged directly with 64 stakeholders, 27 of which sent formal responses to the consultation (42%). We engaged with stakeholders across the UK, including at two events organised with the Scottish Government.

- 23 trade bodies
- 13 businesses
- 5 Think Tanks
- 11 academics / Learned Societies
- 9 Government bodies and devolved administrations
- 3 finance institutions

We raised awareness of IETF and the Informal Consultation with a further 62 stakeholders through speaking at events hosted by others.

- 9 trade bodies
- 38 businesses
- 5 Think Tanks
- 5 Government bodies
- 5 finance institutions.

## Informal Consultation Questions

1. What wider benefits could the IETF deliver, such as local growth and low-carbon leadership opportunities?
2. Are these barriers the ones that prevent you from investing in industrial energy efficiency and decarbonisation projects or are there other barriers? If so, what are they?
3. How would you raise funding for a decarbonisation project? Would you consider third party financing? If not, why not?
4. What evidence is needed in your organisation in order to make investment decisions, or to spend resources on exploring energy efficiency and industrial decarbonisation projects?
5. What were the payback periods of some of your recent investments? Are there any additional/alternative quantitative factors that heavily influence your investment decisions? Which of these could be an effective test of additionality for the IETF, and why?
6. Do you have views on what design features might best support achieving an appropriate balance of both IETF objectives?
7. How can we best target the IETF to maximise value for money?
8. How do you think we should focus the IETF's decarbonisation element? What is your evidence for this view?
9. Are there any additional complementary policies that the Government could consider to maximise the impact of the IETF funding?
10. What stages of development are most in need of IETF funding, to enable projects to reach deployment?
11. Can you provide evidence for the type of support (such as regulation, grants, loans, equity) that could enable industrial decarbonisation projects to go ahead?
12. Do you have any additional suggestions of how you could engage with us as we design the scheme?

## Annex B – Technology readiness levels

Technology readiness levels are an indication of the maturity stage of development of a particular technology, on its way to being developed for a particular application or product. The table below provides a definition of Technology Readiness Level 1 to 9.

TRL 1 – Basic Research	Scientific research begins to be translated into applied research and development.
TRL 2 – Applied Research	Basic physical principles are observed, practical applications of those characteristics can be ‘invented’ or identified. At this level, the application is still speculative: there is not experimental proof or detailed analysis to support the conjecture.
<b>Applied research and development</b>	
TRL 3 – Critical Function or Proof of Concept Established	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.
TRL 4 – Laboratory Testing/Validation of Component(s)/Process(es)	Basic technological components are integrated to establish that the pieces will work together.
TRL 5 – Laboratory Testing of Integrated/Semi-Integrated System	The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment.
<b>Demonstration</b>	
TRL 6 – Prototype System Verified	Representative model or prototype system is tested in a relevant environment.
TRL 7 – Integrated Pilot System Demonstrated	Prototype near or at planned operational system, requiring demonstration of an actual system prototype in an operational environment.
<b>Pre-commercial deployment</b>	
TRL 8 – System Incorporated in Commercial Design	Technology is proven to work - actual technology completed and qualified through test and demonstration.
TRL 9 – System Proven and Ready for Full Commercial Deployment	Actual application of technology is in its final form - technology proven through successful operations.

## Annex C – Energy Technology List

- The Energy Technology List is designed to promote technologies that are technologically developed but have not established a wide market. Using it therefore fits with our desire to promote the use of technologies that are not achieving deployment widely.
- Organisations access the ETL through an online portal where they search for technologies eligible for ECA either by technology or by manufacturer. The portal receives around 5,000 unique searches per month and between October 2018 and June 2019 there were a total of 46,000 searches on the portal.
- If using a technology type included on the ETL but using a technology not listed, we propose that applicants will need to prove that their proposed technology is as effective as the ETL technology or prove that the proposed technology is the most suitable technology for their site for other reasons. In doing this, they will also need to prove that the proposed technology is State Aid compliant.

