



UK Government

RAF032/2324: Evaluation of Industrial Energy Transformation Fund (IETF)

Interim Impact Evaluation Report

Authors

This report was prepared by Technopolis Group, an independent policy consultancy, and Ricardo, an engineering consultancy, with thanks to government departments, stakeholders, and experts for their insights and contributions throughout the research process.

Views expressed in this report are those of Technopolis Group and Ricardo, and not necessarily those of the UK government.



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Executive summary

Programme overview

The Industrial Energy Transformation Fund (IETF) is a government-funded scheme supporting the UK's commitment to reaching Net Zero by 2050. The IETF was launched in 2020, and has run in 3 competition phases, with up to £500 million funding available until 2028¹.

The IETF aims to support industry in identifying a pipeline of future projects by co-funding feasibility and engineering studies and providing grants to deploy mature technologies that improve the energy efficiency and carbon intensity of industrial processes. The funding is designed to bring the payback of projects within an investable range for companies and incentivises early movers by making low-carbon investment financially more attractive than the carbon-intensive alternative.

The projects funded by the IETF aim to deploy transformational EE and DD technologies² with the potential to be replicated across UK industry, creating knowledge and spillovers within industry of the costs, risks and benefits of these technologies.

The medium-term objectives of the programme are to support competitiveness of UK firms via reduced energy consumption and improved sustainability. The longer-term objectives of the scheme are to support reductions in national level energy consumption and carbon emissions.³

The IETF offered grant funding £42.3m for Phase 1 projects £42.3m and £109.1m for Phase 2 projects.⁴

Key findings from interim impact evaluation

This report summarises the findings from an Interim Impact Evaluation conducted in 2025-2026, and covers Phase 1 to 2 of the IETF. The evaluation was conducted by Technopolis Ltd, together with partners Ricardo Ltd.

The evaluation methodology was rooted in theory-based methods combined with quantitative benefits analysis. The research draws on data collection from programme monitoring sources as well as programme delivery teams, beneficiaries, unsuccessful applicants, and wider sector stakeholders. This Interim Impact Evaluation follows two previous reports:

- an Interim Process Evaluation⁵ conducted in 2021 covering Phase 1 delivery
- a Final Process Evaluation⁶ conducted in 2025 covering Phase 1 and 2 delivery

¹ DESNZ, [Industrial Energy Transformation Fund](#)

² IETF supported energy efficiency technology at Technology Readiness Level (TRL) 8 or above and decarbonisation technology at TRL 7 or above. TRL 7 is when a prototype has been demonstrated in an operational environment.

³ The full set of primary and secondary benefits which programme seeks to achieve are presented in the Theory of Change Supplement (ToCS) (Annex B) which are the basis of the Contribution Claims investigated in this report.

⁴ DESNZ (2026) '[Industrial Energy Transformation Fund \(IETF\): benefits](#)'

⁵ BEIS (2021) '[Industrial Energy Transformation Fund \(IETF\) Phase 1: first stage process evaluation](#)'

⁶ DESNZ (2026) '[Evaluation of the Industrial Energy Transformation Fund \(IETF\)](#)'

A final impact evaluation is also planned to be conducted which will cover the implementation of Phase 3 projects, and monitoring and verification (M&V) data for the full portfolio.

Finding 1 – Positive Primary Benefits have been observed

Primary benefits were estimated over an evaluation period of 2021-2050, to align with the UK Green Book principles of longer (i.e. greater than 10-years) evaluation periods for longer-horizon projects where much of the benefits come in later years after a ‘ramp up’ period. This choice of evaluation period also aligns with the UK’s 2050 Net Zero targets, allowing ‘like for like’ comparisons of the IETFs contribution.

The **18 EE projects** currently reporting M&V data are estimated to **reduce energy intensity** (measured in terms of reduction in production-adjusted energy consumption) by around **445 GWh between 2021-2050**, which corresponds to a **1.5% reduction against the adjusted counterfactual** levels of fuel consumption. This results in over **103,500 tCO₂e of carbon emissions saved** over the evaluation period of 2021-2050.

The **3 DD projects** currently reporting M&V data are estimated to reduce energy intensity (measured in terms of reduction in production-adjusted energy consumption) by over **25 GWh between 2021-2050**. This corresponds to a **56% reduction against the adjusted counterfactual levels of fuel consumption**, generating **carbon emission savings of over 1,400 tCO₂e**.

In line with these fuel and carbon intensity benefits, air quality damage costs have been reduced:

Monetised benefit (million £, 2025£)	EE projects	DD projects	Total
Projects included in analysis	18	3	21
Net reduction in energy costs	£92m	£1m	£93m
Monetised net reduction in carbon emissions	£27m	£0.3m	£27m
Net reduction in air quality damage costs†	£0.4m	£0.7m	£1m
Total project benefits	£118m	£2m	£120m

Source: Ricardo, using DESNZ M&V information

†Note: Air quality was a secondary benefit for the programme but is included in the primary benefits table as it contributes to the quantitative analysis of total project benefits.

Finding 2 – Positive Carbon Cost Effectiveness (CCE) and Benefit Cost Ratio (BCR)

CCE:

A positive CCE has been observed at an interim stage. IETF projects are estimated to **abate 5.6 kgCO₂e per £ of grant support they receive and 1.9 kgCO₂e per £ spent overall**.

Specifically, EE projects deliver emissions reductions of 5.8 kgCO₂e per £ of the IETF grant amount and 2.0 kgCO₂e per £ spent overall. DD projects deliver slightly lower emissions reductions of 1.4 kgCO₂e per £ of the IETF grant amount of 0.8 kgCO₂e per £ spent overall.

The central benchmark Green Book value for 2025 is £313/tCO₂e (in 2025£), representing the economic benefit to society of avoiding one tonne of emissions. Based on the public grant contribution alone, the abatement cost for the IETF is estimated at £178/tCO₂e, well below the benchmark carbon value, demonstrating strong value for money from a taxpayer perspective.

However, projects supported through the IETF rely heavily on private co-investment, and would not be delivered without this additional funding, which is included in the total project costs. Based on this measure, the IETF's abatement cost is estimated at £521/tCO₂e, which is higher than the benchmark carbon value. Therefore, grant funding under the IETF is helping to unlock much larger private investment, allowing emissions to be reduced for much less public money than the economic benefit generated by the abatement.

BCR:

The 21 IETF projects captured in the Interim Impact Evaluation are estimated to deliver a net benefit to society, **with a BCR of 2.6 overall**. That is, **for every £1 spent, a benefit of £2.60 is generated**. This implies that net societal benefits attributable to the IETF (in terms of reduced energy consumption and carbon emissions and improvements in air quality) exceed the total investments (public and private) under the IETF. Due to the large number of EE projects reporting data for the interim evaluation (i.e. 18 out of 21), the combined BCRs largely reflect the EE outcomes which have a BCR of 2.6. However, the small number of DD projects also deliver a net benefit to society, with a combined BCR of 1.5.

Important limitations do, however, frame this interim assessment, as the interim evaluation is based on a limited sample of 21 projects reporting six-monthly M&V data and only covers 13% of all IETF projects funded under the programme. Moreover, withdrawals, project lifetime and project performance are all factors that may change over the full lifetime of the portfolio.

Finding 3 – Financial barriers have been overcome

Evidence indicates that the **IETF has played a critical role in overcoming financial barriers to conducting studies and deploying EE and DD technologies**, which are unlikely to happen otherwise due to long, marginal payback periods. Beneficiaries and wider industry stakeholders consistently highlighted the role of the IETF in supporting the pace and scale of investment in transformative technologies. Without the IETF, existing market and regulatory incentives are viewed as insufficient to drive the same level of investment. The lack of an emerging pipeline of projects outside of the IETF reflects that the financial barrier to deployment remains high and remains the critical barrier, and the IETF has not been able to influence a sector-wide shift in uptake in the absence of subsidy.

Finding 4 – Capability barriers have been partially overcome, but are not the key barrier to deployment

Study grants and, to a lesser extent, deployment grants have supported some development of capabilities and knowledge which have helped firms assess viability and optimise application of EE and DD technologies. However, in general these effects have been modest contributions to firm's existing capabilities, reflecting the programme design and application criteria which require beneficiaries to possess the necessary capabilities for the implementation of mature technologies. Studies generated the most significant improvements in capabilities and de-risking of technologies through feasibility assessments, which in some cases have enabled deployment of smaller scale solutions without subsidy.

Knowledge and spillover effects on wider sector uptake of technologies have been minimal, with limited evidence of reduced perceived risk in the wider sector, again reflecting the centrality of financial barriers to deployment. Learning and knowledge transfer has largely occurred within beneficiary organisations, and from inputs of expertise from engineering consultants and suppliers. DESNZ and Innovate UK events have played a positive role in supporting awareness of the IETF scheme and eligible technologies but have had limited effect on the transfer of knowledge and capability necessary for the deployment of EE and DD technologies.

Finding 5 – Modest evidence of impacts on competitiveness and jobs

Competitiveness:

Mixed evidence has been found relating the programme's influence on industrial competitiveness. **By helping UK firms reduce energy and carbon costs, IETF grants have helped address one of the main challenges for UK industrial competitiveness.**

However, the scale of impacts from installed equipment relative to overall pressures on competitiveness is likely modest. IETF projects have not significantly benefited from increased sales or investment as a result of relatively weak consumer and investor demand for low carbon products. However, linked to overcoming financial barriers, IETF grants are seen as essential for securing CAPEX investment within international company structures, where investment decisions play out in an international marketplace of subsidies.

Jobs:

IETF grants were found to have **modest effects on jobs**, mostly by securing existing engineering and project management roles for the implementation and maintenance of projects, as well as short term contractor roles during the construction and implementation phase. Wider commercial factors were viewed as playing a larger role in employment outcomes, which the scheme's competitiveness impacts (i.e. reduced energy costs and group CAPEX investment) feed into as described above.

Finding 6 – Strong additionality, at this stage, for primary benefits but weaker evidence attached to secondary benefits

Reflecting the discussion above, **IETF grants are seen to generate strong additionality for primary benefits linked to activities of beneficiaries**. This reflects the unique and necessary contribution of the scheme to these impacts, as identified through the contribution analysis. Whilst additionality is strong, an element of caution should be exercised as there is likely beneficiary bias present in qualitative evidence sources.

However, there is **limited additionality for secondary benefits where benefits are expected to have occurred in the absence of the programme**.

Limitations

The Interim Impact Evaluation faced various limitations. While some mitigations were taken, and caveats provided within the analysis, these limitations should be taken account of when considering the validity of the conclusions, most notably:

- A high representation of beneficiaries within the overall sample frame.
- Lack of a representative sample to provide a strong and robust counterfactual group that did not receive funding
- The QBA is based on a limited sample due to M&V data only being available from 21 phase 1 and 2 projects which have begun reporting at the interim stage, which represents 13% of the Phase 1 and 2 deployment grantee cohort. Of these, only 3 were DD projects

Glossary

The following abbreviations are used throughout this report.

Abbreviation	Definition
AIA	Annual Investment Allowance
B2B	Business-to-business
BCR	Benefit Cost Ratio
CA	Contribution Analysis
CAPEX	Capital expenditure
CAPT	Contribution Analysis with Process Tracing
CBA	Cost Benefit Analysis
CBAM	Carbon Border Adjustment Mechanism
CC	Contribution Claim
CCBM	Carbon Capture Business Model
CCE	Carbon Cost Effectiveness
CCL	Climate Change Levy
CCSA	Carbon Capture & Storage Association
CCUS	Carbon Capture, Usage and Storage
CfD	Contracts for Difference
DD	Deep Decarbonisation (now known as Decarbonisation)
DESNZ	Department for Energy Security and Net Zero
DEVEX	Development expenditure
DoDe	Doubly Decisive
ECA	Enhanced Capital Allowance
ECUK	Energy Consumption in the UK
EE	Energy Efficiency
EED	Energy Efficiency Directive
EEF	Energy Entrepreneurs Fund

Abbreviation	Definition
EII	Energy Intensive Industry
EPC	Engineering, Procurement, and Construction
EPR	External Packaging Responsibility
EQ	Evaluation Question
ESOS	Energy Savings Opportunity Scheme
ETL	Energy Technologies List
(EU) ETS	(European Union) Emissions Trading Scheme
(EU) PUE	Power Usage Effectiveness
FBC	Full Business Case
FEED	Front End Engineering Design
FiT	Feed-in tariff
FTE	Full time equivalent
GAP	Grant Assessment Panel
GOL	Grant Offer Letter
HAR	Hydrogen Allocation Round
HAR2	Hydrogen Allocation Round 2
HMG	His Majesty's Government
HPBM	Hydrogen Production Business Model
HT	Hoop Test
ICC	Industrial Carbon Capture
IDHRS	Industrial Decarbonisation and Hydrogen Revenue Support
IDRIC	The Industrial Decarbonisation Research and Innovation Centre
IEA	International Energy Agency
IEEA	Industrial Energy Efficiency Accelerator
IETF	Industrial Energy Transformation Fund
IHRS	Industrial Heat Recovery Support Programme
ISCF	Industrial Strategy Challenge Fund

Abbreviation	Definition
ISO	International Organization for Standardization
kgCO ₂ e	Kilograms carbon dioxide equivalent
LIDP	Local Industrial Development Plan
M&V	Monitoring and Verification
MI	Management Information
MO	Monitoring Officer
MRPNA	meter point reference number
MtCO ₂ e	Megatonnes of carbon dioxide equivalent
MW	Mega-watt
MWh	Mega-watt hour
NCC	Network Charging Compensation
(ND)-MEES	(Non-domestic) Minimum Energy Efficiency Standards
NPV	Net Present Value
ONS	Office for National Statistics
PCF	Project Completion Form
PCR	Project Change Request
PT	Process Tracing
QBA	Quantitative Benefits Assessment
QPM	Quarterly Progress Meeting
RO	Renewables Obligation
RPSC	Return on public sector costs
RQ	Research Question
SBTi	Science Based Targets initiative
SECR	Streamlined Energy and Carbon Reporting
SG	Smoking Gun
SIC (Code)	Standard Industrial Classification (code)
SIETF	Scottish Industrial Energy Transformation Fund

Abbreviation	Definition
SITW	Straw in the wind
SME	Small and Medium Enterprise
tCO ₂ e	Tonnes carbon dioxide equivalent
ToC	Theory of Change
ToCS	Theory of Change Supplement
TRL	Technology Readiness Level
(UK) ETS	(United Kingdom) Emissions Trading Scheme

1. Introduction

Background and objectives of IETF

The Industrial Energy Transformation Fund (IETF) is a government-funded scheme supporting the UK's commitment to reaching Net Zero by 2050. The IETF aims to reduce energy demand and industrial emissions, supporting the delivery of carbon budgets 5⁷ and 6⁸.

The IETF aims to support industry in identifying a pipeline of future projects by co-funding feasibility and engineering studies, and providing grants to deploy mature technologies that improve the energy efficiency and carbon intensity of industrial processes. The funding is designed to bring the payback of projects within an investable range for companies and incentivises early movers by making low-carbon investment financially more attractive than the carbon-intensive alternative.

The projects funded by the IETF aim to deploy transformational energy efficiency (EE) and deep decarbonisation (DD) technologies⁹ with the potential to be replicated across UK industry, creating knowledge and spillovers within industry of the costs, risks and benefits of these technologies.

The medium-term objectives of the programme are to support competitiveness of UK firms via reduced energy consumption and improved sustainability. The longer-term objectives of the scheme are to support reductions in national level energy consumption and carbon emissions.¹⁰

The IETF launched in 2020 and is in three phases with up to £500 million of funding available up until 2028.¹¹

Table 1 below describes the main characteristics and differences of each phase. Phase 3 is not in scope for the Interim Impact Evaluation.

⁷ Committee on Climate Change (2015) '[The Fifth Carbon Budget: The next step towards a low-carbon economy](#)'

⁸ Committee on Climate Change (2020) '[The Sixth Carbon Budget: The UK's path to Net Zero](#)'

⁹ IETF supported energy efficiency technology at Technology Readiness Level (TRL) 8 or above and decarbonisation technology at TRL 7 or above. TRL 7 is when a 'technology prototype has been demonstrated in an operational environment'. TRL 8 is when 'actual technology [is] completed and qualified through test and demonstration' See UKRI, '[Eligibility of technology readiness levels \(TRL\)](#)', for more details.

¹⁰ The full set of primary and secondary benefits which programme seeks to achieve are presented in the Theory of Change Supplement (ToCS) (Annex B) which are the basis of the Contribution Claims investigated in this report.

¹¹ DESNZ, [Industrial Energy Transformation Fund](#)

Table 1: Description of the three IETF Phases

Phase 1 (c.£70m)	Phase 2 (c.£220m)	Phase 3 (c.£185m)
Launched in 2020, consisting of two competition windows funding feasibility and engineering studies and EE deployment.	Comprised of four competition windows spread out from 2022 to 2023, it expanded eligibility to support the deployment of decarbonisation technology.	Launched in 2024, it continued the support for studies and deployment projects including additional eligible sectors such as controlled environment horticulture and industrial laundries.
The fund aimed to support the deployment of energy efficiency projects and conducted energy efficiency and decarbonisation studies with an emphasis on immediate energy efficiency improvements	During this phase the minimum grant threshold was lowered to £250,000 to accommodate and incentivise the participation of SMEs	It incorporated feedback that redefines the fund's design and further simplifies the application process.

It should be noted that Scotland has its own scheme, Scottish Industrial Energy Transformation Fund (SIETF)¹², which was initiated with Scotland's share under the Barnett Formula. SIETF is outside the scope of this report. The SIETF share is included within the up to £500m of funding made available

Phase 1 and 2 of the IETF has 136 live or closed grants, with £42.3m for Phase 1 projects and £109.1m for Phase 2 projects¹³. Key characteristics of the Phase 1 and 2 portfolio composition are provided below:

Table 2: Distribution of grants per company size (total £ and number of grants)

Company size ¹⁴	Combined grant funding	Count
Large	£132,122,037	102
Medium	£11,421,792	24
Small	£8,785,393	10

¹² Scottish Government, [Scottish Industrial Energy Transformation Fund: guidance and application forms](#)

¹³ DESNZ (2026) '[Industrial Energy Transformation Fund \(IETF\): benefits](#)'

¹⁴ Based on a combination of thresholds of employee numbers, turnover and balance sheet totals defined by UK Companies House, available online here: Companies House (2026) '[Preparing and filing Companies House accounts](#)'

Table 3: Distribution of grants per grant type (total £ and number of grants)

Grant type	Combined grant funding	Count
EE Deployment	£81,858,611	56
DD Deployment	£49,560,808	24
EE Study	£4,141,835	28
DD Study	£16,767,968	28

Table 4: Distribution of grants per technology type (total £ and number of grants)

Technology	Deployment grants	Deployment count	Study grants	Study count
DD: CCUS	£210,864	1	£11,063,655	11
DD: Fuel switch (other e.g. biomass, biogas)	£63,457,685	40	£2,746,796	15
DD: Fuel switch (electrification)	£13,847,176	2	£1,113,949	4
DD: Fuel switch (hydrogen)	£220,299	1	£66,455	1
EE: Equipment upgrade	£1,025,100	1	£-	0
EE: Heat or energy recovery	£5,557,833	7	£-	0
EE: Process optimisation	£15,427,605	3	£1,160,991	3
EE: Fuel switch (electrification)	£16,505,864	12	£1,714,645	11
EE: Resource efficiency	£304,665	2	£345,762	2
EE: Heating and cooling equipment	£11,391,853	7	£1,901,632	8
Other	£3,470,475	1	£795,918	1

Table 5: Distribution of grants per sector and SIC code (total £ and number of grants)

Sector and SIC code	Combined grant funding	Count
Food and beverages (10-11)	£40,635,739	41
Paper and printing (17-18)	£7,367,329	6
Energy and refining (19, 35)	£15,658,929	7
Chemicals and pharmaceuticals (20-21)	£5,079,699	5
Plastics and rubber (22)	£108,110	4

Sector and SIC code	Combined grant funding	Count
Non-metallic minerals (23)	£34,556,267	33
Metals and fabrication (24-25)	£38,659,911	18
Machinery and equipment (28)	£262,389	2
Transport equipment (29-30)	£1,433,571	3
Other manufacturing (31-33)	£4,873,897	5
Waste and recycling (38-39)	£970,453	3
Trade (46–47)	£1,554,742	2
Logistics and services (53, 63, 64, 68, 70, 71, 72, 74, 82, 96)	£1,168,187	7

Evaluation aims

There are three main purposes of the Interim Impact Evaluation,

- **Objectives, Contribution, Causation, and Attribution:** To establish the extent to which the scheme has met its objectives, how, and why, especially the degree to which IETF has “contributed to” or “caused” its identified impacts ‘benefits’ and with reference to additionality
- **Primary Quantitative Benefits of IETF:** To robustly estimate the numerical primary quantitative benefits of the IETF to date which have arisen from funded projects
- **Reduced Costs & Risks and Secondary Benefits of IETF:** To identify the degree to which, IETF has delivered secondary benefits and, whether any effects have extended into the wider market such as shifts in perception or behaviour.

