



Department for  
Business, Energy  
& Industrial Strategy

# Technological Scope for Decarbonisation Studies

Industrial Energy Transformation Fund  
Application Guidance

Phase 1: Spring 2021



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# 1. General Principles

The Industrial Energy Transformation Fund (IETF) was established with the aim of supporting industry on the path to net zero. Through the studies strand of the competition the IETF will award grant funding towards the cost of deep decarbonisation studies that reduce greenhouse gas emissions generated by industrial processes. Funding for the deployment of deep decarbonisation technologies will be made available in later IETF competition windows.

To qualify as an eligible decarbonisation study, the application will need to describe the greenhouse gas emissions saving potential of the technology or technologies considered. These technologies do not necessarily have to have an associated energy efficiency saving, but in some cases, this may form part of the rationale for undertaking the study. Emissions savings (tCO<sub>2</sub>e) must be measured and take place at site level.

The intention is to support studies necessary to facilitate the permanent installation of technologies at industrial sites, rather than general research, development, and testing of a technology solution.

## 2. Technology scope overview

The IETF is technology neutral to allow applicants to explore the most suitable technology for their site and industrial process. Applications should demonstrate why the chosen technology solution is appropriate, the savings it will achieve, and check that it meets the standards and eligibility criteria specified in this guidance.

## 3. Technologies scope detail

The list below provides examples, but not a comprehensive list, of the solutions and technology types that are in scope for exploration through decarbonisation feasibility and engineering studies.

- Fuel switching, where the switch is to a lower carbon intensity fuel that is also not a higher carbon intensity than the gas grid, including:
  - Electrification of industrial processes
  - Use of heat pumps
  - Retrofits and upgrades of industrial equipment to use hydrogen or hydrogen blends
  - Retrofits and upgrades of industrial equipment to use gas, or in certain instances biomass, in place of other fossil fuels
- Onsite carbon capture

Eligibility rules for each technology type are further elaborated below.

### 3.1 Fuel switching studies

The IETF will support fuel switching as a decarbonisation measure (eligible for the studies competition) where it can be demonstrated that the outcome of the switch delivers emissions reductions associated with an industrial process. Studies for fuel switching Combined Heat and Power (CHP) plants are included in this definition (see further guidance below). Fuel switching is only permitted in instances where the switch is to a less carbon intensive fuel, further guidance is provided in the table.

**Table 1: Eligible decarbonisation fuel switches**

| From  | To  |
|---|---|
| Fossil fuels  | Biomass, waste or hydrogen                    |
| Fossil fuels  | Biogas (see further details in section 3.3)   |
| Fossil fuels more carbon intensive than the gas grid (e.g. coke, coal, oil) | Gas grid (see further details in section 4.1) |
| Any fuel  | Electricity                                   |

#### 3.1.1 Scope of fuel switching support

The IETF can provide financial support towards the costs of on-site changes necessary to facilitate the fuel switch in the industrial process. This includes, for example, the costs of retrofitting equipment to use the new fuel, the cost of upgrading on-site transformers, and the cost of installing equipment to generate electricity using waste heat, waste pressure, waste process gas, or waste process liquid not suitable for transport use.

#### 3.1.2 Standards for fuel switches in scope

- Fuel combustion proposals must be above 1MWth input and comply with UK air quality regulation.
- Heat pumps, where the heat is sourced from the natural environment, must achieve appropriate performance across the year to meet the proposal’s objectives. Applicants should evidence that the heat source and design of the pump meets this condition in their application.

The IETF will not provide financial support towards any changes required for the fuel switching that occur off-site. The costs of purchasing, installing, and maintaining renewable electricity generation equipment, such as solar panels, will also not be covered by the IETF. See 'Energy Supply' section 4.1 below for more details.

### 3.1.3 Fuel switching is not permitted where:

- it involves a switch to a fossil fuel, that is more carbon intensive than the gas grid (for example LPG). Carbon intensities are provided by the Green Book supplementary guidance, data table 2a ([HMT Green Book](#));
- it involves the use of compressed or liquified natural gas that must be transported to site, even if the identified source is the gas grid;
- the fuel switching is not part of a decarbonisation project and does not provide any emissions reductions, in which case please consider whether your project meets the criteria for the energy efficiency strands of the competition where funding for studies and deployment is available.

## 3.2 Biomass fuel switching studies

Where biomass is the decarbonisation technology of choice, applicants will need to demonstrate the reasons for choosing biomass and why alternative decarbonisation options within scope of IETF funding are not technologically feasible at the site.

Applications for studies that explore switching towards virgin biomass or residues will be supported in situations where:

- they consider a switch away from solid fossil fuels (for example coal, coke), and from other fossil fuels (such as oil or natural gas) to biomass;
- the source of the biomass considered is sustainable. The application will need to show that the biomass fuel used will deliver greenhouse gas reductions and will not result in adverse environmental impacts such as air pollution, through compliance with existing environmental regulation and biomass sustainability criteria. The required biomass sustainability criteria are those used in [Schedule 3 of the Renewable Heat Incentive Scheme Regulations 2018](#); and
- the output from the biomass combustion is used in high temperature applications in which the operational temperature of the industrial process or processes being heated is equal to or more than 240 degrees Celsius.