### Technologies listed on the ETL

- Air-to-air energy recovery devices
  - Waste heat (from exhaust air stream) is used to heat incoming air stream to the same building ventilation systems.
- Automatic Monitoring & Targeting
  - These are systems that monitor and report on energy use, automatically identify areas of wastage in energy use.
- Boiler equipment
  - Including boilers, burner controls, heat recovery
- Combined Heat and Power
- Compressed Air Equipment
  - Desiccant air dryers with energy saving controls, master controllers, refrigerated air dryers with energy saving controls
- Heat Pumps
- Heating, Ventilation, and Air Conditioning (HVAC)
- High Speed Hand Air Dryers
- Lighting Equipment
- Motors and Drives
- Pipework Insulation
- Radiant and Warm Air Heaters
  - Space heating (large areas such as warehouses)
- Refrigeration Equipment
- Solar Thermal Systems and Collectors
  - Solar collector has dark coloured absorbing surface, which 'traps' solar radiation and converts it into heat. Heat is then transferred to a storage vessel.
- Uninterruptible Power Supplies
  - Allow electrical equipment to continue operating when mains power supply is interrupted

- Use electronic power converters, switches and energy storage devices (such as batteries) to generate output voltage
  - Generators (called rotary uninterruptible power supply units)
- Waste Heat to Electricity Conversion Equipment
  - Waste heat captured from exhaust stacks in manufacturing plants
  - Heat from saturated steam



## Annex D - Eligibility criteria table

Criteria	Detail	Section of consultation document
Organisations	<i>For energy efficiency technologies ready for deployment, the IETF will be open for all companies in industrial manufacturing as set out in the Office for National Statistics Standard Classification (SIC) codes 10-33 (in the consultation we will ask whether other energy intensive users should be eligible). For deep decarbonisation projects, eligibility will not be restricted to manufacturing SIC codes 10-33.</i>	Section 3.2.2 and 3.2.4
Size of Organisations	<i>The IETF will be open to all sizes of organisation.</i>	Section 3.2.2 and 3.2.4
Third party applicants	<i>Third party applications on behalf of eligible manufacturing companies to the IETF will be eligible.</i>	Section 3.2.2
Eligibility of non-private companies	<i>For deep decarbonisation technology applications, the IETF will allow for applications from consortia including academic, research, public, third sector or community organisations, working with private sector members.</i>	Section 3.2.4
Technologies	<i>For energy efficiency technologies, the IETF will support technologies that will improve industrial process energy efficiency and those that reduce energy demand across a system. This rules out technologies relating to transport, building heating and cooling and other electrical building measures (e.g. lighting). The IETF can support all deep decarbonisation options, such as CCUS fuel-switching options (hydrogen, biomass and electrification), and material efficiency projects.</i>	Section 3.3.1 and 3.3.2
Energy Technology List	<i>We are seeking views on whether applicants should be required to use the Energy Technology List (ETL) where a project is proposing, at a component level, using a technology type already covered by the ETL. Where projects do not plan to use a listed equipment, alternative products should meet or</i>	Section 3.3.1

	<i>exceed the performance requirements specified in the Energy Technology Criteria List</i>	
Technology Readiness Levels	<i>The IETF will support energy efficiency technologies which are ready for deployment, at either TRL 8 or 9. The IETF will support deep decarbonisation projects which are either ready for demonstration in an operational environment or ready for deployment (TRL 7 or higher).</i>	Section 3.3.1 and 3.3.2
Interactions with other BEIS schemes	<i>Cumulative HMG funding for a project must stay within State Aid limits. Any grant from the IETF must take account of funding from other schemes. We seek views on the potential effects resulting from IETF interaction with other schemes.</i>	Section 6
Biomass	<i>We propose that where a project is proposing the use of solid or liquid biomass either as a fuel or feedstock in industry, these projects will need to use the Biomass Suppliers List (BSL), or an equivalent scheme approved by the Secretary of State through Regulation 51 of the Renewable Heat Incentive Scheme Regulations 2018/2019. This would mean they would be compliant with the Government's biomass sustainability criteria, including on land use and GHG criteria.</i>	Section 3.3.3
Minimum thresholds for IETF grants (in Phase 1)	<p><i>For <b>capital investment projects</b> (for the deployment of energy efficiency technologies), we will provide IETF awards from £1m.</i></p> <p><i>For <b>feasibility/FEED studies</b>, we will support feasibility studies/FEEDs for capex projects which could meet the £1m minimum threshold for capex grants in Phase 1</i></p>	Section 3.2.3
Aggregation of projects	<i>We seek views on the potential value of allowing aggregation of bids and how this could be restricted to ensure effective delivery.</i>	Section 3.2.2