How to read this report

The remainder of the report is structured as follows:

- **Chapter 2** sets out the programme Theory of Change (ToC), explains the role of contribution claims in the evaluation, and maps the contribution claims to the evaluation questions
- **Chapter 3** summarises the methodology and research tools that have been used to deliver to Interim Impact Evaluation
- **Chapter 4** describes the primary and secondary benefits (set out in the theory of change) that have been observed
- **Chapter 5** presents the evidence that supports the contribution of the programme to delivering the observed benefits. The chapter also identifies the contribution of other factors in affecting the delivery of observed benefits

- **Chapter 6** discusses the quantitative assessment of programme costs and benefits, including carbon cost effectiveness, and cost-benefit analysis
- **Chapter 7** discusses the linkages between the additionality of the programme, observed unintended consequences, and lessons learned from the programme for future policy
- **Chapter 8** provides conclusions from the Interim Impact Evaluation

The report is also accompanied by annexes providing additional information to support the evaluation.

2. Theory of Change and contribution claims

The Interim Impact Evaluation also aimed to test the validity of the later stages (Barriers overcome > Outcomes) of the Theory of Change (ToC) for the programme.

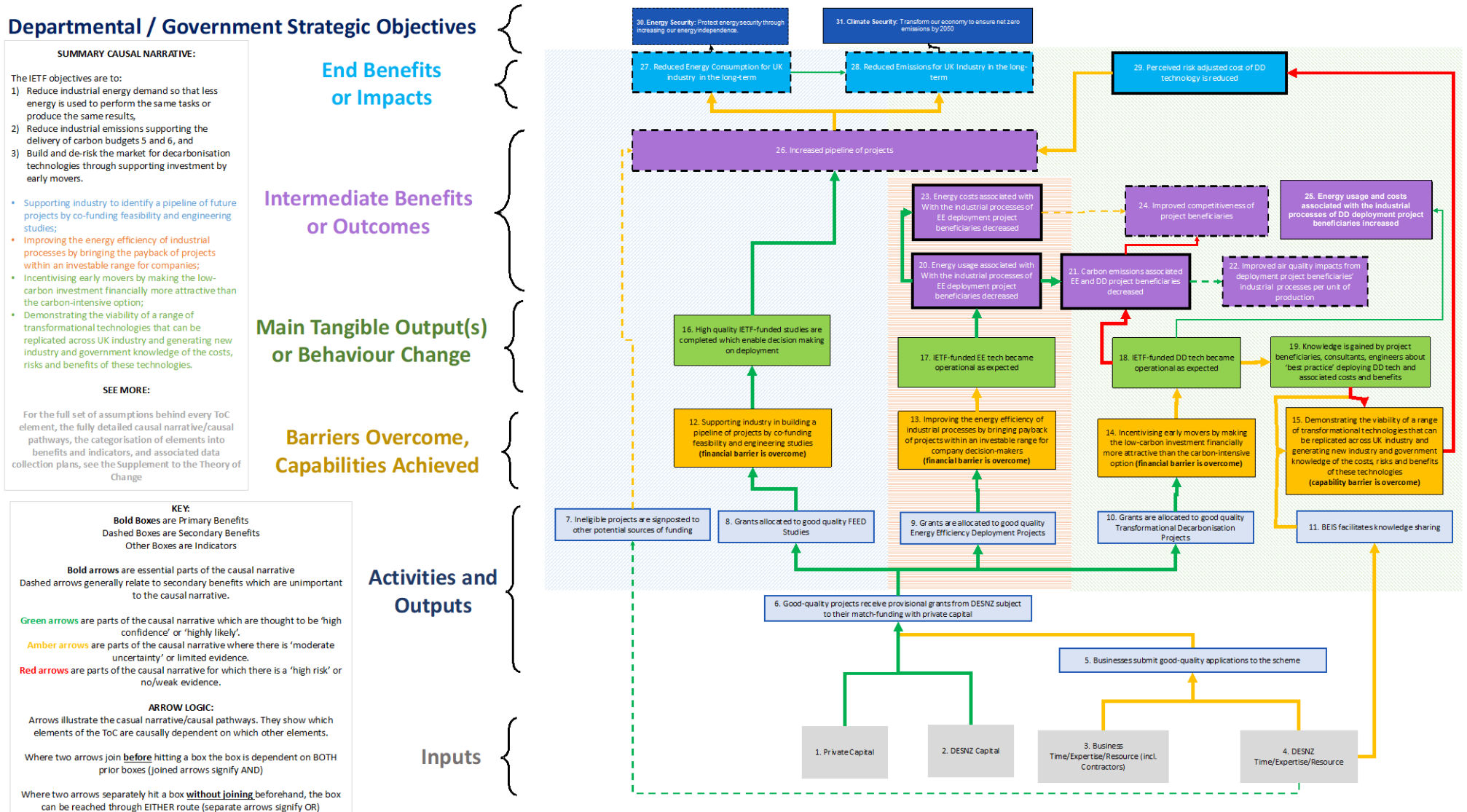
During 2021, a preliminary ToC was developed for the IETF by external contractors. It emphasised quantitative monitoring metrics to serve the project's Benefits Management governance regime but had limited detail on the causal narrative.

The Department for Energy Security and Net Zero (DESNZ) IETF Monitoring & Evaluation team worked on expanding and developing the preliminary ToC, expanding on causal claims through a supplement, which details the causal links and prospective indicators for evaluation.

The ToC diagram for the IETF is shown in Figure 1, below. The wider ToC also includes a Theory of Change Supplement (ToCS) (Annex B) developed by DESNZ, that makes the assumptions of the ToC causal story explicit and identifies evidence that may be needed to test the ToC causal linkages.

The Interim Impact Evaluation tested the causal pathways between Boxes 12-26, focusing on the pathways from project delivery through to initial and longer-term outcomes that materialised following project implementation.

Figure 1: IETF Theory of Change Diagram



Source: DESNZ

Contribution claims

The study team used a Contribution Analysis approach¹⁵ to test the causal pathways in the ToC and the ToCS. Each causal pathway was used to define a contribution claim for the IETF. A contribution claim attempts to describe how and why the intervention contributed to the result, detailing the "causal package" at work.

It provides a credible, evidence-based case that a reasonable person would likely agree with.

The ten (10) contribution claims form the basis of the analysis in this report. They were defined as:

Contribution claim 1: IETF study grants contribute to an increased pipeline of EE/DD projects because studies conclude that it is financially viable to deploy EE/DD technologies, enabling beneficiaries to commit to deployment. Firms would not be able to fund studies otherwise (due to financial barrier).

Contribution claim 2: IETF EE grants lead to reduced energy consumption and energy costs for beneficiary projects, by enabling the deployment of more energy efficient technologies which firms would otherwise not deploy due to long payback period (financial barrier).

Contribution claim 3: IETF DD and EE grants enable beneficiaries to reduce the carbon intensity of processes, by enabling the deployment of low carbon and/or energy efficient technologies which they would otherwise not deploy due to more carbon intensive options being more financially attractive (financial barrier).

Contribution claim 4: The IETF helps to develop capabilities required for DD and EE¹⁶ deployment among beneficiaries and wider industry, through supporting demonstration and knowledge sharing activities which would not happen without the IETF. This increased capability leads to a reduced perceived (and actual) risk adjusted cost of deploying DD technologies, which leads to an increased pipeline of projects.

Contribution claim 5: IETF funding contributes to increased competitiveness of beneficiaries, because EE beneficiaries are able to reinvest energy efficiency savings or offer more competitive products, and EE and DD firms are better positioned within markets and policy environments which favour low carbon products.

Contribution claim 6: IETF DD projects experience higher energy usage (MWh) and costs (£) because lower carbon fuels are more expensive per unit or carbon capture requires greater energy input.

¹⁵ Contribution Analysis is explained further in [Chapter 3 Research Methodology](#).

¹⁶ The programme ToC originally theorised that the capability pathway was only relevant for DD, however during the Interim Impact Evaluation design phase, the evaluation team and DESNZ decided to also include EE capabilities for the purpose of the evaluation.

Contribution claim 7: IETF contributes to lower energy consumption of UK industry and greater energy security over the long term by supporting a shift to more energy efficient technology adoption within UK industry.

Contribution claim 8: IETF contributes to lower carbon emissions of UK industry and the transition to Net Zero by supporting a shift to lower carbon technology adoption within UK industry.

Contribution claim 9: IETF funding contributes to air quality improvements because EE and DD projects produce fewer harmful gases / particulates.

Contribution claim 10: The IETF supports the creation and/or strengthening of jobs either directly within beneficiary firms or indirectly within supply chains, by proving and stimulating new revenue streams built around new EE and DD technologies.

Evaluation questions

The evaluation questions (EQs) for the study are set out in Table 6 below.

The table maps the EQs to the contribution claims listed above. This provides a structured approach to testing the ToC, whilst answering the evaluation questions. The impact EQs marked with an asterisk (*) were highlighted by DESNZ as priority questions prior to the study inception.

Table 6: Evaluation questions mapped to contribution claims

TOC:

EQ #	Evaluation question	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10
1	Test and refine the causal pathways in the ToC from Barriers Overcome/Capabilities Achieved to End Benefits or Impacts (elements 12-31 of the ToC).	x	x	x	x	x	x	x	x	x	x

Strategic objectives, contribution, causation, and attribution:

EQ #	Evaluation question	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10
2	To what extent can it be evidenced that the IETF itself contributed to achieving the benefits delivered by the underlying projects?*	x	x	x	x	x	x	x	x	x	x
3	How additional was IETF funding, in terms of the benefits achieved over and above a non-IETF scenario?	x	x	x	x	x	x	x	x	x	x
4	To what extent did the EE scheme objectives impact, support or counteract with the DD scheme objectives and vice versa?*		x	x			x				

EQ #	Evaluation question	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10
5	Have there been any unintended consequences (positive or negative) of the IETF policy and if so, what are they and why did they arise?*	x	x	x	x	x	x	x	x	x	x
6	Were there any material interactions between IETF and other government environmental or economic policies?*	x	x	x	x	x	x	x	x	x	x
7	What lessons, if any, arise from the IETF which could help HMG in determining the pathway to 2050 decarbonisation goals?*	x	x	x	x	x	x	x	x	x	x

Primary Quantitative Benefits of IETF:

EQ #	Evaluation question	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10
8	How has the scheme reduced energy intensity, energy costs and carbon emissions for industry (EE objective)?*		x	x							
9	How has the scheme reduced energy intensity and carbon emissions for industry? (DD objective)*			x			x				
10	What was the overall carbon cost-effectiveness of the IETF (tCO ₂ e/£)?*			x	x						
11	What was the overall BCR of the IETF?		x	x			x				
12	To what extent has the IETF contributed to carbon budgets (especially 4 or 5) and the Net Zero 2050 target?*		x	x					x		

Reduced costs & risks and secondary benefits of IETF:

EQ #	Evaluation question	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10
13	How has the scheme brought down the perceived risk-adjusted costs of energy efficiency and deep decarbonisation technologies and the actual risk-adjusted costs for deep decarbonisation technologies for the wider sector beyond beneficiaries?*	x			x						
14	What has been the impact of the IETF on the competitiveness of beneficiaries (e.g. productivity, finances, ability to use new technology) and why?					x					
15	To what extent have qualitative factors enhanced or diminished the scheme's value-for-money?	x			x	x		x	x	x	x
16	How has the IETF impacted jobs?*										x
17	To what extent has the IETF generated evidence on the costs and benefits of EE and DD tech and how has that evidence been shared with, or otherwise influenced wider industry?*				x						

Source: Technopolis

3. Research methodology

The Interim Impact Evaluation Research methodology annex (Annex A) provides expanded details on the research methodology, research questions and the evaluation fieldwork. The evaluation was framed by a set of prioritised research questions focused on understanding the performance of key programme processes, the programme ToC, and wider questions such as the programme's alignment with wider Net Zero policies.

The research methodology was structured around a Contribution Analysis and Process Tracing (CAPT) framework (Annex D). The CAPT framework acted as a map of logical tests and evidence sources required to test the programme TOC, providing a structured and transparent way of arriving at evaluative judgements.

The CAPT framework draws together qualitative and quantitative sources of evidence which have been triangulated to assess the benefits, contribution and additionality of the programme. Quantitative Benefits Analysis (QBA) is a distinct modelling process for analysing the programme's primary benefits, which is integrated as an evidence source within the CAPT framework.

Conclusions from the CAPT analysis provided the foundations for answering the evaluation questions (as illustrated in Table 6 above).

CAPT framework

Contribution Analysis (CA) and Process Tracing (PT) are two distinct theory-based approaches, which can be combined to strengthen the evaluation of complex programmes, such as the IETF. A combined CAPT framework was chosen for the evaluation of the IETF because it enables rigorous testing of ToC causal mechanisms and the programme's contribution to a complex mix of qualitative and quantitative benefits. Additionally, CA and PT are non-experimental methods which can be applied in a context where experimental methods more difficult to apply, as is the case for large and unique interventions like the IETF.

By enabling a rigorous testing of the causal mechanisms within the programme ToC, a CAPT based evaluation supports a deeper analysis of the programme design, and the role the IETF plays in overcoming financial and capability barriers to industrial decarbonisation.

The CAPT framework also provides transparency, in advance of fieldwork, on what criteria will be used to judge whether programme theories hold true or not and how conclusions will be drawn.

Process Tracing tests

PT seeks evidence to evaluate each step in a hypothesised causal chain, and applies logical tests to assess the strength of evidence for causal pathways. These PT tests can be usefully adapted to programme level analyses in combination with CA to trace and evidence programme mechanisms.

There are four types of causal tests commonly used in process tracing. Definitions of the PT tests are provided in Table 7 below.

Table 7: Process Tracing test definitions

Term	Definition
Straw-in-the-Wind (SITW)	Evidence that lends support to a causal claim in the hypothesis but is not sufficient in itself to confirm it if observed, or to disprove with certainty if not observed. This type of evidence is slightly more likely to be observed if the hypothesis is true, but might be observed even if it is false.
Hoop test (HT)	Disproves or considerably weakens the hypothesis if not found, but is not sufficient to confirm the hypothesis. These are necessary pieces of evidence that we would 'expect to see' if the given hypothesis is true, such as grant funded projects were completed.
Smoking gun (SG)	Evidence that provides a convincing cause-and-effect type contribution story. It strengthens the hypothesis if observed but does not disprove the hypothesis if not observed (although may slightly weaken it). These are pieces of evidence that are likely to be observed if a given hypothesis is true and unlikely to be observed if it is not true.
Double-decisive (DoDe)	If observed, confirms the hypothesis and disconfirms alternative explanations. If not observed, the hypothesis is rejected or significantly weakened. In practice, such definitive evidence may be harder to uncover.

Source: Adapted from Stephen Van Evera (1997) 'Guide to Methods for Students of Political Science'

The assessment of individual contribution claims later in the report includes references to whether how evidence passes or fails various types of these process tracing tests. As described in detail in Annex A, an assessment of the strength of evidence per contribution claim is given based on an aggregation of the evidence tests. Strength of evidence is defined as either strong, moderate, weak/limited or no evidence in support. Strength of evidence is used to classify how reliable the evidence is, separate to the 'contribution story' that emerges from the evidence.

Quantitative Benefits Analysis

As part of the overall CAPT framework, a Quantitative Benefits Analysis (QBA) was performed to assess the programme's primary benefits. The outputs from the QBA were included as evidence sources within PT tests, and triangulated as part of the integrated CA.

The main data source for the QBA was the programme's monitoring and verification (M&V) reporting, as well as complementary qualitative fieldwork insights to develop counterfactual scenarios.

The QBA, backed by monitoring and counterfactual data, provided evidence regarding the reduction in energy intensity, energy costs and carbon emissions within the IETF-funded portfolio of projects. These project-level savings provide evidence that IETF-funded projects contributed to reductions in energy intensity, energy costs and carbon emissions (EQ8 and EQ9). However, the analysis did not assess the scale of these impacts relative to overall industry-wide reductions. Counterfactual (i.e. without IETF) outcomes were estimated and sensitivity tested based on stakeholder consultations to ensure the net effect of the fund is captured. It should be noted that the QBA only assessed the direct and primary benefits of the IETF beneficiaries.

The estimated primary benefits were used in a cost-benefit analysis (CBA) that aggregates and calculates the IETF's benefit-cost ratio (BCR) (EQ11), carbon-cost effectiveness (CCE) (EQ10), as well as its contribution to carbon budgets (EQ12).

Additional details of the QBA methodology are provided in Annex C.

Research tools

The evaluation took a mixed-methods approach to gather and triangulate evidence. Data collection and evidence sources included:

- **Interview programme:** 36 Interviews were conducted – across 6 stakeholder groups – 15 Deployment Beneficiaries, 10 Study Beneficiaries, 2 Unsuccessful/withdrawn study and deployment beneficiaries, 6 Wider Industry (trade associations, academia, consultants), and 3 Government (DESNZ and Innovate UK). Interviews were c.45-60min semi structured consultations, using interview guides and conducted via online video calls.
- **A beneficiary survey** was sent to all Phase 1 and 2 grant holders and unsuccessful/withdrawn applicants. 65 responses were completed¹⁷. The survey was conducted using an online survey portal¹⁸. Table shows the response rates for beneficiaries. DESNZ directly supported engagement by sending requests for participation and reminders.

¹⁷ Successful Deployment: 35; Unsuccessful deployment: 3 Study survey: 26; Unsuccessful study: 1

¹⁸ [SurveyMonkey website](#)

Table 8: Beneficiary survey response rates

Beneficiary group	Population	No. Responses	Response rate
Studies	56	26	46%
Deployment	80	35	44%

Source: Technopolis survey

Note: Response rates for unsuccessful applicants were below 1%. This reflects a disengaged stakeholder group, and represents a limitation for the study (listed in the section below).

- **Document analysis:** Project specific documents¹⁹ were reviewed by study team members as part of project mobilisation/ onboarding; to inform research tool design; and as part of project level familiarisation prior to interviews with specific stakeholders.
- **Delivery database:** The delivery database provided details of all the key elements of a project's delivery including: i) applicant details ii) application status iii) funding details vi) project specification v) project location
- **Monitoring and Verification data (M&V) and Benefits Database:** Deployment projects are required to report data on equipment performance for 5 years following installation. This data is reported by projects via a standardised M&V Data Collection Template, which is then consolidated in the programme Benefits Database. The sources together provided the data input necessary for the QBA.
- As part of the triangulation of evidence set out in the CAPT framework, documents were also reviewed to identify evidence supporting or refuting contribution claims. Documents reviewed included:
 - **Case studies:** Case studies were prepared by beneficiaries to describe the project. These case studies often included the rationale for the project, delivery timelines, challenges and barriers to implementation and metrics demonstrating successful completion. The documents were not specifically for use in the evaluation and varied in scope, length, quality and detail.
 - **Project Completion Forms (PCFs):** Beneficiaries are required to complete a PCF upon completion of their projects. PCFs are a survey covering questions on what was delivered, how it performed against objectives, budget, and timelines, and the outcomes achieved.
 - **Project Change Request (PCR) Log:** The PCR Log captures changes to project scope, cost, schedule, or benefits, and set the rationale for approval.
 - **Knowledge event database:** The database provided details of attendees of the IETF events organised by DESNZ and Innovate UK. These included showcase events delivered around the launch of the IETF Phases to provide attendees with information about the programme and examples of successful projects.