Proposals that do not meet all three requirements above will not be eligible for funding.

The following are not in scope:

- biomass projects that are less than 1MWth input

- conversion of biomass to biofuels for later use or to upgrade to biomethane for injection into the gas grid

### 3.3 Biogas fuel switching studies at off gas grid sites

If the site is not on the regional or national gas grid, switches to biogas combustion or biogas combined heat and power projects are permitted for consideration. In this case the biogas must be sourced from a dedicated supply that could not otherwise be injected into the gas grid.

The supply must be based onsite or transported to site through fixed infrastructure (for example pipelines). The IETF will not provide financial support towards the costs of installing or maintaining off-site infrastructures, or towards biogas production plants.

### 3.4 Combined Heat and Power (CHP) fuel switching studies

Gas and Biomass CHP study applications will be supported only where the switch is eligible as per the scenarios in Table 1 and outlined above. Where biomass is used, the output from the CHP project must be used in high temperature applications in which the operational temperature of the industrial process being heated is equal to or more than 240 degrees Celsius. Studies for Biogas CHP switches will only be supported at off gas grid sites and must meet the rules set out in section 3.3.

In some cases, CHP equipment integral to the process may not be owned by the lead applicant or may not be co-located on the immediate site. Studies investigating eligible fuel switches for CHP plants will be considered in scope provided that at least 70% of both the heat output and electricity output produced by the CHP plant is used for an eligible process by the lead applicant or consortium. The lead applicant must in this case be an eligible end-user, and the CHP operator must be a collaborating partner on the project. If these conditions are met then the IETF can support the costs of fuel switching study at the identified plant.

### 3.5 Hydrogen fuel switching studies

The IETF can support studies to investigate retrofits and upgrades of industrial equipment to use hydrogen or hydrogen blends that results in a reduction in emissions in the industrial process.

Applications for hydrogen studies must include realistic, economically planned hydrogen supply options and where possible include estimates of the cost of supply as part of its economic assessment. Where the project is dependent on the development of off-site hydrogen supply networks, for example in a cluster setting, the applicant can note any core assumptions that have been made.

The scope of the study should focus on any feasibility or pre-engineering work required to invest in onsite equipment related to the industrial process. For this reason, the following projects are outside of the scope of what the study should consider:

- Hydrogen production (including onsite electrolysis plants)
- Hydrogen transport networks

### 3.6 Onsite carbon capture studies

The IETF will support studies that consider carbon capture technologies, where the captured CO<sub>2</sub> might be used on site or transported and stored.

Applications for carbon capture studies must include realistic, economically planned CO<sub>2</sub> routes and where possible include estimates of the energy and carbon costs of moving CO<sub>2</sub> to the disposal or utilisation site as part of its economic assessment. Where the project is dependent on the development of off-site transport and storage infrastructures, for example in a cluster setting, the applicant can note any core assumptions that have been made.

The scope of the study should focus on any feasibility or pre-engineering work required to invest in **onsite** equipment related to the industrial process. For this reason, the following projects are outside of scope of what the study should consider:

- CO<sub>2</sub> transport networks or long-term storage infrastructures
- Direct air capture of CO<sub>2</sub> or the development of test centres for this technology

## 4. Technologies that are out of scope

The IETF aims to fund projects that will have a transformative impact on industrial energy efficiency and industrial emissions. We will therefore not be funding projects where there is existing support through government schemes or where there is an established market. We will also not support technologies that are not aligned with the Net Zero pathway for industry.

### 4.1 Energy supply

The IETF will not support the cost of purchasing, installing, and maintaining renewable electricity generation equipment such as solar panels and wind turbines, or other means of electricity generation, unless from waste heat, waste pressure, waste process gas, waste process liquid not suitable for transport use, or CHP with eligible fuel switching.

The IETF will not cover the costs of linking the site to local or national gas and electricity grids or other off-site fuel supplies. Work required within the site boundaries to enable the switch may be covered however, and applicants to whom this applies are advised to speak to Innovate UK about the details of their project before applying.



## 4.2 Production of fuels

The IETF will not support the costs of installation, operation or maintenance of equipment related to the production of fuels, including but not limited to:

- Hydrogen fuel
- Biogas
- Biofuel

## 4.3 Repair and Maintenance

The IETF will not support projects that involve repair and maintenance that would be undertaken in the normal course of business. This includes both repairs to or replacement of components in an industrial process with an identical model or a different model with equivalent performance capabilities. Any maintenance checks or tests required to identify such issues will also not be funded. We cannot support any costs incurred from decarbonisation measures that bring the site or equipment up to minimum legal standards.

## 4.4 Plant closure projects

The IETF will not support projects related to production capacity reductions or plant closure where it is not required in order to deploy/retrofit equipment necessary to achieve emissions savings.