## Annex E - List of manufacturing SIC codes 10-33<sup>65</sup>

- 10: Manufacture of food products
- 11: Manufacture of beverages
- 12: Manufacture of tobacco products
- 13: Manufacture of textiles
- 14: Manufacture of wearing apparel
- 15: Manufacture of leather and related products
- 16: Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- 17: Manufacture of paper and paper products
- 18: Printing and reproduction of recorded media
- 19: Manufacture of coke and refined petroleum products
- 20: Manufacture of chemicals and chemical products
- 21: Manufacture of basic pharmaceutical products and pharmaceutical preparations
- 22: Manufacture of rubber and plastic products
- 23: Manufacture of other non-metallic mineral products
- 24: Manufacture of basic metals
- 25: Manufacture of fabricated metal products, except machinery and equipment
- 26: Manufacture of computer, electronic and optical products
- 27: Manufacture of electrical equipment
- 28: Manufacture of machinery and equipment n.e.c.
- 29: Manufacture of motor vehicles, trailers and semi-trailers
- 30: Manufacture of other transport equipment
- 31: Manufacture of furniture
- 32: Other manufacturing
- 33: Repair and installation of machinery and equipment

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<sup>65</sup> Office for National Statistics, Section C: Manufacturing. Available at: [https://onsdigital.github.io/dp-classification-tools/standard-industrial-classification/ONS\\_SIC\\_hierarchy\\_view.html](https://onsdigital.github.io/dp-classification-tools/standard-industrial-classification/ONS_SIC_hierarchy_view.html)

# Annex F – Experience from other countries

## Other countries policies for industrial energy efficiency and deep decarbonisation

Country	Programme Name	Description
Sweden <sup>66,67,68</sup>	Industrial Leap	This is a fund worth £24m/year supporting feasibility studies, pilots and demonstration projects for decarbonisation of industrial process emissions. Industrial Leap has supported HYBRIT, fossil-free steel production using a combination of hydrogen and electrification technology.
Netherlands <sup>69</sup>	Demonstration Energy and Climate Innovation (DEI +)	This year it has a budget of €35m to support energy innovation and €23.74m to support carbon emissions reduction in industry. DEI + is very flexible, the Government can tailor it to the low carbon technology solution it wants to support. Support has been provided for steam recompression technology and UrbanCement, a technology to produce a new type of cement from secondary raw materials.
Germany <sup>70,71</sup>	Wettbewerb Energieeffizienz	This scheme supports energy efficiency in industry, for example waste heat recovery and optimisation of energy consumption in production processes. The lower subsidy required per amount of carbon reduced, the higher the chance the funding is granted. It is a successor to the pilot for industrial energy efficiency called Step UP.
United States <sup>72,73</sup>	Section 45Q of the US tax code	A tax credit that incentivises Carbon Capture and Storage. Power plants and industrial facilities that capture CO <sub>2</sub> and store it receive the highest tax credit. If the captured CO <sub>2</sub> is used for Enhanced Oil Recovery the credit reduces in value. Credits last for 12 years, guaranteeing investors a return on investment.

<sup>66</sup> Swedish Government, 2017, Press Release. Available at: <https://www.government.se/press-releases/2017/12/new-climate-decision-to-reduce-industry-and-transport-emissions/>

<sup>67</sup> Swedish Energy Agency, 2018, Press Release. Available at: <http://www.energimyndigheten.se/en/news/2018/flying-start-for-the-first-investment-in-new-industry-venture-the-industrial-leap/>

<sup>68</sup> Swedish Energy Agency, HYBRIT Project Information. Available at: <http://www.energimyndigheten.se/forskning-och-innovation/projektdatabas/sokresultat/?projectid=27981>

<sup>69</sup> Netherlands Enterprise Agency, DEI +. Available at: <https://www.rvo.nl/subsidies-regelingen/demonstratie-energie-en-klimaatinnovatie>

<sup>70</sup> <https://www.wettbewerb-energieeffizienz.de/>

<sup>71</sup> Step Up, Press Release. Available at: <https://www.wettbewerb-energieeffizienz.de/service/pilotprogramm-step-up/gefoerderte-projekte>

<sup>72</sup> US Congress, 2017, FUTURE Act. Available at: <https://www.congress.gov/bill/115th-congress/senate-bill/1535?>

<sup>73</sup> Clean Air Task Force, 2019, Carbon Capture & Storage in the United States Power Sector: The Impact of 45Q Federal Tax Credits. Available at: [https://www.catf.us/wp-content/uploads/2019/02/CATF\\_CCS\\_United\\_States\\_Power\\_Sector.pdf](https://www.catf.us/wp-content/uploads/2019/02/CATF_CCS_United_States_Power_Sector.pdf)

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