¹⁹ Documents reviewed included: the programme Full Business Case, Project Completion Forms, Project Change Log, the IETF programme delivery database, M&V Data Collection Template, case studies, event attendance data, and secondary data sources including ECUK, DUKES and ONS.

Data was then arranged in a coding framework to enable a structured analysis and triangulation of each PT test and contribution claim.

Limitations of Interim Impact Evaluation

The Interim Impact Evaluation faced various limitations, which should be taken account of when considering the validity of the conclusions.

The qualitative element of the study faced the following limitations:

- **A high representation of beneficiaries within the overall sample frame** introduced bias within the qualitative evidence. This was partly mitigated by triangulation between interview and survey responses of different beneficiary types, as well as inclusion of non-beneficiary perspectives including unsuccessful/ withdrawn applicants (6), wider industry representatives (6) (trade associations, academics and a consultancy), and DESNZ/Innovate UK representatives (3). Where beneficiary accounts are used as a key evidence source for contribution claims, their bias is accounted for in strength of evidence assessments.
- **The primary fieldwork lacked a representative sample to provide a strong and robust counterfactual group that did not receive funding.** This was partly mitigated by targeting the participation of unsuccessful/ withdrawn applicants (6) to understand how they progressed without funding. In addition, consultations with study beneficiaries who have not received deployment grants provided a form of counterfactual on the ability to progress to deployment. Mitigating actions were taken to maximise response rates among this group, by cross referencing study and deployment beneficiaries and targeted survey and interview outreach. In addition, beneficiaries were asked interview and survey questions about alternative scenarios from multiple lines of enquiry (e.g. alternative investment options, likely pace and scale of alternative outcomes). This links to the discussion on QBA counterfactual discussion below.

The quantitative element of the study faced the following limitations:

- **The scope of the QBA for this interim evaluation covered 21 projects from phases 1 and 2 for which M&V data is available.** This represents around 13% of all IETF projects funded under the programme. A more representative sample will be available once additional M&V data has been collected.²⁰ In addition, most of the reporting projects were at an early stage of reporting, with some only having completed one or two 6-month monitoring periods. Therefore, the available data does not capture the possible variance over the lifetime of the 21 projects.
- **The results were particularly limited by the small sample and relatively early-stage nature of the DD projects (n=3).** The small sample of DD projects in the quantitative analysis has been acknowledged when discussing DD insights throughout the report.

²⁰ A final impact evaluation is expected to include a higher percentage of M&V data, once more projects have collected post project implementation data.

- **Defining a counterfactual for forecasted capital works.** Naturally, IETF projects will displace previously forecasted capital works for projects. However, the direction of these changes varied across projects. For example, it is possible IETF capital works increased ongoing labour maintenance requirements or decreased future capital costs by replacing equipment earlier than would have otherwise been possible. Quantitative estimates of these counterfactual cost profiles were not collected as part of M&V data, and as such has not been included in counterfactual estimates. While in theory these counterfactual costs are unlikely to be zero, and thus should be included in the QBA, using the total project costs as a proxy for these 'additional costs' of the IETF represented a conservative approach.
- **Quantitative assumptions around counterfactual definition.** Characterising the counterfactual effectively was a core part of the QBA. Counterfactual outcomes were submitted by project administrators as part of the M&V data and captured in the IETF Benefits Database. The reported counterfactual fuel consumption in the IETF Benefits Database was drawn from the baseline or 'pre-IETF' processes and indicates the fuel consumption that each beneficiary would make in the absence of IETF funding, over a similar time period. However, pre-IETF fuel consumption might not always be an accurate representation of the counterfactual scenario. For example, IETF beneficiaries could have already been considering investments in alternative industrial processes ahead of exploring IETF support and could have still transformed these processes in the absence of said support in some way. There is a risk that the original, unadjusted 'pre-IETF' counterfactuals mis-state the energy consumption and emissions reductions that could have occurred without the IETF support.

Overall limitation on additionality

- Overall, the issues presented above suggest that a primary limitation of the study was a **lack of robust evidence to test claims of additionality**.

This is due to the following factors:

- i) The interim stage of the impact evaluation means only a relatively modest sample of benefits monitoring data is currently available, and many projects are not yet completed (as well as having no representation from Phase 3 projects).
- ii) Poor response rates from unsuccessful applicants / non-applicants mean a stronger counterfactual comparison was not possible.

4. Benefits

This section summarises the observed benefits against the programme’s intended Primary and Secondary Benefits. The following discussion on Contribution Claims (CCs) then details the mechanisms and evidence behind these headline achievements.

Primary benefits

This section presents the ‘medium’ sensitivity results of the QBA carried out using M&V data submitted by post-implementation projects, which represent the most likely outcomes of the QBA. Please refer to Anex C for the ‘low’ and ‘high’ sensitivity analysis results which represent the unlikely but possible lower and upper bounds of the QBA results respectively.

Reduced energy and carbon intensity / production adjusted consumption

Table 9 below sets out the net reduction in energy consumption and net reduction in carbon emissions associated with the 21 projects that have submitted post implementation M&V returns to date.

Table 9: Estimated primary benefits for IETF projects (Medium sensitivity)

Benefit	Unit	EE projects	DD projects	Total
Projects included in analysis	#	18	3	21
Net reduction in energy consumption	GWh	445	25	470
Net reduction in carbon emissions	tCO ₂ e	103,500	1,400	104,900

Source: Ricardo, using DESNZ M&V information

Overall, the 18 EE projects within the IETF scheme are estimated to reduce energy intensity (measured in terms of reduction in production-adjusted²¹ energy consumption) by around 445 GWh between 2021-2050, which corresponds to a 1.5% reduction against the adjusted counterfactual levels of fuel consumption. This results in over 103,500 tCO₂e of carbon emissions saved over the evaluation period of 2021-2050.

²¹ The counterfactual is production-adjusted to account for observed changes in output over time, ensuring that the counterfactual consumption corresponds to the level of energy consumption that would have been expected for the same level of production as the actual, realised level of production.

The direction and magnitude of impacts is driven by two large projects; one of which generates large increases in energy consumption and emissions that are outweighed by the reductions in energy consumption and emissions of the other project in the ‘medium’ sensitivity results presented above²².

The 3 DD projects within the IETF scheme are estimated to reduce energy intensity (measured in terms of reduction in production-adjusted energy consumption) by around 25 GWh between 2021-2050. This corresponds to a 56% reduction against the adjusted counterfactual levels of fuel consumption, generating carbon emission savings of around 1,400 tCO₂e.

Reduced energy costs, including air quality benefits

Table 10 below sets out the discounted monetised values for net reduction in energy costs, carbon emissions and air quality damage costs associated with the 21 projects that have submitted post implementation M&V returns to date.

Table 10: NPV of estimated, monetised benefits, discounted to 2021 (Medium sensitivity)

Monetised benefit (million £, 2025£)	EE projects	DD projects	Total
Projects included in analysis	18	3	21
Net reduction in energy costs	£92m	£1m	£93m
Monetised net reduction in carbon emissions	£27m	£0.3m	£27m
Net reduction in air quality ²³ damage costs	£0.4m	£0.7m	£1m
Total project benefits	£118m	£2m	£120m
Average total benefits per project	£6.6m/project	£0.7m/project	£5.7m/project

Source: Ricardo, using DESNZ M&V information

²² The sensitivity analysis shows that the overall reduction in energy consumption, energy costs, and emissions is maintained only in the ‘high’ sensitivity scenario, where EE projects are estimated to deliver reductions across all three metrics. In the ‘low’ sensitivity scenario, total energy consumption and carbon emissions are estimated to increase. This outcome is driven by a single project with disproportionately large increases in energy use and emissions, which more than offset the reductions achieved by the remaining projects in the EE portfolio. Despite this, energy costs are still estimated to decrease in the ‘low’ sensitivity scenario, reflecting a substantial cost reduction from one project that outweighs the impact of higher energy consumption elsewhere in the portfolio. These results highlight the heterogeneous performance of projects within the portfolio and associated delivery risks. Further details of the sensitivity analysis are provided in Annex C

²³ Air quality was a secondary benefit for the programme but is included in the primary benefits table as its contributions to the quantitative analysis of total project benefits.

EE projects drive the majority of the observed monetised benefits, largely through energy cost savings and carbon emissions reductions, as they account for a larger proportion of the portfolio (18 out of 21 projects). DD projects generate much lower monetised benefits overall due to their focus on decarbonisation, but with a relatively higher share of total benefits attributable to air quality damage cost reductions compared with EE projects. These results may change in the Final Evaluation, as only a small number of DD projects (3 out of 21) are currently reporting M&V data.

Secondary benefits

In addition to the primary benefits which have been described quantitatively above, secondary benefits have also been observed. These secondary benefits have been assessed qualitatively.

Competitiveness of beneficiaries

The IETF has supported modest enhancement in cost competitiveness²⁴ arising from lower energy expenditure and reduced carbon costs, reflecting lower emissions. By decreasing ongoing operating costs, the programme supports participating organisations in maintaining or strengthening their market position.

Employment benefits

Employment-related²⁵ benefits have also been observed. Evidence indicates that a modest number of jobs have been both safeguarded and created. These effects have predominantly arisen during the design, engineering and construction phases, including mechanical engineering, construction and project management activities. Such employment effects have generally been temporary in nature, reflecting the time-limited requirements of installation and commissioning phases.

Employment has also been safeguarded as a result of the improved competitiveness described above, as well as for the resourcing of ongoing operations, such as the operation and maintenance of energy assets.

Learning and capabilities

Learning and capability benefits have been observed²⁶. Areas of learning included:

- The introduction of hydrogen into sites, often as a substitute for natural gas. Participating organisations have developed knowledge relating to the technical, safety and operational requirements associated with hydrogen use, including infrastructure modifications, regulatory considerations and system integration.
- Understanding risks associated with the adoption of technologies that were, in some cases, initially met with internal (management) scepticism—most notably heat pumps.

²⁴ Further details of the IETF contribution to competitiveness are discussed in [Contribution Claim 5](#).

²⁵ Further details of the IETF contribution are discussed in [Contribution Claim 10](#).

²⁶ Further details of the IETF contribution are discussed in [Contribution Claim 4](#).

- Contractors and specialist consultants have played a central role in developing skills and knowledge of internal project teams. As a result, organisations have strengthened their capability to specify, manage and operate low-carbon energy systems.
- Integration of established technologies into specific site and industry contexts. While many of the technologies deployed are well understood in principle, their application within particular operational environments has required site-specific learning.

Pipeline development

Limited benefits from the scheme's contribution to pipeline development have been observed beyond direct beneficiary projects, as discussed in CC1 and CC4, primarily because financial barriers remain too high to pursue unsubsidised deployment.

The IETF has supported modest contributions to knowledge and capabilities required to deploy EE and DD technologies, which has played a role in reducing the perceived risk of deployment by demonstrating viability among a wider set of UK industries. Studies have enabled assessments of the viability of deployment, however, progression from studies to deployment remains limited by the ability to overcome financial barriers.

5. Contribution of IETF to achieving the benefits

Overall assessment

Table 11 shows an overall assessment of the contribution that IETF has made to achieving primary and secondary benefits, as set out in the 10 contribution claims. The contribution claims are assessed on two scales:

- the contribution of the IETF to achieving the outcome/impact described in the contribution claim (necessity/ sufficiency)
- the strength of evidence available to support the assessment of contribution

Table 11: Assessment of contribution of IETF and strength of evidence to support assessment

#CC	CC name	Extent to which outcome has been achieved	%	Contribution of IETF (Link between IETF and observed outcomes/ impacts)	%	Strength of evidence (confidence in findings)	RAG
1	Contribution Claim 1: IETF studies funding creates a pipeline of future industrial decarbonisation projects	Outcome partly achieved: beneficial studies, but pipeline still reliant on further subsidy support	50%	IETF grants necessary for studies to be conducted, but not sufficient for deployment.	50%	Moderate evidence to support assessment of contribution.	Amber
2	Contribution Claim 2: EE grants enable deployment of more energy efficient technologies	Outcome achieved: reduced financial barrier and evidence of improved energy performance	100%	IETF grants necessary for outcome, but supported by other market and regulatory factors	75%	Strong / moderate evidence to support assessment of contribution	Green
3	Contribution Claim 3: IETF grants lead to reduced carbon intensity of processes	Outcome achieved: reduced financial barrier and evidence of improved emissions performance	100%	IETF grants necessary for outcome, but supported by other market and regulatory factors	75%	Strong / moderate evidence to support assessment of contribution	Green
4	Contribution Claim 4: IETF helps to develop capability through demonstration and knowledge sharing, leading to lower perceived risks and increased project pipeline	Outcome partially achieved: moderate benefit for capabilities, but limited effect on wider sector uptake / pipeline	25%	IETF supports some capability via demonstration and learning, but wider uptake is driven by financial barrier	50%	Weak / moderate evidence to support assessment of contribution	Amber
5	Contribution Claim 5: IETF contributes to increased competitiveness	Outcome partly achieved: reduction of energy costs supports resilience, but limited product/ investor attractiveness	50%	IETF supports competitiveness via energy and carbon cost reductions, but competitiveness determined mostly by other market factors.	25%	Moderate evidence to support assessment of contribution	Amber

#CC	CC name	Extent to which outcome has been achieved	%	Contribution of IETF (Link between IETF and observed outcomes/ impacts)	%	Strength of evidence (confidence in findings)	RAG
6	Contribution Claim 6: DD projects experience higher costs to achieve lower carbon intensity	Outcome mostly achieved: DD projects demonstrate smaller reductions in energy costs compared to EE	75%	IETF DD grants achieve smaller energy cost reductions than EE projects due to inherent fuel costs.	25%	Weak evidence to support assessment of contribution	Red
7	Contribution Claim 7: IETF supports reduction in national industry energy intensity	Outcome slightly supported: energy reduction at project level, but not attributable to national trends	25%	IETF plays a minor contributing role in national trends, which are driven more by other market and regulatory factors.	25%	Moderate evidence to support assessment of contribution	Amber
8	Contribution Claim 8: IETF contributes to lower carbon emissions of UK industry	Outcome achieved: air quality damage factors improved at project level	100%	IETF enables deployment, but other market and regulatory factors support business case	75%	Moderate evidence to support assessment of contribution	Amber
9	Contribution Claim 9: IETF contributes to local air quality improvements	Outcome achieved: air quality damage factors improved at project level	100%	IETF enables deployment, but other market and regulatory factors support business case	75%	Moderate evidence to support assessment of contribution	Amber
10	Contribution Claim 10: The IETF supports jobs	Outcome partially achieved: modest jobs benefits during project construction and operation	25%	IETF grants play a minor role in hiring decisions relative to wider market factors.	25%	Moderate evidence to support assessment of contribution	Amber

Contribution Claim 1 – Studies Pipeline

Pathway: IETF study grants contribute to an increased pipeline of EE/DD projects because studies conclude that it is financially viable to deploy EE/DD technologies, enabling beneficiaries to commit to deployment. Firms would not be able to fund studies otherwise (due to financial barrier)

CC1: Contribution of IETF

Summary of contribution:

The IETF is found to play a moderate role in contributing to an increased pipeline of EE/DD projects via study grants. Study beneficiaries emphasised that the IETF reduced the financial barrier to conducting studies and strongly informed decisions around deployment, yet other factors also contributed to beneficiary decision-making and their ability to progress to deployment.

IETF study grants were found to make a unique contribution in encouraging innovation-focused projects, providing resources for study teams to experiment and assess the viability of technologies. The grants act as testing ground for companies, de-risking technologies and allowing them subsequently to apply to larger schemes and funding opportunities such as Hydrogen Allocation Rounds (HAR)²⁷ and wider Carbon Capture Business Model (CCBM)²⁸ funding.

Role of IETF in reducing the financial barrier to conducting studies:

Study beneficiaries emphasised how the IETF grant enabled them to invest in EE and DD technology studies by significantly reducing the financial barrier of conducting them.

In surveys 69% of study beneficiaries²⁹ strongly agreed that the IETF grant reduced the financial barrier, as shown in Figure 2 below. This sentiment was also echoed in study beneficiary interviews (n=10) with two DD interviews noting that they were not aware of alternative financing mechanisms in the UK for larger companies and clusters. Survey data also showed that half³⁰ of study projects would not have gone ahead due to cost of investment. Others would have progressed at a significantly slower pace (19%) and/ or smaller scale (27%). For example, study beneficiaries may have otherwise delivered a simple desktop study.

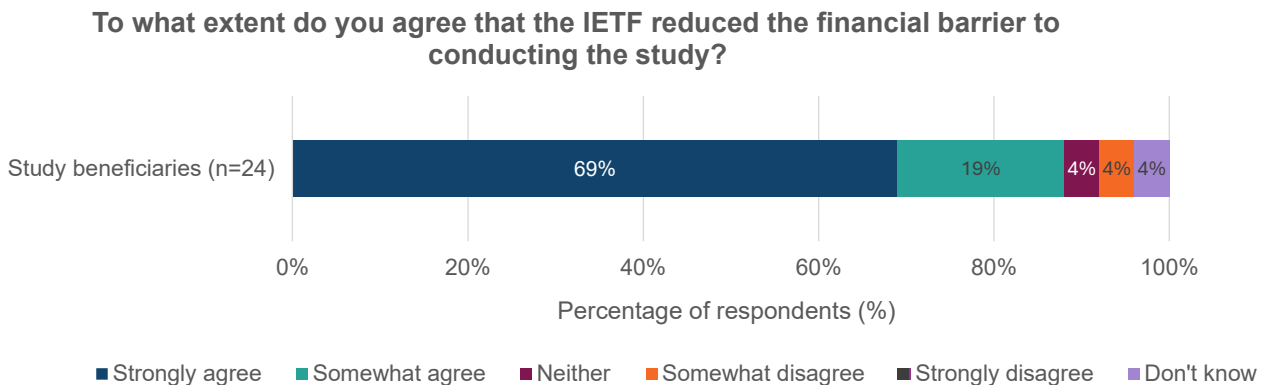
²⁷ The [Hydrogen Allocation Rounds \(HARs\)](#) allocate revenue support through the Hydrogen Production Business Model (HPBM).

²⁸ DESNZ (2026) '[Carbon capture, usage and storage \(CCUS\): business models](#)'

²⁹ n=24

³⁰ n=26

Figure 2: Perceived reduction in financial barriers to conducting the study as a result of IETF support



Source: Technopolis study beneficiary survey

Other factors which contributed to business cases to invest in studies were also mentioned by study beneficiaries in interviews. These included:

- Demand-led factors, including internal company decarbonisation targets which are in part driven by customer demand/ perceived customer demand from (e.g.) supply chain and supermarkets.
- Mitigating increases in costs, such as forecasted carbon price rises and energy price spikes.
- Regulations/ government incentives. Regulations included the EU’s Power Usage Effectiveness (PUE)³¹, ISO 50001 compliance³², and the Science Based Targets initiative (SBTi)³³. Government incentives included the Hydrogen Allocation Round (HAR) 2 and Industrial Carbon Capture (ICC) business models³⁴.

Role of IETF studies in supporting informed decisions around deployment:

Study beneficiaries emphasised that IETF studies allowed them to assess the viability of technologies in order to make informed decisions around deployment.

Project case studies and interviewees identified that study projects were useful to assess both technical viability and financial viability of projects. 86% of survey respondents³⁵ strongly agreed that studies gave them the ability to identify technical and financial viability of the project. There was also strong evidence from study beneficiaries that IETF studies enabled decision making on deployment.

³¹ EU PUE, starting January 1, 2025, under the Energy Efficiency Directive (EED) measures data centre energy efficiency. If a UK business has an EU branch, subsidiary, or offers goods/services directly to individuals in the EU (e.g. cloud services, IoT products), they must comply with EU regulations.