## 4.5 Decarbonisation measures in transportation

The IETF will not support projects that decarbonise modes of transportation used on or off site including but not limited to:

- Forklifts
- Automotive vehicles
- Heavy goods vehicles
- Diggers, cranes, or excavators
- Rail
- Ships, boats, barges
- Conveyor belts to transport materials or goods off-site (rather than between on-site production stages which would be in scope)

## 4.6 Buildings improvements

The IETF will not support projects that upgrade systems associated with buildings that are not integral to the industrial process itself. This includes but is not limited to:

- Building lighting
- Space heating and cooling where not integral to the industrial process

## 4.7 New builds and expansions

- Energy savings must be measured and take place at site level where there is an existing, identified operational industrial process.
- Funding cannot be used to support capital delivery of new build plant.
- Funding cannot be used to repurpose a manufacturing site for a new industrial process.
- Funding cannot be used to cover the costs of a project which aims to expand the capacity at an existing plant. An exception would be where the energy efficiency measure itself directly leads to a change in production levels or productivity, in which case the IETF can support the specific elements of the project which can be identified as energy efficiency measures and where it can be shown there is a per unit saving in energy consumed.

Applicants with queries about how this rule applies to their project are advised to speak to Innovate UK about the details of their project before applying.

# 5. Technology Readiness Levels (TRLs)

The intention is to support the commercial roll out and permanent installation of technologies at industrial sites, rather than general research, development, and testing of a technology solution. Figure 1 shows the stage of technology maturity, measured by Technology Readiness Levels (TRLs), that the IETF can support, this corresponds to real world demonstration of the technology in an industrial setting. Through this competition we can support pre-engineering work (studies) required to take an investment decision on deploying the technology at an identified site.

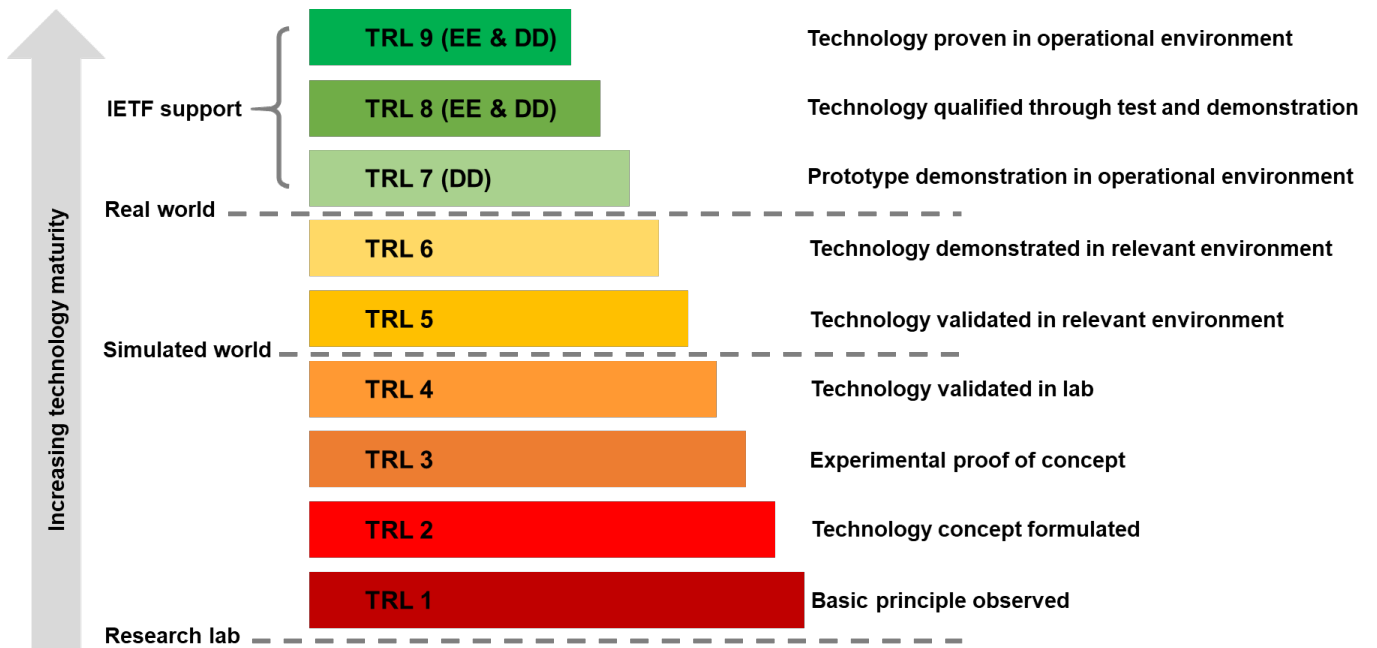
The IETF recognise that Deep Decarbonisation (DD) technologies may be less developed in commercial settings, and will therefore support technologies at TRLs 7, 8, 9 and above. This means that the technology must either:

- have been proven to work through successful operations and/or is qualified through test and demonstration.

or

- is currently at a prototype stage or requires demonstration of an actual system prototype in an operational environment.

Figure 1: Technology Readiness Levels



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