³² [ISO 50001](#) is the ISO standard for energy management.

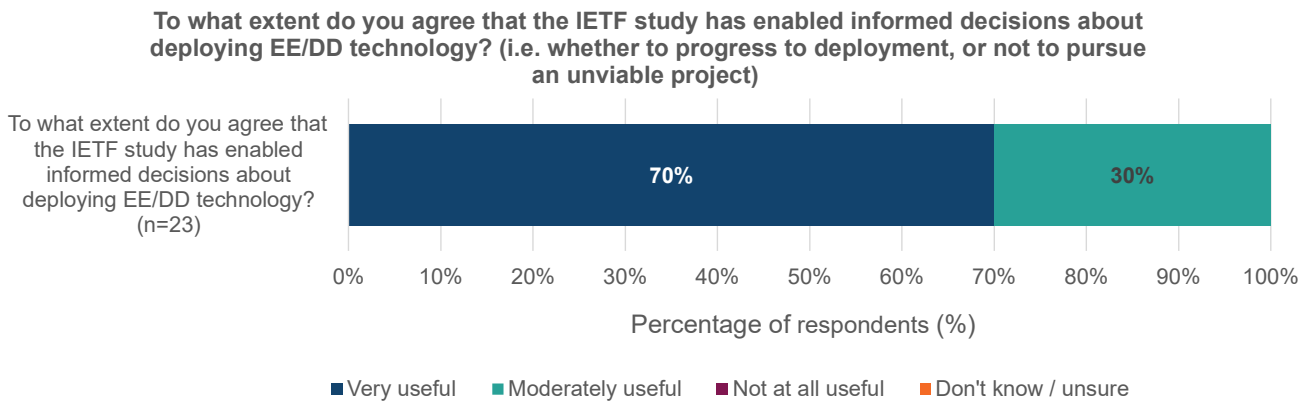
³³ SBTi develop the standards, tools, and guidance which enable companies and financial institutions worldwide to take credible, science-based climate action. More information can be found on the [SBTi website](#).

³⁴ HAR 2 ([Hydrogen Allocation Round 2](#)) and ICC ([Carbon Capture, Usage and Storage \(CCUS\): business models](#)) influenced businesses to invest in studies. Studies enabled businesses to (e.g.) discover the viability of a technology, enhancing their HAR 2 and ICC applications.

³⁵ n=7

As shown in Figure 3 below, the majority (70%) of survey respondents³⁶ answered that the study was ‘very useful’ in enabling informed decisions, which was echoed in all study beneficiary interviewees. Two beneficiaries discovered through the study that their projects were financially unviable, one of which discovered that the blending of hydrogen into a gas system on their own site would put pressure on the equipment and subsequently redirected them to apply for an IETF deployment grant for a different technology.

Figure 3: Extent to which IETF study evidence informed or enabled subsequent deployment projects



Source: Technopolis study beneficiary survey

Several interviewees also stressed that studies were useful in terms of enabling deeper analytical depth, allowing for more ambitious scope for experimentation. One interviewee said the study allowed the assessment (and later deployment) of transformational rather than incremental equipment changes, covering the specialist engineering design and analysis work that the company would not have funded internally. The study outputs gave the business confidence to invest and commit to construction, even without the deployment grant.

In a couple of cases, studies and grants were used for the co-production of knowledge, attracting interest and involvement from external institutions, including academia, consultancies, and other companies. One hydrogen study beneficiary interviewee noted that they received free support from a consultancy purely because of their association with IETF - support provided from an academic partner also resulted in two published academic papers. Additionally, a study beneficiary interviewee said that the study enabled them to carry out early stage, precursor work towards a larger HAR 2 project application. The study demonstrated that hydrogen was feasible, de-risking the HAR 2 project and increasing the likelihood of securing funding.

“For HAR 2 it’s been really useful having this IETF [project] running, because [HAR 2 requires that] your off taker is ready to have the hydrogen. And we can say, ‘Yes we are, we’re doing this study...we’ve got programmes in place to make sure that we would be ready to take hydrogen by the time you’re ready to give us hydrogen’ ” – Study Beneficiary

³⁶ n=23

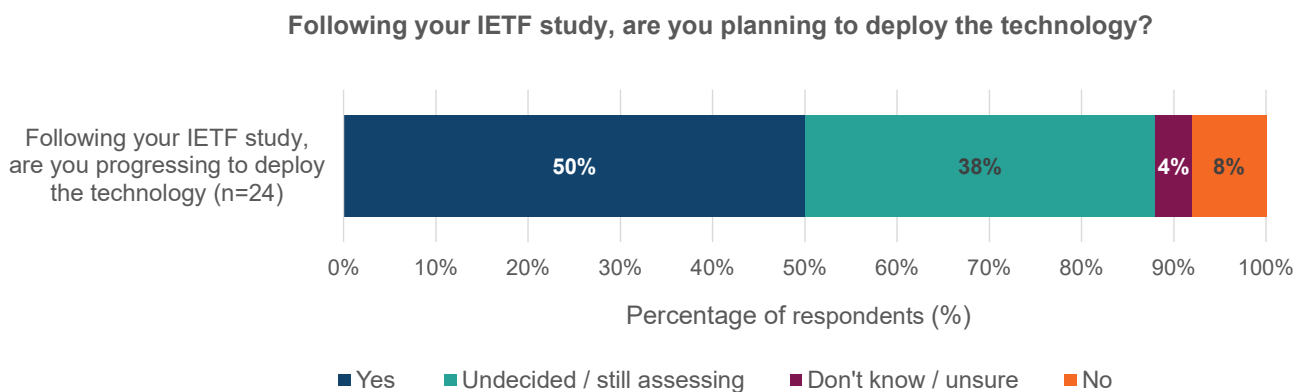
This aspect was also mentioned by the IETF delivery team and wider industry/expert interviewees, who highlighted that studies support the preparation of projects which later can become HAR off-takers or connect to CCBM infrastructure. Interviewees noted that IETF studies can act as a testing ground for companies, giving them the ability to de-risk projects, as well as build supply chains, positioning them well in preparation for HAR and CCBM funds.

Role of IETF studies in enabling deployment/ building a pipeline of projects:

Evidence from study beneficiaries showed that IETF studies have, in some cases, successfully led to project deployment, although the extent of this impact remains uncertain.

As indicated in the Figure 4 below, 50% of study beneficiaries³⁷ surveyed stated that they intended to progress to deploy the technology³⁸. This proportion was similarly echoed in interviews. However, the ability of larger projects to progress was consistently highlighted as being contingent on the ability to secure further funding support (either through the IETF, HAR or CCBM) or otherwise were progressing with smaller projects or projects in other countries where subsidy support is available. Where project teams were not progressing, they cited a lack of further available financial support as the primary factor, with many expressing concerns over the discontinuation of the IETF as a primary route for deployment. For example, one study beneficiary had applied for, but not been successful in securing an IETF deployment grant. In some cases, projects were still assessing deployment viability – for example, evidence from one case study explained that the project concept explored in the study still needed to be progressed to a scalable deployment project.

Figure 4: Progression to technology deployment following completion of the IETF study



Source: Technopolis study beneficiary survey

Contribution of non-programme factors:

Interviewees also pointed to other factors that have contributed to both their decision and their ability to progress to deployment. Where study beneficiaries have progressed, they cited both rising energy costs and Net Zero commitments as drivers for deployment, and to a lesser extent consumer demand. Where study beneficiaries did not progress, a variety of issues were highlighted, including clarity on future UK Emissions Trading Scheme (UK ETS)³⁹ allocations and concerns around the future of Carbon Border Management Adjustment (CBAM).

³⁷ (n=24)

³⁸ 80% of DD FEED study survey respondents were progressing to deployment

³⁹ DESNZ (2025) '[UK Emissions Trading Scheme \(UK ETS\): policy overview](#)'

One study beneficiary noted significant technological and operational risks highlighted by the study as the reason why they were not progressing, while another highlighted the cost risk of the required shutdown to deploy the new technology. This was deemed as not feasible without a deployment grant (for which they had been unsuccessful in applying for). One wider industry viewpoint was as follows:

“There is no visibility on how the CBAM rate is going to be calculated. We have major concerns over the auditing and whether the CBAM will actually work as intended... to the point where it is simply going to be an irrelevant policy that doesn't deliver its aim... we significantly question whether it will work at all.” - Wider Industry Stakeholder

It is worth noting that although the eligibility criteria for (primarily feasibility) studies required a minimum TRL of 7 (8 for EE studies), there were cases where there was uncertainty at project start about the future technical or commercial viability of a project. In the cases where studies identified that the proposed project was not viable, no progression to deployment can be expected. As per the programme ToC, the identification of a non-viable project (and avoidance of financial loss) is viewed as positive outcome of the study grant.

A non-programme factor that affected the ability of study beneficiaries to progress to deployment (rather than the decision to progress) was availability of low carbon hydrogen. As mentioned earlier, hydrogen suppliers have to demonstrate that they have credible customers that are ready to take the hydrogen before they are in a position to supply. This presents a reinforcing dependency risk as off takers would normally not choose to spend money without a guarantee that you have a supply readily available for you. Furthermore, government funding for IETF grants and for suppliers to provide low carbon hydrogen are not joined up. This means that if an IETF grantee gets funding to build, there is a risk that their supplier may not get funding (as discussed further in CC3).

CC1: Assessment of Confidence in contribution/ strength of evidence

The evidence in support of CC1 is **Moderate**.

All data sources are consistent in showing that study beneficiary grants play a unique and essential role in lowering the financial barrier to studies, and strongly support informed decisions around deployment. However, the ability to progress to deployment is influenced by a range of factors related to financial barrier, such as customer demand, internal company targets, and regulatory signals (namely energy costs, ETS and CBAM), and reliance on other funding for larger schemes (e.g. HAR 2).

The evidence is consistent (i.e. triangulated) across sources including multiple stakeholder group perspectives, and hoop tests and all but one ‘straw-in-the-wind’ (SITW)⁴⁰ tests are passed.

⁴⁰ More details about the classification of Process Tracing tests, including Hoop Tests and Straw-in-the-wind tests is provided in the Interim and Final Impact Evaluation Plan.

Contribution Claim 2 – EE grants enable deployment of more energy efficient technologies

Pathway: IETF EE grants lead to reduced energy consumption and energy costs for beneficiary projects, by enabling the deployment of more energy efficient technologies which firms would otherwise not deploy due to long payback period (financial barrier).

CC2: Contribution of IETF

Summary of contribution:

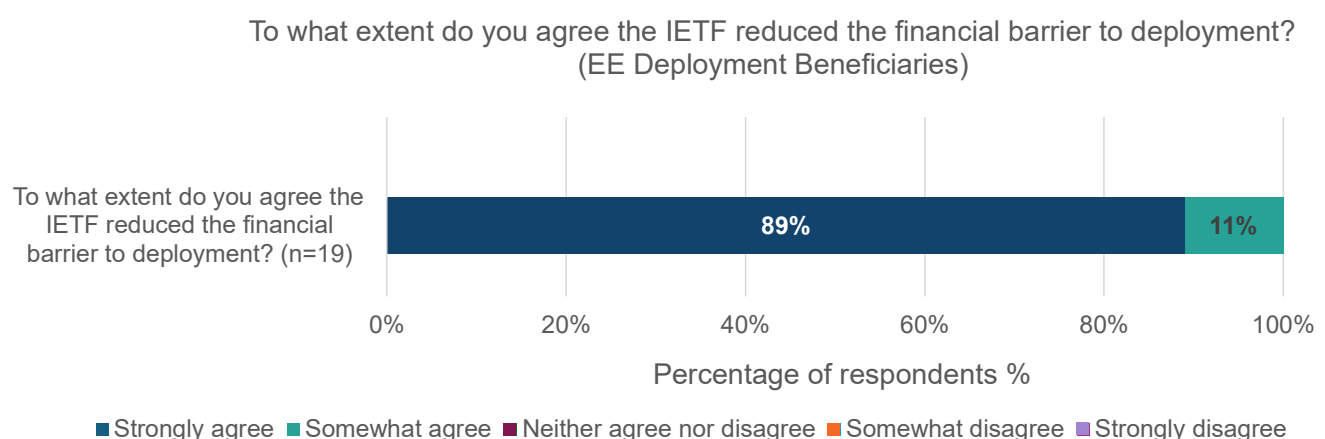
The IETF is found to play an essential role in supporting beneficiaries reduce energy consumption and energy costs, by reducing the financial barrier to deployment of more energy efficient technology. Other contributing factors were identified as supporting the business case for investment, including other policies, programmes, market and regulatory costs. However, the IETF is identified as playing a unique role in enabling the pace and scale of investments in eligible IETF technologies, which are otherwise considered unlikely to happen.

Role in reduction of payback / financial barrier:

EE deployment beneficiaries, and wider industry stakeholders consistently emphasised the unique role that IETF grants have played in reducing the payback period for capital investments that would otherwise be deemed too long to pass internal investment thresholds.

As shown in Figure 5 below, 17 out of 19 EE deployment beneficiary survey responses (89%) strongly agreed that the IETF reduced the financial barrier to deployment, which was supported by views expressed in interviews.⁴¹

Figure 5: Reduction of financial barriers to deployment



Source: Technopolis deployment beneficiary survey

⁴¹ The only medium sized EE deployment respondent indicated 'somewhat agree' - potentially reflecting how these investments are still more challenging for smaller firms, even with grant support.

Evidence from EE deployment beneficiaries demonstrated that projects would not have otherwise gone ahead in the absence of the programme due to the financial barrier. Many beneficiaries stated in interviews (n=9) that without the IETF, they would have prioritised maintenance options rather than upgrades, or where equipment was coming to the end of its life, would replace with lower cost, less transformative equipment. This was echoed by the majority of survey respondents (n=19) who also said that without IETF funding, projects would not have gone ahead or gone ahead at a slower pace and smaller scale. 10 EE deployment responses to the programme Project Completion Form similarly indicated that either no project would have gone ahead in the absence of funding, or only at significantly reduced scale and pace, with a delay of between 2 to 5 years.

“I'm very confident the project wouldn't of [sic] gone ahead without the support.” – EE Deployment Beneficiary

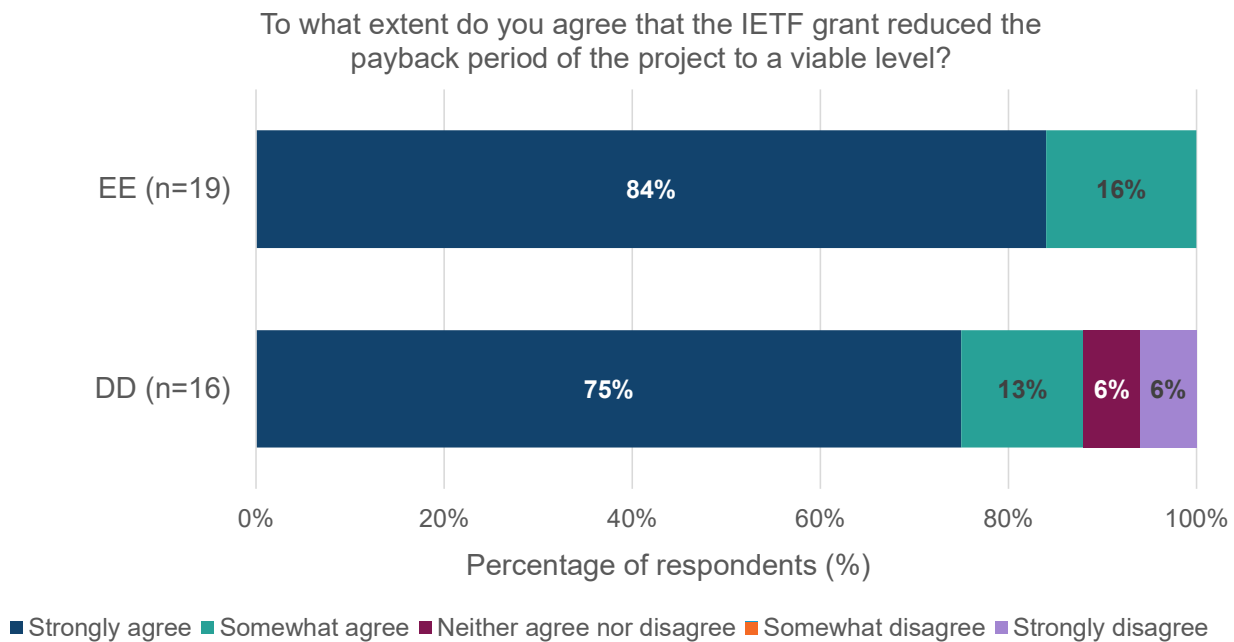
Wider industry representatives (n=6) including trade associations, academia and an engineering consultancy similarly emphasised the necessity of the IETF for the type and scale of investment. Their views were characterised by the following:

“Not a lot of other government programmes are useful... It's complex engineering projects and what they need is funding to get those projects over the line ...it is often difficult to get even funding for the pre-engineering feasibility studies to prove that the projects are feasible within themselves. Other government services have not been helpful in addressing what the IETF did.” – Wider Industry Stakeholder

The two withdrawn EE deployment applicants who were consulted similarly confirmed the importance of IETF funding for their projects, which have not gone ahead since having to withdraw from the scheme.

Reduced payback periods were observed by EE deployment beneficiaries reflecting lower financial barriers. As per Figure 6 below, 16 out of 19 respondents (84%) indicated they 'strongly agree' grants have reduced the payback period of projects to a viable level. Interview evidence (also reflected in survey results) suggested that IETF supported projects in achieving a reduction in payback period of approximately 2-3 years on average. This brought projects in line with internal payback approvals, which typically needed to be under a maximum of 5 years. However, many beneficiaries still referred to the payback as being borderline, even with the IETF grant. This supports the notion that IETF grants were often a deciding factor in a go / no-go decision.

Figure 6: Reduction of payback periods



Source: Technopolis deployment beneficiary survey

As described in the section below on the role of non-programme factors, high UK energy prices were viewed as supporting the investment case for EE capital projects. However, because of energy costs that have increased in recent years, interviewees also reflected that many of the lower cost energy efficiency investments have already been made. Therefore, to go beyond these “easy wins” required a different scale of investment which exceeds company payback thresholds.

Related to financial barrier (and as discussed in CC5), many interviewees highlighted the importance of the IETF in making capital investments in UK subsidiaries attractive at a multinational group level. Many interviewees reported that European countries offer attractive grants for industrial decarbonisation and energy efficiency, so the IETF plays an important role in strengthening the business case for investment in UK plants. This view was consistent among beneficiaries and wider industry stakeholders.

IETF grants represented an average of approximately 29%⁴² of Phase 1 and Phase 2 EE project⁴³ costs, suggesting a reduction of a similar level in upfront costs for beneficiaries. This grant intensity is in line with the programme Full Business Case, and reflects the high proportion of large companies in tier 1 (non-disadvantaged locations) who have been awarded.

⁴² £81m grants; £282m total project costs

⁴³ 56 projects

Reduction in energy consumption and costs:

As discussed in the Primary Benefits section above, the QBA analysis of the 18 EE beneficiaries who are currently reporting M&V data finds that 17 are achieving improvements in energy consumption and costs compared to a counterfactual scenario (as discussed in the Primary benefits section above)⁴⁴. However, one of the largest of these 18 projects is currently reporting negative benefits (increase in energy consumption) due to a malfunctioning control system.

Evidence across all sources confirms that the majority⁴⁵ of EE deployment projects have been, or are on track to be, completed effectively without major barriers. The majority of survey and interview respondents who had completed installation confirmed that the projects were operating as expected relative to their own forecasts of performance. Some interviewees described how a period of calibration and refinement has been necessary to achieve optimal performance, which some said had led to a delay in the realisation of energy consumption and cost benefits.

However, while overall delivery risk in the portfolio of EE grants is viewed as low, the single EE project reporting negative benefits highlights the heterogeneity within the portfolio and associated risk. The final impact evaluation will enable a full assessment of the level of attrition and benefits that materialise from the portfolio.

Contribution of non-programme factors:

A variety of external factors provided a set of conditions that strengthened the business case for projects – these include energy costs, regulations, other government funded programmes, and market demand.

Beneficiary and wider industry respondents frequently reflected that high UK energy costs were by far the most significant non-programme factor supporting energy efficiency investments. Additional regulatory costs (such as the Climate Change Levy (CCL)^{46,47}, and UK ETS costs were also cited as contributing to the investment case. However, as discussed above, the combined effect of these energy and regulatory costs mean UK energy intensive companies have generally already pursued aggressive energy efficiency measures and implemented the lowest cost options available. Therefore, the IETF was able to provide additional funding required by beneficiaries to overcome financial barriers associated with higher capital expenditure and associated higher payback period.

⁴⁴ As noted elsewhere, caution needs to be given for the representativeness of this small interim sample group.

⁴⁵ However, 45% of projects submitted Project Change Requests (PCRs), with 12% of projects submitting PCRs deemed 'major', and 25% of survey respondents indicated projects faced 'major barriers - significantly harder than expected'. 3 projects requesting PCRs have withdrawn for a mix of reasons (financials, timelines and one uncategorised)

⁴⁶ HMRC, [UK Climate Change Levy rates](#)

⁴⁷ Interviewed firms who are affected by [CCL's](#) highlighted that their sector Climate Change Agreement's (CCA's) do significantly reduce this cost. CCA's provide up to 92% discount on CCL's.

Wider industry stakeholders and beneficiaries consistently highlighted the unique role of the IETF among UK government programmes in supporting deployment of EE equipment, with no other grant or subsidy programmes covering a similar remit. Some wider industry stakeholders highlighted the similar (but not as transformative) remit of the Enhanced Capital Allowance (ECA) scheme which ceased in 2020⁴⁸.

The Energy Savings Opportunity Scheme (ESOS)⁴⁹ and Streamlined Energy and Carbon Reporting (SECR)⁵⁰ were indicated by some beneficiaries and wider industry stakeholders as playing a role in supporting awareness of energy usage and efficiency measures. Non-domestic Minimum Energy Efficiency Standards (ND-MEES)⁵¹ for commercial buildings and ISO standards for equipment⁵² were also mentioned as part of the regulatory backdrop driving efficiency measures among all UK companies. Again, however, these were seen as having only a marginal contribution compared to the scale of transformative change enabled by IETF grants.

Firms also reflected on the role of market demand for low carbon products/credentials as a factor directing their reduction in energy consumption. While this was seen as a contributor to commercial strategy (as discussed in CC5), beneficiaries and wider industry stakeholders reflected that most markets remain highly cost sensitive and consumers are rarely willing to absorb higher environmental costs.⁵³

Finally, some beneficiaries highlighted that the investment in new equipment also supports improved production performance and product quality – therefore, this dual benefit in some cases further strengthens the business case.

⁴⁸ [Enhance Capital Allowances scheme](#).

The ECA has since been replaced by the [Annual Investment Allowance \(AIA\)](#), which no stakeholders commented on. The AIA provides tax relief for plant and machinery up to £1m per year, including technologies listed on the [Energy Technologies List \(ETL\)](#) which has some overlap with the IETF eligible EE technologies (namely heat-pumps, waste heat recovery and refrigeration technologies).

Notable distinctions between the AIA and IETF are that the AIA is not a grant scheme, it is limited to £1m tax relief on capital only (it does not cover personnel costs) and does not support the full range of IETF EE technologies nor provide the same level of flexibility of choice for technologies not listed on the ETL.

⁴⁹ [Energy Savings Opportunity Scheme](#).

⁵⁰ BEIS (2013) '[Environmental reporting guidelines: including Streamlined Energy and Carbon Reporting requirements](#)'

⁵¹ Further information can be found at: [Non-domestic private rented property: minimum energy efficiency standard - landlord guidance](#)

⁵² [ISO 50001](#) is the ISO standard for energy management.

⁵³ 'Lack of demand for low carbon products in the UK' was indicated as a moderate risk for future carbon leakage in the UK. See: HM Treasury & DESNZ (2023) '[Addressing carbon leakage risk to support decarbonisation: Summary of consultation responses and government response](#)'.

CC2: Assessment of Confidence in contribution/ strength of evidence

The strength of evidence in support of CC2 is considered **Strong/ Moderate**.

All data sources are consistent in showing a portfolio of grants aligned to the business case are being delivered, and that these grants play a unique and essential role in lowering the financial barrier to deployment.

The QBA analysis against counterfactual found that the investments did achieve a reduction in energy emissions, which in light of the qualitative evidence, are unlikely to have happened otherwise. Therefore, the IETF is found to make a unique contribution to the ability for firms to invest in the deployment of energy efficiency technologies.

While the evidence is consistent (i.e. triangulated) across sources including multiple stakeholder group perspectives, and draws on authoritative evidence (via the QBA), the strength of evidence is downrated from strong to moderate to account for beneficiary bias particularly in relation to views on funding.

Contribution Claim 3 – IETF grants lead to reduced carbon intensity of processes

Pathway: IETF DD and EE grants enable beneficiaries to reduce the carbon intensity of processes, by enabling the deployment of low carbon and/or energy efficient technologies which they would otherwise not deploy due to more carbon intensive options being more financially attractive (financial barrier).

CC3: Contribution of IETF

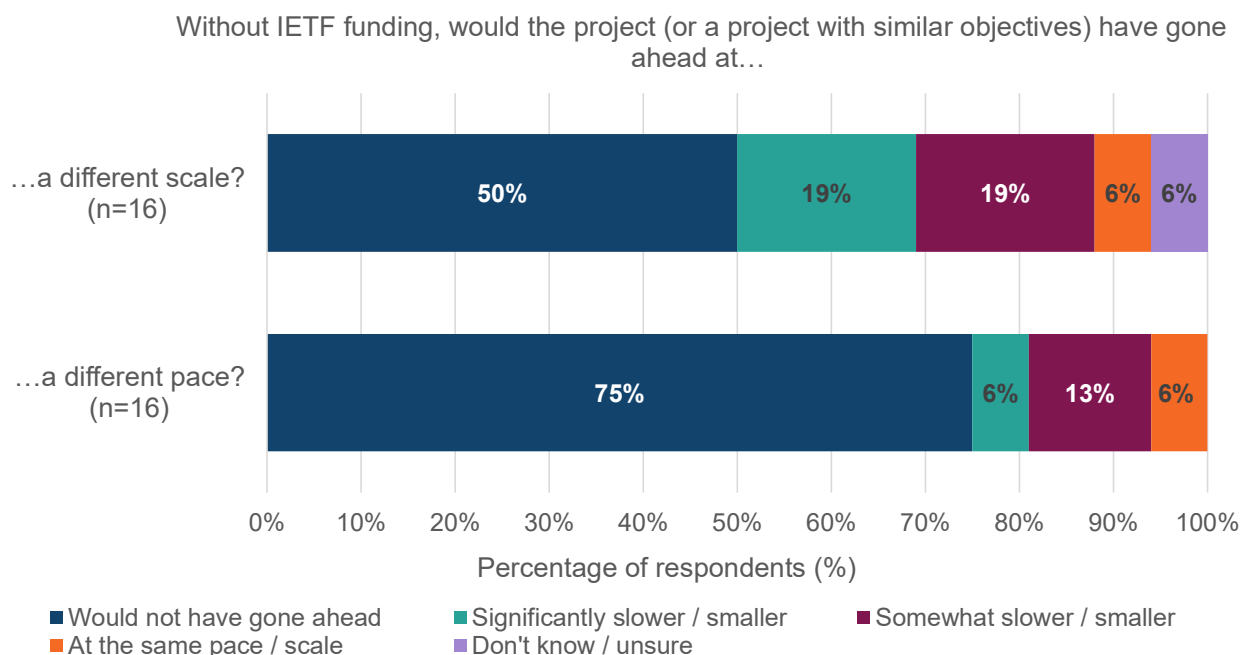
Summary of contribution:

The IETF is found to play a necessary role in enabling the deployment of DD technologies across industrial sites. As with EE projects (see CC2), the IETF addresses a clear financial barrier that wider market and policy drivers alone do not overcome. Monitoring evidence shows that most DD projects have been delivered or are on track, despite the greater technical complexity of these investments. Grants substantially reduce upfront costs and bring payback periods within internal thresholds, enabling projects that would otherwise be unlikely to proceed. Quantitative analysis confirms that funded projects reduce energy use and emissions relative to a counterfactual.

Delivery of DD projects:

Figure 7 below shows that 75% of respondents reported that, without IETF funding, the project would not have gone ahead at all, while a further 19% indicated it would have progressed at a slower pace. In terms of scale, 50% stated the project would not have proceeded, and 38% said it would have been delivered at a smaller scale.

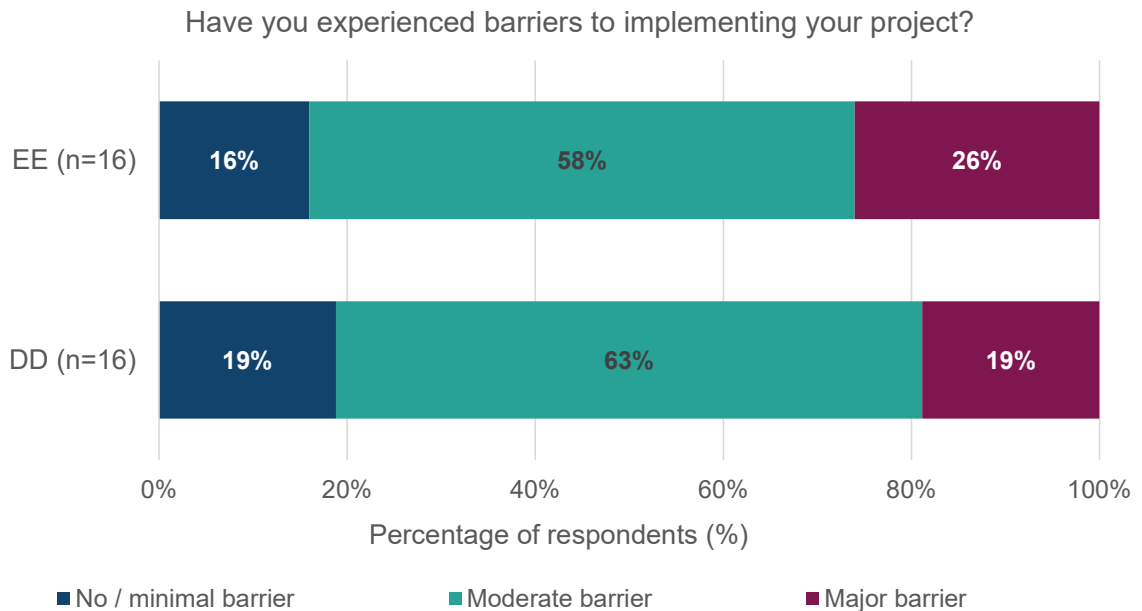
Figure 7 Likelihood of DD projects progressing at a different pace or scale without IETF funding



Source: Technopolis deployment beneficiary survey

Monitoring data shows that most DD projects progressed without major barriers. As indicated in Figure 8 below, 19% of DD projects reported major barriers (n=16), with the majority reporting delivery as moderately challenging or as expected. Interview responses described difficulties that are typical of large engineering projects rather than fundamental problems.

Figure 8: Barriers experienced to implementing project



Source: Technopolis deployment/study beneficiary survey

Whilst both PCF and PCR data reflected that delivery changes were more common in DD projects than EE projects, most projects remain live and progressing, suggesting that DD projects are deliverable despite greater complexity.

An important interdependency and risk for hydrogen DD projects was highlighted by programme delivery stakeholders, where some projects are currently unable to progress due to delays in the availability of HAR supported low-carbon hydrogen. As such, this highlights the interdependency of Net Zero programmes and funding for different stages of development and operation. The final impact evaluation will be able to capture the longer run impact of this interdependency.

Role in reducing financial barriers:

As with CC2, the primary mechanism of the IETF’s role in supporting DD deployment is reduction of financial barriers.

Programme delivery data showed IETF grants represent, on average, 43% of total project costs (in line with the FBC grant intensity), reducing upfront capital requirements. Survey evidence found most (81%)⁵⁴ beneficiaries reported that the IETF significantly reduced the financial barrier. The majority (88%)⁵⁵ (see Figure 6, in CC2 section above) also said it reduced payback to viable levels.

⁵⁴ n=16

⁵⁵ n=16

Interview and PCF evidence is consistent. All interviewed beneficiaries (7) and all PCF respondents (7) stated that their projects would not have progressed without funding. Several reported they would have selected lower-cost, more carbon-intensive alternatives. This indicates the grant was often decisive in the investment decision.

Reduction in energy consumption and emissions:

Operational feedback indicates that most completed projects are performing as expected or better than expected, with some requiring short optimisation periods following installation.

QBA analysis (as detailed in the Primary Benefits section above) [AT69.1][DC69.2] shows measurable reductions relative to a counterfactual. The 3 reporting DD projects are estimated to reduce energy consumption by over 29,000 MWh between 2021 and 2050, resulting in over 2,300 tCO₂e of emissions savings. This provides objective evidence that IETF enabled deployment translates into decarbonisation outcomes. However, and as state elsewhere, caution needs to be applied to the representativeness of this small interim sample group.

Some examples of the ways in which the projects have delivered lower carbon approaches include:

- Replacement of natural gas boilers with an ammonia process source heat pump
- Installation of a new furnace to operate on [up to] 100% hydrogen fuel
- Improving waste heat capture from the industrial process to create a waste heat storage buffer, that can enable participation in flexibility markets
- Installation of an electric boiler at high voltage to operate flexibly, reduce gas boiler use, and enable participation in flexibility markets

Contribution of non-programme factors:

There were several external factors driving decarbonisation investment, but these were viewed as insufficient to enable the same type and scale of IETF DD deployment. As described in CC2 above, beneficiaries and wider industry respondents cited regulatory costs (e.g. UK ETS and CCL), high energy prices, and corporate carbon targets as contributing to the business case. Some noted that customer demand for lower-carbon production provides a longer-term strategic incentive, particularly for larger B2B, institutional and high-end customers. Other government programmes were again also referenced, including low-carbon hydrogen funding (i.e. HAR) and carbon capture funding (i.e. CCBM). However, these factors were generally described as secondary or complementary, not providing the same scale of incentive for the range of IETF technologies and applications at dispersed industrial sites.

Interviewees consistently reported that, given the high upfront costs and long paybacks associated with DD technologies, projects would not have proceeded at the same pace or scale without grant support. As per CC2, these wider drivers strengthen the rationale for action but do not overcome the core financial barrier addressed by the IETF.

CC3: Assessment of confidence in contribution / strength of evidence

The evidence in support of CC3 is considered **Strong/ Moderate evidence**.

Monitoring data, surveys, interviews provide consistent and triangulated evidence that the IETF played an essential role in reducing financial barriers and enabled DD deployment, while energy and emissions reductions are evidenced quantitatively through the QBA against a counterfactual.

The presence of beneficiary bias downrates the strength of evidence from strong to moderate, particularly in relation to views on the necessity of funding.

Contribution Claim 4 – IETF helps to develop capability through demonstration and knowledge sharing

Pathway: The IETF helps to develop capabilities required for DD [and EE] deployment among beneficiaries and wider industry, through supporting demonstration and knowledge sharing activities which would not happen without the IETF.

This increased capability leads to a reduced perceived (and actual) risk adjusted cost of deploying DD technologies, which leads to an increased pipeline of projects.

CC4: Contribution of IETF

Summary of contribution:

IETF contributed moderately to improving knowledge and capability of IETF beneficiaries. This overall finding reflects the IETF design focused on mature technologies that are ready to deploy. Real-world deployment of the technologies supported learning around site integration, operational viability, and performance which created opportunities for learning. These deployments brought technologies closer to the users and helped them to understand the working of the technology and its resultant effects at the system level. Successful working of deployed technologies on site increased awareness about the incidence of risks, bringing down the level of perceived risks. Evidence is limited to suggest there was any meaningful sharing of new knowledge beyond project boundaries (including supply chain).

While new knowledge and reduction in perceived risks have boosted confidence in these technologies, there is weak evidence to suggest that the programme itself has contributed to pipeline building beyond IETF as finance remains a key barrier to deployment.

Role of IETF project delivery in developing knowledge and capabilities:

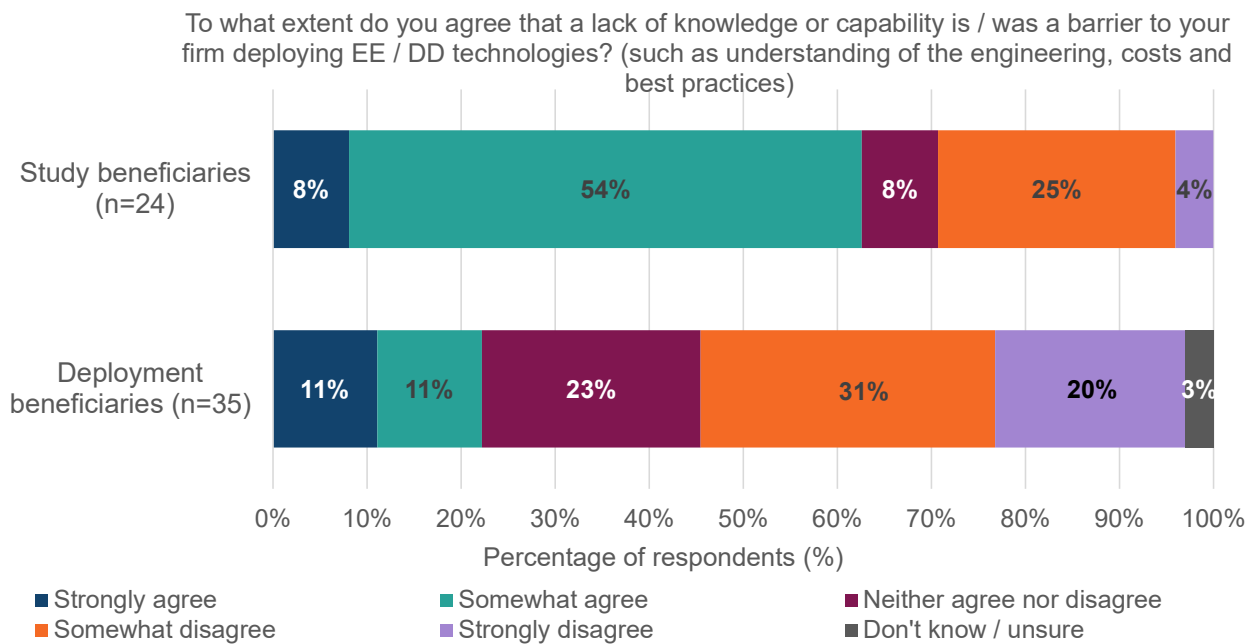
Evidence from IETF case studies, beneficiary survey and interviews suggest that IETF had a moderate effect in enhancing knowledge and capabilities of its beneficiaries.

Most deployment beneficiaries began in a place of good technical understanding and reported that a lack of knowledge and capabilities was not a barrier to deployment.⁵⁶ This remained broadly consistent across both EE and DD beneficiary groups.

IETF study beneficiaries, on the other hand, were more exploratory with a lower understanding of the technology to begin with. As shown in Figure 9 below, the majority (62%) of study beneficiary survey responses reported that knowledge and capability was a barrier to deploying EE/DD technologies, compared to 22% in their deployment beneficiary counterparts. As mentioned in CC1, evidence from interviews and surveys underscores the critical role IETF studies have played in identifying technical gaps, clarifying thinking and understanding their capability limitations.

⁵⁶ This is consistent with the IETF competition guidance note that technologies must be developed to TRL7 or above to be eligible.

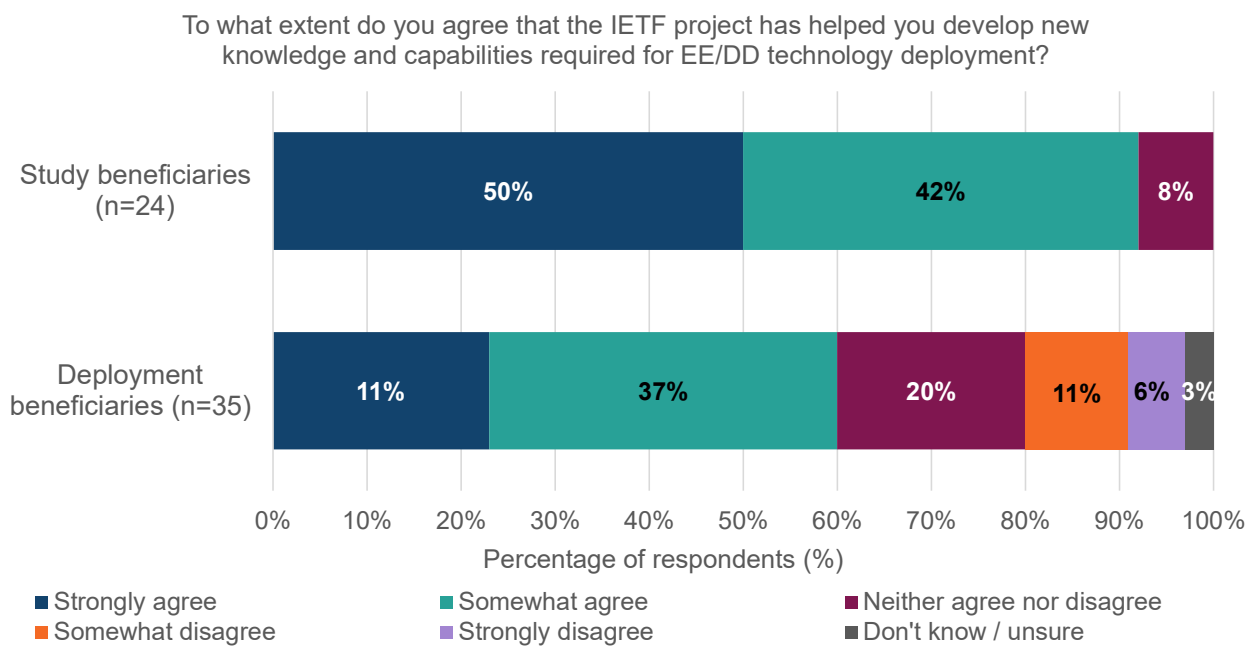
Figure 9: Impact of lack of knowledge and capability on deploying EE / DD technologies



Source: Technopolis deployment/study beneficiary survey

Pre-IETF differences in the understanding of technology between the two groups influenced how IETF supported the growth of knowledge and capability in beneficiaries. As shown in Figure 10, 92% of study beneficiaries agreed that IETF improved their knowledge and capability as opposed to 60% of deployment beneficiaries.[AT72.1][DC72.2] This is consistent with interview findings which showed that study beneficiaries had greater learning gains from IETF participation which boosted their R&D efforts.

Figure 10: Impact of IETF participation on developing new knowledge and capabilities



Source: Technopolis deployment/study beneficiary survey

As referenced in CC1, a majority of study beneficiaries (n=8) suggested that their IETF project contributed to (a) better understanding of the technology and standards and (b) appreciate risks and inform decisions about future deployment. This differs from deployment beneficiary learning benefits which were related to implementation, site integration and deliverability of the technology rather than the technology itself.

Role of consultant and supply chain:

The role that consultants, suppliers and contractors played in closing knowledge gaps where specialisation was required was discussed previously in the Final Process Evaluation of the programme.⁵⁷

One DD deployment beneficiary highlights their role in the quote below:

“Engineering contractors supported the project during early design stages, including pre-FEED and FEED, alongside the furnace vendor. Contractors brought in specialist hydrogen expertise, while the furnace vendor provided detailed combustion and furnace design knowledge. Capability was shared across three parties: in-house teams, the EPC⁵⁸ contractor, and the furnace supplier.”

While external consultants helped access specialist knowledge, it also enabled beneficiaries upskill their in-house teams. 77% of the deployment survey respondents agreed that there has been transfer of knowledge and capabilities within the organisation with both study beneficiaries (n=4) and deployment beneficiary (n=5) interviewees corroborating this. However, only 34% of deployment survey respondents agreed that knowledge transfer happened between project consortia members. As explained by a delivery stakeholder, the difference in level of knowledge transfer depends on the type of relationship. A contractual relationship is limited to a defined scope of work whereas partner relationships were more successful in cross-organisational learnings.

Role of IETF knowledge sharing events:

Evidence demonstrating that the programme contributed to knowledge dissemination with wider industry is weak. Whilst the seven showcase events were held between November 2021 and March 2024 saw wide participation across academia, industry, government and trade associations. This suggests that the events helped to engage a slightly wider audience, and inspired new applications to the scheme. The IETF Final Process Evaluation reported that most projects had not engaged in dissemination activities beyond participation in DESNZ facilitated events, which was confirmed through the Interim Impact Evaluation fieldwork. However, a small number of wider stakeholder and DESNZ delivery official interviewees (n=2) indicated that showcase events and case study publications had modest success.

⁵⁷ DESNZ (2026) [‘Evaluation of the Industrial Energy Transformation Fund \(IETF\)’](#)

⁵⁸ Engineering, Procurement, and Construction

Role in reduction of perceived risks:

Evidence from survey responses and interviews collectively suggests that learning from the IETF has partially helped to reduce perceived risks in EE/DD technologies. Other wider factors are seen to have played a part in influencing risk among beneficiaries.

Deployment and study beneficiaries observe a reduction in perceived risks with 51% (n=35) of deployment beneficiaries and larger proportion of study beneficiaries (75%) recognising the positive contribution of the IETF. 11% of deployment beneficiaries also reported an increase in perceived risks as the deployment adversely affected their production throughput. Survey data also shows that IETF contribution to reducing risks remain the same between EE and DD projects (n=9). The majority of deployment beneficiary (n=15) interviewees aligned with the outcome and described a range of benefits that resulted from a reduced perceived risk:

- Improved understanding of costs and savings
- Lowered financial risks and reduce payback period
- Improved the investment case and brought projects forward
- Understood supply chain challenges
- Increased confidence in deploying similar technologies at other sites
- Reduced company's resistance to change to make bolder decisions

Similarly, most study beneficiary interviews (n=9) also reported benefits because of reduced perceived risk, including:

- Improved understanding of different types of risks (financial, operational)
- Reduced financial costs and derisked future activities
- Validated performance claims by suppliers/vendors

In addition, a few (n=3) wider stakeholders positively noted the role of the IETF in reducing perceived risk within the technology user landscape. In the quote below, one wider stakeholder specified the role of IETF in mitigating site implementation risk:

"...and it's [IETF] been effective in that. Again, it's not a technology risk, but an implementation risk – i.e. Does this actually work on my premises, on my site? Will it deliver the product quality that I have with the current equipment?" – Wider sector stakeholder

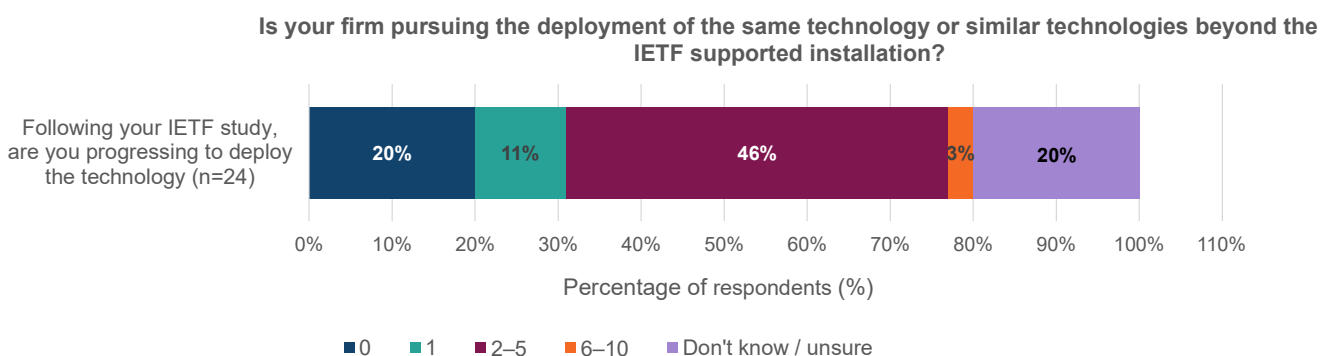
Beneficiary interviewees discussed wider **non-programme factors** as influencing perceived risks to a small extent. Whilst the wider UK policy direction on a transition to Net Zero provides an overarching signal in creating momentum and driving projects to build their own capabilities, other factors (e.g. energy price volatility) raised the risk profile of new technologies.

Role in building a wider (non IETF funded) deployment pipeline⁵⁹:

There is limited indication that a pipeline of non-IETF funded deployment projects has increased, mainly due to financial barriers of the costs of technologies. In this context, the IETF’s role in supporting the development of a wider pipeline of projects as a result of capability improvements is marginal. However, in general, wider stakeholders express uncertainty regarding this causal mechanism as they do not have clear visibility of the wider pipeline building in the UK.

Survey data presents a mixed picture. As shown in Figure 11 below, 46% of deployment beneficiaries⁶⁰ are pursuing or are likely to pursue ‘2-5’ similar projects in the next five years, whilst 40% will either not proceed or are unsure. A small minority of deployment beneficiaries (n= 3) reported there is a focus on knowledge sharing on sustainability with sister offices/sites with formal mechanisms in place to enable this.

Figure 11: Planned pipeline of similar technology deployments beyond IETF



Source: Technopolis deployment beneficiary survey

Some beneficiaries (n=5) note that they are aware of an emerging deployment pipeline but refer to the more prominent role of IETF in reducing commercial/financial risks rather than learning/capability risks. Interviews revealed other external factors holding back pipeline development in the UK, such as:

- organisations looking to diversify to non-UK sites within their global portfolio
- uncertainty around other infrastructure development (e.g. piped hydrogen)

⁵⁹ CC1 covered the pipeline of projects from study beneficiaries to IETF funded deployment

⁶⁰ n=35

Contribution of non-programme factors:

The role of non-programme factors appear somewhat marginal in overcoming capability barriers as a means to de-risking the EE and DD technologies and developing a pipeline of projects. Evidence from interviews indicate a weak contribution of non-programme factors towards the development of learnings and capabilities. This reflects the general view heard through fieldwork that industry broadly possesses the necessary capabilities but faces significant financial barriers. One interviewee, however, mentioned gaining technology experience after receiving the IHRS grant⁶¹ before participating in the IETF.

Non-programme factors have primarily focused around overcoming financial barriers that enable future pipeline development. This is similar to role of the IETF's role, as set out in CC2 and CC3 above. Beneficiaries and wider stakeholders pointed to a suite of complimentary programmes like the British Industry Supercharger⁶² (including the Network Charging Compensation Scheme), Industrial Fuel Switching⁶³ and regional schemes like Local Industrial Decarbonisation Plans (LIDP)⁶⁴. As discussed elsewhere, beneficiaries also cited risks including high energy costs, infrastructure costs and regulatory costs which have influenced their decision making on technology deployment and future pipeline.

CC4: Assessment of confidence/strength of evidence

The evidence in support of CC4 is considered **Weak to Moderate**.

All the data sources are consistent in showing an increase in the level of knowledge and capabilities among IETF beneficiaries, and more strongly within the study beneficiary cohort (as evidenced by CC1). No hoop tests were failed and a set of triangulated sources lends strong support to this element of the contribution claim.

There is some evidence that increased knowledge and capability of IETF beneficiaries has led to a reduction in wider perceived risks of deployment. However, evidence also supported alternative hypothesis that indicate external factors (namely other factors affecting the financial barriers) play an important role.

Finally, evidence on the role of increased knowledge and capability leading to a pipeline of deployment projects is moderate – with triangulated stakeholder views indicating knowledge and capability play a marginal role relative to financial barriers.

⁶¹ The [Industrial Heat Recovery Support \(IHRS\) Programme](#) grant funding to help industrial businesses in England and Wales install, design, and feasibility-test technologies for recovering waste heat.

⁶² The measures are as follows: i) a 100% exemption from Contracts for Difference, Renewables Obligation (RO), and Feed-in Tariffs (FIT). This came into effect from 1 April 2024 ii) a 100% exemption from the costs associated with the Capacity Market, which came into effect in October 2024 iii) compensation for the charges paid for using the Great British electricity grid through the EII Network Charging Compensation (NCC) Scheme. This has been running since April 2025, with compensation backdated to April 2024. Eligible businesses are entitled to apply for compensation for 60% of these costs. Further information can be found here: DBT (2025) '[Proposed uplift to the Network Charging Compensation Scheme for energy intensive industries \(EIIs\): government consultation response](#)'.

⁶³ [Industrial Fuel Switching Programme: successful projects](#)

⁶⁴ [Industrial Decarbonisation: Local Industrial Decarbonisation Plans](#)

Overall, no hoop tests failed meaning the hypothesis was not undermined, and multiple smoking gun tests pass, providing support for IETF contribution earlier in the causal pathway. But failure of tests including a few SITW and one smoking gun later in the pathway weakens overall strength and downrates it from high to weak/moderate.

Contribution Claim 5 – IETF contributes to increased competitiveness

Pathway: IETF funding contributes to increased competitiveness of beneficiaries, because EE beneficiaries are able to reinvest energy efficiency savings or offer more competitive products, and EE and DD firms are better positioned within markets and policy environments which favour low carbon products.

CC5: Contribution of IETF

Summary of contribution:

There is evidence that the IETF has made a moderate contribution to increased competitiveness of beneficiaries. Evidence is strongest for cost-side impacts, through reduced energy and carbon costs and reinvestment of savings. Evidence is weaker and less consistent for market-facing outcomes such as increased sales or external investment linked to a greener business image.

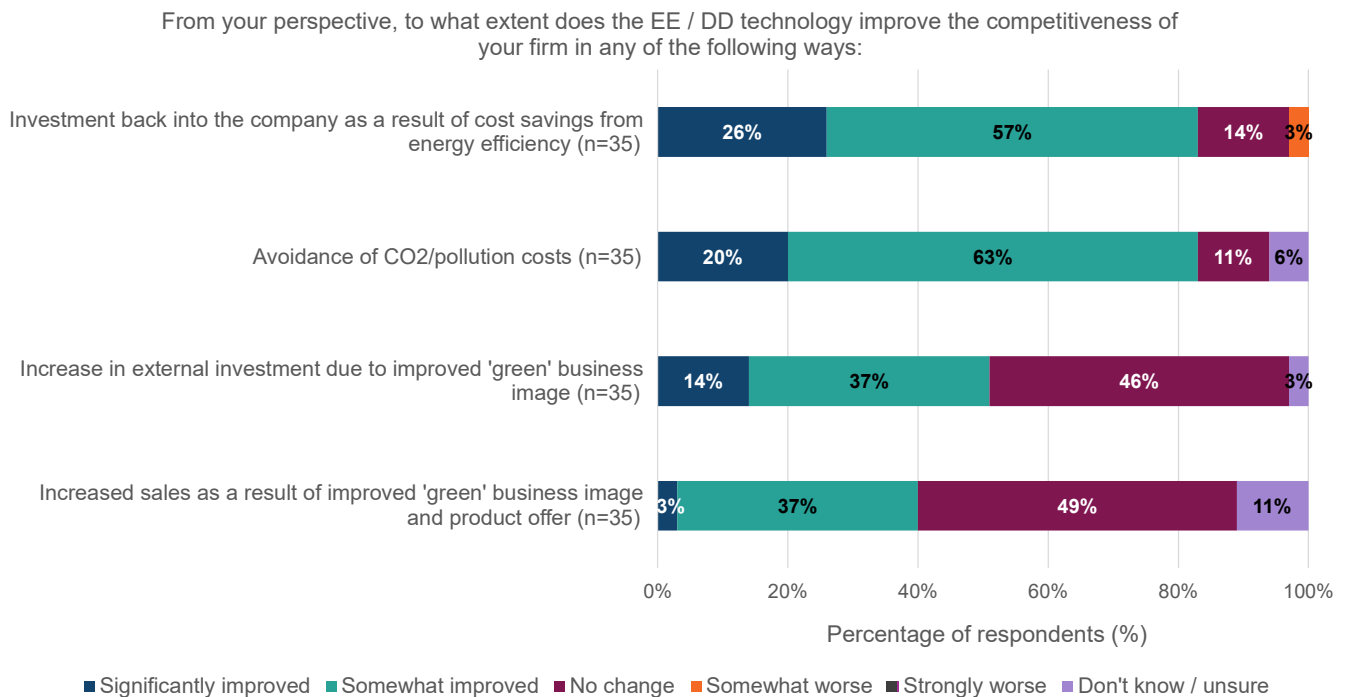
Role of IETF in improving competitiveness through reduced cost base:

The majority of EE deployment beneficiary interviewees stated that their IETF project led to improved competitiveness. This was supported by the survey and is shown in Figure 12 below, in which most deployment beneficiary responses (83%)⁶⁵ showed that the IETF had improved competitiveness through the reinvestment as a result of cost savings from energy efficiency. The example below shows the two ways in which cost savings could lead to improved competitiveness.

“[Improved competitiveness benefits] are two-fold as...you save by using less energy in the process [and] you have more money to invest in other aspects of the business.... The other one... [is that] we pass that saving on to the customer rather than reinvesting it...I think if we can save energy, we can pass on at least some of those savings to the customer.” – EE Deployment Beneficiary

⁶⁵ n=35

Figure 12: Impact of EE/DD technologies on competitiveness through cost savings, green business image, and sales



Source: Technopolis deployment beneficiary survey

The example below also shows the two ways in which cost savings could lead to improved competitiveness.

“[Improved competitiveness benefits] are two-fold as...you save by using less energy in the process [and] you have more money to invest in other aspects of the business.... The other one... [is that] we pass that saving on to the customer rather than reinvesting it...I think if we can save energy, we can pass on at least some of those savings to the customer.” – EE Deployment Beneficiary

A small minority of deployment beneficiaries expressed that whilst their project did not directly help them improve their competitiveness, it has helped maintain their market position in line with the industry benchmarks for cost competitiveness and offset some of the other costs that their businesses were experiencing.

Reduced energy consumption was also highlighted as having a direct impact on regulatory costs, and thereby, competitiveness. The CCL was frequently mentioned by beneficiaries and wider industry as a key regulatory cost. Fuel switching from gas to electricity, combined with reductions in energy consumption, were reported to support reduced CCL costs which applies different carbon tax rates for electricity and gas (reflecting carbon intensity).

Similarly, emission reductions enabled by the IETF (as evidenced in CC2 and CC3) also supports improved competitiveness via reduced UK ETS costs. Roughly half of surveyed DD and EE deployment beneficiaries confirmed they are registered under the UK ETS. As discussed in CC2 and CC3, the UK ETS is viewed as a key factor in the overall business case for projects. However, there is mixed evidence on the significance of UK ETS costs as a

motivating factor for investments in decarbonisation. Some evidence from interviews indicates that the UK ETS is an important driver of action to reduce costs now and in preparation for longer term carbon cost increases. On the other hand, some interviews with wider industry stakeholders and beneficiaries during the Final Process Evaluation indicated that UK ETS costs are not currently high enough to incentivise significant investment in abatement.

Role of IETF in improving competitiveness through improved consumer/ product offering:

Impacts associated with a 'greener business image' were less tangible, and there was less consensus among EE and DD deployment beneficiaries that projects led to increases in external investment. Survey evidence (Figure 12 above) shows mixed results with around half (51%) of deployment beneficiaries, (n=35), reporting improved investment associated with a greener business image, while 46% reported no change. However, interview evidence clarified that this investment was mostly from central group-level funds to UK subsidiaries. As such, there is weak evidence to demonstrate a clear causal link between greener production and external investment.

In addition, there is weak evidence that greener business image led to increased sales. Survey results again show mixed outcomes, with 14 (n=35) reporting improved sales whilst 17 reported no change. Only a single deployment beneficiary interviewee said that the IETF had resulted in positive discussions with customers around a greener image. Yet the interviewee did not directly attribute this to any direct increase in sales.

“Our customers have their own carbon goals and so when we're working with our suppliers, showing that we've got a credible plan, because our Scope 1 and 2 [emissions] are their Scope 3 and...our emissions that are going to be so much lower, so your Scope 3 emissions will be reduced. It does help with those discussions, yeah.” – DD Deployment Beneficiary

More widely, several interviewees explicitly stated that customers were unwilling to pay more for greener products, while others highlighted that only particular types of customers are willing to pay more for low carbon products – namely institutional customers, high-end consumers, and some B2B where companies are managing decarbonisation targets.

Contribution of non-programme factors:

There were a number of factors external to the IETF that were identified as having a strong influence on firms' competitiveness.

Competitiveness was mainly viewed by deployment interviewees at an international level (sometimes with a head office located outside the UK), where UK sites compete with sites in other countries for investment and market share.

Several deployment beneficiaries (8) reported that high and volatile UK energy prices had worsened their competitiveness relative to international competitors⁶⁶. Beneficiaries acknowledged that whilst this is a structural pressure that sits outside the programme's control, these high costs reduce their ability to compete internationally and offset some of the gains achieved through energy efficiency savings. Wider macroeconomic conditions were also reported as negatively affecting competitiveness of beneficiaries. A small number of interviewees (6) identified recent inflation, economic uncertainty, and rising and anticipated increases to input costs as additional pressures on margins. In addition, some cited sector specific regulatory or policy-related costs. For example, one interviewee noted:

"We will pay over £20 million this year in additional costs for [Extended producer responsibility] (EPR)⁶⁷ ... It hurts." – DD Deployment Beneficiary

These wider cost pressures were generally described as having a larger impact on competitiveness than the IETF itself.

CC5: Assessment of confidence/strength of evidence

The evidence in support of CC5 is assessed as **Moderate**.

There is consistent evidence that EE projects support a reduction in operating costs and support competitiveness through cost-side effects, with QBA evidence demonstrating a reduction in energy costs. Evidence for improved sales and investment is generally consistent that the effect of the IETF has been marginal and largely driven by wider economic and regulatory factors.

Revision of CC5: Given the mixed evidence in support of CC5, the claim should be revised as follows to provide a more accurate reflection of the IETF's contribution to competitiveness:

IETF funding contributes to increased competitiveness of beneficiaries, because deployed technologies enable beneficiaries to reduce their operating costs by way of energy efficiency savings and reduced regulatory costs. These savings either enable greater profitability, reinvestment, or lower product costs. The scheme has limited impact on competitiveness by way of improved low carbon products or 'greener' business image, because market demand is relatively weak.

⁶⁶ The UK has among the highest energy prices in Europe. See: DESNZ, [International domestic energy prices](#).

⁶⁷ Extended producer responsibility (EPR) for packaging. See: Defra, [Extended producer responsibility for packaging: who is affected and what to do](#).

Contribution Claim 6 – DD projects experience higher usage/ costs as a result of achieving lower carbon intensity

Pathway: IETF DD projects experience higher energy usage (MWh) and costs (£) because lower carbon fuels are more expensive per unit or carbon capture requires greater energy input.

CC6: Contribution of IETF

Summary of contribution:

Evidence from fieldwork and the QBA indicated that IETF DD grants have enabled the deployment of equipment that has led to a reduction in energy consumption and cost (relative to a counterfactual case). This is partly understood to be the result of new, efficient equipment being installed rather than simply switching to more expensive fuels at the same rate of efficiency.

Compared to EE projects, however, DD projects achieved a smaller reduction in energy consumption and cost, which aligns with the ToC expectation that the DD projects will experience higher consumption and fuel costs as a result of more expensive fuels and carbon capture costs.

Evidence of energy usage and cost:

The 3 DD projects were found to achieve an average lifetime consumption reduction of 8.33 GWh and fuel cost reduction of £470k over their lifetime, despite expectations that fuel switching might lead to an increase in energy consumption and cost. This is understood to be an effect of IETF DD grants enabling the implementation of more efficient technology compared to existing equipment, rather than simply applying the same or higher GWh consumption to a more expensive fuel source.

In comparison, the 18 EE projects were found to achieve an average consumption reduction of 24.77 GWh and fuel cost reduction of £7.5 million. This aligns with the ToC expectation that DD projects lead to relatively higher fuel consumption and costs, in this case reflecting the higher costs associated with electrification.

Survey and interview data confirms that, when compared to EE projects, DD beneficiaries generally expected a smaller overall return on investment with “little or no payback”, as a result of higher fuel costs, which is also reflected in applications.

Contribution of non-programme factors:

Higher relative costs for DD projects are driven by higher costs of electricity and hydrogen, relative to gas and diesel, and carbon capture relative to unabated emissions. These higher costs were recognised as barriers to DD deployment by all stakeholders, which are reflected in the subsidy intensity of IETF DD grants and well documented^{68,69}.

CC6: Assessment of Confidence in contribution/ strength of evidence

The evidence in support of CC6 is deemed **Weak**.

Evidence from the QBA provides a rigorous analysis of fuel consumption against a counterfactual. Triangulated with qualitative evidence and desk research, the evidence is strengthened in presenting a pattern that DD projects achieve a lower rate of reduction in energy consumption and costs compared to EE projects. However, the QBA DD analysis draws only from 3 electrification projects at an early stage in their reporting, which significantly diminishes the ability to draw wider conclusions about real performance at this interim stage.

⁶⁸ ONS (2025) [‘The impact of higher energy costs on UK businesses: 2021 to 2024’](#)

⁶⁹ IEA (2025) [‘Breakthrough Agenda Report 2025: Hydrogen’](#)

Contribution Claim 7 – IETF supports shift to more energy efficient technology adoption at a national level

Pathway: IETF contributes to lower energy consumption of UK industry and greater energy security over the long term by supporting a shift to more energy efficient technology adoption within UK industry

CC7: Contribution of IETF

Summary of contribution:

The IETF has supported reductions in energy consumption at beneficiary level by enabling deployment of energy efficiency technologies that would not otherwise have proceeded (as evidenced by CC2). However, the scope of influence and spillover to wider industry is limited due to the financial barrier to similar investments without grant support. National energy intensity has reduced over the period, but this cannot be attributed directly to the IETF. Overall, the programme's contribution to national energy consumption is therefore modest and hard to clearly attribute.

Evidence supporting IETF contribution to shift in technology adoption:

CC2 demonstrates that IETF EE deployment grants have enabled technology deployment that led to reductions in energy consumption at project level.

CC4 demonstrates that while the IETF has supported the deployment of energy efficiency technologies and a pipeline of projects via study grants, stakeholders reported a limited financial case for deployment without grant support due to high costs and non-viable payback. This indicates that a wider pipeline of similar projects is unlikely to develop outside of IETF funding, given current cost profiles.

DESNZ Energy Consumption in the UK (ECUK, 2025) data demonstrates that energy intensity of UK industry has been static or declining during the period of the IETF⁷⁰. This does not directly attribute reductions to the IETF but provides a positive indication of trend which aligns with the programme objectives and timing, and to which the IETF will be a contributor.

Contribution of non-programme factors:

Qualitative evidence indicates that a mix of non-programme factors play an important role in driving the national trend in reduction in industrial energy consumption. High energy costs were consistently described (see quotation below) as a strong driver of energy efficiency practices across UK industry as a competitive necessity.

⁷⁰ DESNZ, [Energy Consumption in the UK \(ECUK\)](#)

“Looking at the bigger picture, we have a number of other initiatives across the site to reduce energy costs so we're converting all our lighting to LED lighting, there's lots of efficiency measures that are being considered, but they don't link directly to the IETF case.” – EE Deployment Beneficiary

However, as discussed in CC2, energy costs are seen as the strongest motivator of energy efficiency behaviour, but only up to a threshold beyond which payback periods on large investments are not deemed viable.

As described elsewhere (namely CC2 and CC3) regulatory costs (particularly UK ETS and CCL) are also key cost drivers of lower UK industrial energy consumption, creating a cost motivation for energy efficiency. As discussed in CC2, ESOS and SECR were also reported to encourage general awareness of energy efficiency measures. Minimum Energy Efficiency Standards and ISO standards on equipment efficiency were also identified as features of the regulatory package driving the overall trend of reduction in UK industrial energy intensity.

As such, while the IETF supports substantial decreases in project level energy consumption, its contribution at a national scale is marginal, where the main drivers are energy and regulatory costs.

CC7: Assessment of confidence in contribution / strength of evidence

The evidence in support of CC7 is considered **Moderate**.

CC2 demonstrates that the IETF has supported energy use reduction at the beneficiary level that would not have happened otherwise, which passes a hoop test for the project-level mechanism. However, national energy intensity data cannot be attributed to the IETF and the scope of influence beyond IETF grants is limited.

Qualitative evidence and desk review consistently indicates that energy costs and wider regulation play a substantial role in driving wider industry behaviour, which are understood to be the main factors driving national level trends. There is no smoking gun evidence of system-level impacts of the IETF. Overall, the IETF contributes positively but modestly to lower UK industrial energy consumption.

Revision of CC7: Given the mixed evidence in support of CC7, the claim should be revised as follows to provide a more accurate reflection of the IETF's contribution to national level energy consumption:

IETF grants contribute to lower energy consumption of UK industry at the installed equipment level, however, its current contribution to trends in national energy consumption and energy security are minimal. National level trends are instead driven by wider market and regulatory incentives. This limited contribution of the IETF reflects the scale of the IETF portfolio as a portion of national industrial energy consumption.

Contribution Claim 8 – IETF contributes to lower carbon emissions of UK industry

Pathway: IETF contributes to lower carbon emissions of UK industry and the transition to Net Zero by supporting a shift to lower carbon technology adoption within UK industry

CC8: Contribution of IETF

Summary of contribution:

Similarly to the assessment of CC7, the IETF has contributed to emissions reductions at a project level, but its contribution at a national level is modest due to the scale and scope of IETF projects and identified spillovers (at least at this interim stage of beneficiary project delivery). While UK industrial carbon intensity has continued to fall over the period of the IETF, this trend cannot be attributed to the IETF amid a wider set of market, regulatory and policy drivers.

Evidence of contribution of IETF to lower carbon emissions:

CC3 demonstrates that IETF EE and DD deployment grants have led to reductions in energy use and carbon emissions at project level relative to a counterfactual. This indicates a strong contribution of the IETF to reducing emissions as a result of IETF funded deployment projects.

CC4 shows that while the IETF has supported deployment of lower-carbon technologies and a pipeline of projects via study grants, stakeholders reported limited evidence of a wider pipeline beyond the IETF. High costs and long, non-viable paybacks mean similar projects are unlikely to continue without grant support. This suggests the programme's influence remains concentrated within funded sites.

QBA data shows that whilst the IETF does contribute to the UK's Net Zero Transition, its contribution is marginal. The 21 projects analysed are projected to reduce emissions by 105 KtCO₂e by 2050, a figure that represents 0.002% of the 6,200 MtCO₂e reduction required to reach Net Zero.

ONS data on UK industrial emissions intensity⁷¹ for the period 2020–2024 shows declining trend in carbon intensity⁷². While this is consistent with the programme period, the trend cannot be attributed directly to the IETF. The rate of decline is also slower than in the previous five years. This indicates that, in aggregate, the pace of reduction has not accelerated during the time of the IETF.

⁷¹ UK SIC code, Section C - Manufacturing

⁷² ONS (2025) '[Atmospheric emissions greenhouse gas emissions intensity by industry](#)'

Interview evidence from DESNZ, Innovate UK and wider industry representatives describe the IETF as one contributory factor within a wider landscape of drivers of industrial decarbonisation. These stakeholders described the unique role that the IETF plays in enabling capital expenditure on mature EE and DD technologies at dispersed industrial sites that are not supported through other schemes.

Contribution of non-programme factors:

Stakeholders identified a range of other government programmes, regulations and market factors that support reductions in industrial carbon intensity, which will also be contributing to the trend in carbon intensity seen at a national level.

As discussed previously, these include other government programmes such as HAR, CCBM, the Industrial Decarbonisation Challenge⁷³ and major single investments (e.g. support for Tata Steel⁷⁴). Similar to CC7, high energy and regulatory costs (e.g. CCLs and UK ETS) were strong external drivers of reductions in energy consumption and carbon reduction. However (and as discussed in CC3), high electricity prices do also represent a key structural barrier to electrification across UK industry. Again, ESOS and SECR were described as playing a role in increasing general awareness of carbon reduction measures but having only marginal influence for large firms with established practices.

Overall, at the interim stage of IETF delivery, the contribution of the programme to national industry carbon intensity versus other market and regulatory factors is deemed to be modest.

CC8: Assessment of confidence/strength of evidence

The evidence in support of CC8 is considered **Moderate**.

CC3 provides clear project-level evidence that IETF-funded deployments reduce energy use and emissions relative to a counterfactual, which passes a hoop test for the mechanism.

However, national statistics do not demonstrate attributable or accelerated reductions linked to the programme, while there is consistent evidence of multiple non-programme factors that play a substantial role in driving wider national industrial carbon intensity. The alternative explanation is therefore not rejected, and there is no smoking-gun evidence of a system-level impact of the IETF.

Revision of CC8: Given the mixed evidence in support of CC8, the claim should be revised as follows to provide a more accurate reflection of the IETF's contribution to national level carbon emissions:

IETF grants contribute to lower carbon intensity of UK industry at the installed equipment level, however, its current contribution to trends in national emissions is minimal. National level trends are instead driven by wider market and regulatory incentives. This limited contribution of the IETF reflects the scale of the IETF portfolio as a portion of national industrial emissions.

⁷³ More information can be found at: UKRI / Innovate UK (2019) '[Decarbonising the UK's industry: apply for phase 1 funding](#)' (programme closed 2024).

⁷⁴ More information can be found at: DBT (2025) '[5,000 jobs secured as construction starts on Port Talbot green steel project](#)'

Contribution Claim 9 – IETF contributes to air quality improvements

Pathway: IETF funding contributes to air quality improvements because EE and DD projects produce fewer harmful gases / particulates.

CC9: Contribution of IETF

Summary of contribution:

The IETF is found to contribute positively to air quality outcomes by enabling energy efficiency and deep decarbonisation projects which reduce emissions of harmful pollutants, relative to a counterfactual. The primary mechanism for the scheme’s contribution to improved air quality is presented in CC2 and CC3, wherein deployment grants reduce the barrier to deployment of effective technologies.

The QBA provides the primary evidence to assess the claim and estimates net reductions in air quality damage costs associated with IETF-supported projects. Site-level monitoring of air quality is limited and qualitative evidence is mixed. However, this reflects monitoring practices rather than an absence of impact. Taken together, the quantitative analysis indicates that the programme has delivered measurable improvements in air quality, at least at an equipment level, that would otherwise have been unlikely to occur.

Role in improvement of local air quality:

Quantitative evidence provides the strongest support for this contribution claim. The QBA combines M&V data with counterfactual modelling to estimate reductions in air quality damage costs resulting from EE and DD projects. Table 12 shows net improvements in air quality damage costs compared to a non-IETF counterfactual in all three scenarios (low, medium and high).

Table 12 NPV of estimated net reduction in air quality damage costs, (Medium sensitivity)

Monetised benefit (million £, 2025£)	EE projects (N=18)	DD projects (N=3)	All projects (N=21)
Net reduction in air quality damage costs	£0.4 million	£0.7 million	£1 million

Source: Ricardo, using DESNZ M&V data

In contrast, site-level measurement of air quality was not widely reported. Only 4 (n=25) surveyed deployment beneficiaries reported that they record air quality data. Of these, only 2 reported observed improvements. Air quality was not captured in the eligible non-applicant or unsuccessful applicant survey, and Project Completion Forms do not report air quality outcomes. This indicates that routine monitoring is not standard practice among beneficiaries.

Where qualitative insights were provided, they were generally anecdotal rather than based on installed monitoring equipment. A small number of interviewees described perceived improvements, such as reduced diesel fumes or lower local exhaust emissions, and one beneficiary reported improved on-site air conditions through the capture of fugitive emissions⁷⁵. A larger group of interviewees reported no noticeable or expected change, often explaining that their technologies were already electrified or did not materially affect local pollutants, or that their monitoring focused on energy and carbon rather than local air quality.

Qualitative evidence suggests that the effect on local air quality at individual sites may be modest. Many beneficiaries explained that IETF-supported technologies represent one component within much larger production processes or industrial clusters. As a result, changes in emissions from a single installation may not be easily detectable in local air quality conditions. Several interviewees noted that improvements, if present, would likely be small relative to wider background emissions.

Contribution of non-programme factors:

There is limited direct evidence on whether similar air quality improvements would have occurred in the absence of IETF support. Surveys and interviews did not systematically explore this counterfactual for air quality specifically. However, evidence from CC2 and CC3 indicates that many EE and DD projects would not have proceeded or would have proceeded at smaller scale or slower pace, without grant funding.

As discussed in CC2 and CC3, some beneficiaries indicated that some form of scaled-down or delayed investment might have occurred without the IETF. In such cases, some air quality improvements may still have been realised. However, these would likely have been reduced in magnitude or delayed relative to the funded scenario. There is little evidence to suggest that equivalent improvements would have occurred through other activities alone.

Post-completion forms and interviews with non-applicants or unsuccessful applicants did not provide evidence of air quality improvements arising from alternative, non-IETF actions. Overall, this suggests that while some background improvements may occur, the scale of benefits observed is primarily attributable to IETF-enabled projects.

CC9: Assessment of Confidence in contribution/ strength of evidence

The evidence in support of CC9 is considered **Moderate**.

The QBA provides authoritative, quantitative evidence based on monitoring data and counterfactual modelling and meets the threshold for a strong “smoking gun” test. The QBA air quality impacts are based on Green Book air quality damage cost factors, linked to measured fuel throughput. Qualitative evidence is limited and largely anecdotal, but it does not contradict the quantitative findings. There is also little evidence supporting alternative explanations. Taken together, the presence of strong quantitative evidence outweighs the limited site-level monitoring, resulting in moderate confidence that the IETF contributed positively to air quality improvements.

⁷⁵ Unintentional leaks or releases of gas and vapours from industrial processes and equipment.

Contribution Claim 10 – IETF supports jobs

Pathway: The IETF supports the creation and/or strengthening of jobs either directly within beneficiary firms or indirectly within supply chains, by proving and stimulating new revenue streams built around new EE and DD technologies.

CC10: Contribution of IETF

Summary of contribution:

The IETF is found to play a limited role in supporting jobs within beneficiary firms and their supply chains. Where impacts were observed, these most commonly related to supporting existing jobs, and in some instances directly creating new jobs. Other contributing factors were also identified, including wider market conditions and internal business strategy.

Role of IETF in supporting beneficiary jobs:

There is some evidence from beneficiary interviews to support the claim that IETF-funded projects helped secure existing jobs or led to the hiring of new employees within firms, or the hiring of external consultants and suppliers. The majority (10) (n=15) of the deployment beneficiaries interviewed reported that the IETF had helped secure existing jobs, mainly through maintaining competitiveness (see Contribution Claim 5) and helping to mitigate operational challenges that may otherwise have resulted in reduced operations or closures. Two deployment beneficiaries said that their IETF project helped indirectly create short-term employment through engineering, construction, project management and contractor roles.

“There were 70 jobs on average during the construction phase, and then we’ve employed five people to work on that site.” - Deployment beneficiary interviewee

Only one deployment beneficiary reported that the IETF directly led to the creation of FTE roles, which were hired to operate and manage the site once the deployment project became operational.

“Would the site have disappeared without these investments? There was a stronger chance of that and because we’ve moved the project...we have moved pretty much all the jobs across.” - Deployment beneficiary interviewee

This was also supported by study beneficiaries who were interviewed, with around half (6) (n=10) of study beneficiary interviewees reporting that the IETF had helped secure or create jobs within their organisations. This included helping to secure wages or avoid redundancies (1 beneficiary), supporting existing internal roles or staff time (2), creating new internal jobs (3), and enabling the employment of contractors during the study period (3). Many of the reported positive impacts on job creation resulted from studies progressing to deployment.

Project Completion Form responses lend some support to the claim, with one (n=9) deployment beneficiary reporting jobs being created in their firm because of the project, and another reporting jobs being created within their partner organisation. One beneficiary also speculated that improved production capacity may lead to jobs being created in the future.

The beneficiary surveys provide much more limited evidence supporting the IETF leading to job creation within beneficiaries' firms. The majority (30) (n=35) of the deployment beneficiaries surveyed reported the IETF led to no change in jobs at their firm however some (5) reported the IETF was either a marginal (2) or a significant (3) [AT87.1][EH87.2][DC87.3]factor for securing or creating jobs at their firm. All five deployment beneficiaries said the IETF led to jobs being secured, with three saying it led to between 1 to 5 jobs being secured and two reporting 25 or more jobs being supported. These jobs included engineering, project management and operative roles.

It is worth noting that whilst there is evidence that jobs were secured and created, it is as a result of IETF grants keeping the site open and stimulating construction of new equipment. This does not provide evidence to support the idea that jobs were created as a result of new revenue streams built around new EE and DD technologies.

Role in supporting supply chain jobs:

7 (n=35) surveyed deployment beneficiaries reported that their IETF-funded projects supported jobs within their supply chains, among equipment suppliers, installers, or specialist contractors, mainly linked to installation, commissioning, or monitoring activities. However, interviews indicated that they were likely not all were fully attributable to the IETF, and one beneficiary reported that some supply chain jobs that were supported were located abroad. The survey provided weaker evidence in support, which suggests that the interviews were not reflective of the wider cohort.

Contribution of non-programme factors:

There was limited evidence on changes in jobs across companies. However, linked to CC5 (competitiveness), beneficiaries and wider industry stakeholders consistently identified that other factors, including wider market conditions, commercial demand and business strategy were the most important drivers of staffing decisions.

There was very limited evidence that non-IETF factors influenced supply-chain employment outcomes, with only one deployment beneficiary interviewed reporting that supply chain job impacts were not solely attributable to the IETF.

CC10: Assessment of Confidence in contribution/ strength of evidence

The strength of evidence for the assessment of CC10 is considered **Moderate**.

Multiple Straw-in-the-Wind tests pass, indicating that observed employment outcomes are consistent with the IETF contributing to job retention and limited, short-term employment effects, particularly during project delivery and installation phases. Interview and survey evidence provides several examples of jobs being secured or temporarily supported, and in a small number of cases created, suggesting some contributory role for the programme.

However, there is limited Smoking Gun evidence of direct and sustained job creation attributable solely to the IETF. Survey findings show little overall net change in headcount across beneficiary firms and reported employment impacts are typically small in scale. Where jobs were supported, these were often short-term or linked to contractors and supply chain activity rather than permanent internal roles.

Triangulation across interviews, surveys, Project Completion Forms and monitoring data shows broadly consistent findings of modest and uneven employment effects. At the same time, evidence in support of the alternative hypothesis is credible, with several beneficiaries explicitly identifying wider market conditions, commercial demand and internal business strategy as the primary drivers of staffing decisions. This suggests that many employment outcomes would likely have occurred in the absence of the programme.

Taken together, there is moderate evidence to assess that the IETF plays a limited contributory role in employment outcomes, with other factors often more influential. Confidence in this conclusion is therefore limited, reflecting both the small scale of observed effects and the presence of plausible alternative explanations.

Revision of CC10: Given the mixed evidence in support of CC10, the claim should be revised as follows to provide a more accurate reflection of the IETF's contribution to national level energy consumption:

IETF grants have provide some benefits for the creation and retention of jobs during the construction and operation of projects, as well as indirect impacts via improved competitiveness. However, job impacts for participating firms are predominantly determined by wider market factors which determine the competitiveness of firms and employment decisions.

6. Quantitative Assessment of IETF costs and benefits

As part of the evaluation's quantitative assessment, both a carbon cost-effectiveness (CCE) analysis and a cost-benefit analysis (CBA) were conducted.

Carbon cost-effectiveness is defined as the emissions savings per £ of money invested in the IETF. The CCE (measured in kgCO₂e/£) was estimated as the ratio between the net reduction in carbon emissions attributable to the IETF, and programme costs over the evaluation period 2021-2050. This approach enables comparison of the IETF with other emissions or energy focused policy programmes on a like-for-like basis.

The CBA estimated the BCR, which measures the extent to which the monetised benefits generated by the IETF exceed the programme costs over the evaluation period. The BCR was estimated as the ratio between the net present value (NPV) of monetised benefits attributable to the IETF, and the NPV of programme costs over the evaluation period 2021–2050, with both costs and benefits discounted⁷⁶ in line with the Green Book.

Overall, there were 21 projects that had reported sufficient M&V data⁷⁷ for inclusion in the CCE and CBA for the Interim Impact Evaluation for analysis. This represents around 13% of IETF projects funded under the programme.

Carbon cost-effectiveness of the IETF (tCO₂e/£)

Carbon cost-effectiveness was calculated by dividing the relevant cost definition by the net cumulative reduction in carbon emissions. Results are reported both for EE and DD projects.

Two alternative definitions of programme costs were considered to derive different estimates of cost effectiveness:

- IETF grant amount, reflecting direct public expenditure under the programme. This was used to derive the cost effectiveness per £ of IETF grant amount
- Total project cost, defined as the sum of IETF grant funding and beneficiary self-financed contributions, reflecting the full investment associated with delivering the emissions reductions. This was used to derive the cost effectiveness per £ of total project expenditure

Overall, Table 13 and Table 14 show that the IETF projects are estimated to abate 5.6 kgCO₂e per £ of grant support they receive and 1.9 kgCO₂e per £ spent overall.

Specifically, EE projects deliver emissions reductions of 5.8 kgCO₂e per £ of the IETF grant amount and 2.0 kgCO₂e per £ spent overall. DD projects deliver slightly lower emissions reductions of 1.4 kgCO₂e per £ of the IETF grant amount of 0.8 kgCO₂e per £ spent overall.

⁷⁶ A discount factor of 3.5% was used for costs and benefits except reductions in air quality damages, which were discounted using the health factor of 1.5%

⁷⁷ Latest M&V submissions included in analysis were submitted in December 2025

Table 13: CCE per £ of IETF grant amount (Medium sensitivity)

Indicator	EE projects	DD projects	All projects
Projects included in analysis	18	3	21
Net reduction in carbon emissions	103,500 tCO ₂ e	1,400 tCO ₂ e	104,900 tCO ₂ e
Total IETF grant	£18 million	£1 million	£19 million
£/tCO₂e reduced⁷⁸	£171/tCO₂e	£707/tCO₂e	£178/tCO₂e
CCE per £ of IETF grant	5.8 kgCO₂e/£	1.4 kgCO₂e/£	5.6 kgCO₂e/£

Source: Ricardo, using DESNZ M&V submissions

Looking at the results in £/tCO₂e units allows for comparing the IETF's performance with the UK Green Book's benchmark carbon values. The central Green Book value for 2025 is £313/tCO₂e (in 2025£), representing the economic benefit to society of avoiding one tonne of emissions. Based on the public grant contribution alone, the abatement cost for the IETF is estimated at £178/tCO₂e, well below the benchmark carbon value.

Table 14: CCE per £ of total project cost (Medium sensitivity)

Indicator	EE projects	DD projects	All projects
Projects included in analysis	18	3	21
Net reduction in carbon emissions	103,500 tCO ₂ e	1,400 tCO ₂ e	104,900 tCO ₂ e
Total project costs	£53 million	£2 million	£55 million
£/tCO₂e reduced	£512/tCO₂e	£1,223/tCO₂e	£521/tCO₂e
CCE per £ of total project cost	2.0 kgCO₂e/£	0.8 kgCO₂e/£	1.9 kgCO₂e/£

Source: Ricardo, using DESNZ M&V submissions

However, projects supported through the IETF rely heavily on private co-investment, and would not be delivered without this additional funding, which is included in the total project costs. Based on this measure, the IETF's abatement cost is estimated at £521/tCO₂e, which is higher than the benchmark carbon value.

These results are largely driven by EE projects, which make up most of the projects included in the interim evaluation. For DD projects, the estimated abatement costs exceed the benchmark carbon values when considering both the IETF grant and the total project cost. This reflects the capital-intensive nature of the IETF portfolio, particularly for DD projects.

⁷⁸ The abatement cost (£/tCO₂e) is calculated by dividing the IETF grant amount by the net cumulative reduction in carbon emissions attributable to the IETF over the evaluation period 2021–2050. This is the inverse of the CCE metric (kgCO₂e/£), scaled by a factor of 1,000 to convert from kilograms to tonnes. The figures in the table are derived from unrounded values in the CBA model.

Overall, the lower grant-based abatement cost shows that grant funding under the IETF is helping to unlock much larger private investment, allowing emissions to be reduced for much less public money than the economic benefit generated by the abatement. This demonstrates strong value for money from a taxpayer perspective.

Sensitivity analysis results show that the IETF portfolio continues to have a positive CCE in the 'high' sensitivity scenario, which becomes negative in the 'low' sensitivity scenario due to one project generating very large increases in emissions that offset the reduction across the entire portfolio. These ranges highlight that the portfolio-level results are driven by a mix of high-performing and lower-performing projects. Further details of the sensitivity analysis are provided in Annex C.

Overall Benefit Cost Ratio

The NPV of monetised benefits and full project costs (as proxy for the primary costs of the IETF intervention from a social perspective) is estimated and presented by project category in Table 15 below.

In addition, the BCR⁷⁹ was calculated by dividing the NPV of total project benefits by the NPV of total project costs. BCRs are also reported in the table below. Please note that the estimates in the Interim Impact Evaluation are limited by the small sample of projects reporting M&V data, and the 'medium' sensitivity estimates should be interpreted as likely indicative average estimates of the societal impact of the IETF, rather than outcomes that may be uniformly realised across all projects (see limitations section and Annex C for further details).

Table 15: NPV of costs and benefits (discounted to 2021) and Benefit Cost Ratio (BCR) based on total project costs (Medium sensitivity)

Indicator	EE projects	DD projects	All projects
Projects included in analysis	18	3	21
Total project benefits (million £, 2025£, NPV)	£118 million	£2 million	£120 million
Total project costs (million £, 2025£, NPV)	£45 million	£1.5 million	£47 million
BCR	2.6	1.5	2.6

Source: Ricardo, using DESNZ M&V data

Overall, the results demonstrate that the 21 IETF projects captured in the Interim Impact Evaluation are estimated to deliver a net benefit to society, **with a BCR of 2.6 overall**. That is, **for every £1 spent, a benefit of £2.60 is generated**. This implies that net societal benefits attributable to the IETF (in terms of reduced energy consumption and carbon emissions and improvements in air quality) exceed the total investments (public and private) under the IETF.

⁷⁹ A BCR greater than 1 indicates that the expected benefits from an investment outweigh the costs, suggesting that the project is socially profitable over the evaluation period.

Due to the large number of EE projects reporting data for the interim evaluation (i.e. 18 out of 21), the combined BCR largely reflect the EE outcomes.

The results remain robust under significant cost variation. The analysis indicates that total project costs would need to increase by approximately 160 per cent before the combined BCR reduces to 1.0, the point at which the present value of benefits equals the present value of costs. This indicates that the IETF would continue to offer value for money under a wide range of cost scenarios.

The results also demonstrate a positive return on public sector costs (RPSC), as **the ratio of the NPV of the total project benefits (net of non-public sector costs) to the NPV of the public sector costs i.e., the IETF grant⁸⁰** amount is estimated at 5.6, that is, **£5.60 of benefits generated per £1 of public spending** (see Annex C). This is slightly lower, but comparable, to the net benefit of £6.50 per £1 of public spending that was estimated within DESNZ's original Full Business Case (FBC). Importantly, FBC forecast results are based on all projects (not just the 13% reporting data at time of the interim evaluation). Comparison between FBC estimates and IETF outcomes will form a key part of the final evaluation.

Table 16 NPV of costs and benefits (discounted to 2021) and return on public sector cost (RPSC) based on total public sector costs i.e., IETF grant (Medium sensitivity)

Indicator	EE projects	DD projects	All projects
Projects included in analysis	18	3	21
Total project benefits (million £, 2025£, NPV)	£118 million	£2 million	£120 million
Total public sector costs (million £, 2025£, NPV)	£15 million	£1 million	£16 million
Total project costs (million £, 2025£, NPV)	£45 million	£1.5 million	£47 million
RPSC	5.8	1.8	5.6

Source: Ricardo, using DESNZ M&V data

Sensitivity analysis⁸¹ results show that the BCR of the IETF, as implemented to date, exceeds 1.0 (2.6-8.8) in both the 'medium' and 'high' scenarios. In the 'low' scenario, the BCR falls below 1.0 (-0.1). This is due to a single project with very large negative benefits (see Box 1 below), which outweighs the relatively small positive benefits generated by the rest of the portfolio. This programme wide outcome is considered unlikely in practice, as the scenario results are driven by the relatively small sample size of projects available for analysis in the interim evaluation. Sensitivity analysis also shows that the RPSC is estimated to range between -£0.40 to £23.80 per £1 of public spending, which is aligned with the direction and magnitude of results in the FBC (-£0.80 to £23.80 per £1 of public spending).

⁸⁰ The return on public sector cost (RPSC) compares the overall monetised benefits net of the matched funding from project beneficiaries to the level of IETF grant. This provides a metric of the social value generated relative to the cost to the public sector.

⁸¹ Further details of the sensitivity analysis are provided in Annex C

Box 1: Description of project reporting negative benefits

Upon review of the project with negative benefits, it was determined that the expected outcomes were not achieved because the installed technology did not perform as anticipated. Therefore, the outcome data was lower than the counterfactual (i.e. without IETF) estimates.

In the 'low' sensitivity scenario, this under-performance is further magnified by the counterfactual adjustments, resulting in substantial negative benefits that outweigh the positive benefits generated by the remainder of the portfolio. These negative benefits continue over the evaluation period, in line with the approach for all other projects. Consequently, the overall BCR and RPSC become negative.

When this project is excluded from the appraisal, the portfolio's BCR becomes positive and approaches 1.0, while the RPSC exceeds 1.0 in the 'low' scenario. This indicates that the project exerts a considerable 'swing' effect on the aggregate results.

In practice, however, the counterfactual outcomes associated with the 'low' scenario are considered unlikely, because it assumes a combination of adverse conditions – namely sustained under-performance of the technology, and conservative adjusted counterfactual energy consumption – that is unlikely to be realistic.

7. Additionality, wider effects and lessons for future policy

This section distinguishes the unique benefits produced by the IETF programme, which are unlikely to have occurred in the absence of the programme.

Additionality

Contribution Claim 1: Study grants overcome a financial barrier to inform decision making and a pipeline of EE/DD projects

Study grants were found to address a financial barrier to progressing feasibility and engineering work for transformative technologies that was otherwise unlikely to happen (either at all, or at the same pace and scale). Most study activity would therefore not have occurred in the absence of support. The outcome of IETF supported studies, is therefore also largely additional, which includes informed decision making around deployment and enhanced knowledge and capabilities. As discussed in CC1 (and CC4), the extent to which studies then enabled deployment is however somewhat limited, given the necessity of other identified factors, namely funding. IETF studies were also found to play an important enabling for the success of other government schemes – namely HAR and CCBM, by providing the necessary DEVEX funding for firms to assess and design viable hydrogen and CCUS.

Contribution Claims 2: (Reduced energy consumption and costs – EE objective) and 3 (reduced carbon intensity – DD objective)

Evidence for Contribution Claims 2 and 3 indicates that, without IETF funding, most deployment activity (over and above the counterfactual) would not have proceeded due to financial barriers. Consequently, benefits directly linked to project delivery (namely energy and emissions outcomes) are considered largely additional.

For EE deployment, IETF grants reduced upfront capital requirements and have shortened payback periods by an average of 2 to 3 years⁸², bringing projects within internal approval thresholds. Without the support of the IETF, most investments would not have proceeded, would have been delayed or would have occurred at smaller scale. The observed reductions in energy consumption of around 441 GWh between 2021 and 2050, and associated cost savings of approximately £138 million, are therefore largely attributable to the programme.

⁸² There was a range of survey responses for reduced payback period, covering 1-8 years. The observed mechanism reducing payback period was the reduction in the cost of deployment. To achieve additionality for projects with longer payback periods, a higher grant intensity would have been required in order to reduce payback periods to within an investible level (i.e. within 1 business cycle).

A similar pattern of additionality was observed for DD projects. High capital costs and long payback periods meant that most projects did not meet internal investment thresholds and would not have proceeded without support. Estimated savings of over 104,000 tCO₂e for EE projects and over 2,300 tCO₂e for DD projects between 2021 and 2050 are therefore attributable to the programme. These outcomes are unlikely to have been realised without the intervention and can therefore be considered additional.

Contribution Claims 4 to 10

In Contribution Claims 4 to 10, lower levels of additionality were observed.

Contribution Claim 4 (capability development and pipeline creation):

The programme was found to have relatively low additionality. The financial barrier was observed to be a more significant barrier to deployment than learning and capability development, and the ability for a pipeline to form without financial support is constrained.

Contribution Claim 5 (competitiveness):

The programme was found to demonstrate positive additionality in supporting lower energy costs and securing group level CAPEX investment, which in turn supports competitiveness. However, the installed equipment was not seen as enabling significant gains in competitiveness because of the influence of wider factors including high energy and regulatory costs and relatively weak consumer for low carbon products.

Contribution Claim 6 (DD projects experience higher energy consumption and costs):

The IETF is found to possibly play a role in enabling the deployment of efficient low-carbon equipment (by overcoming financial barrier) which help mitigate higher energy costs that might otherwise be associated with electrification (hydrogen project data was not available for the Interim Impact Evaluation).

Contribution Claim 7 (UK industrial energy intensity and energy security is improved) and Contribution Claim 8 (UK industrial carbon intensity is reduced):

The additionality of the IETF at this interim stage is viewed as minimal. The number of IETF beneficiaries is a small number of operating projects, when considered in the context of the total energy and carbon intensity of UK industry. In addition, wider spillover effects were observed to be modest, suggesting that the IETF has had limited impacts beyond direct beneficiary projects.

Contribution Claim 9 (air quality improvements):

Reduced air quality damage costs have been observed via the QBA, directly linked to reduced fuel throughput. As a result, the air quality impacts are regarded as largely additional, due to the programme's role in overcoming financial barriers to deployment. However, the significance of these direct air quality impacts relative to wider local air quality is not well understood.

Contribution Claim 10 (jobs impacts):

The programme was found to achieve very modest additionality – at around 0-5 new or retained jobs per project. The primary source of additionality was the creation of temporary roles during project construction. However, it is unclear whether jobs retained as a result of IETF deployment of low carbon asset would have been lost in the absence of the programme. Wider economic and commercial factors were confirmed to be the main determinants of jobs impacts.

Unintended consequences and lessons for future policy

Lessons for the pathway to 2050 decarbonisation

Subsidy dependence:

The primary unintended consequence identified by the evaluation is that the IETF may contribute to subsidy dependence for EE/DD investment. Firms generally have the knowledge, skills and delivery capability to implement these projects, but reported that grants were essential to make investments viable and secure internal approval. However, a large proportion of firms participating in the IETF are multinational groups within which subsidiaries compete for centrally managed CAPEX funds. Evidence strongly indicates that the availability of subsidy materially influences where investment proceeds. The IETF therefore positions the UK within a system of international subsidy competition (primarily in competition with the EU bloc), where countries use grants to attract or retain industrial activity. In the absence of comparable or continued support, projects were viewed as likely to be delayed or delivered in other markets where more attractive subsidies are available. As such, the introduction of alternatives financing mechanisms such as low-cost loans would need to factor in this wider subsidy marketplace dynamic. This therefore presents two opposing risks: losing investment from the UK if no attractive funding is available, or contributing to an international “race to the bottom” in subsidy provision rather than strengthening the underlying EE and DD investment cases for UK and EU firms through market and regulatory signals.

However, UK industry faces increasing regulatory and energy costs (with inbuilt levies), ETS and CCL costs which weaken domestic competitiveness, but do not sufficiently strengthen the underlying financial case for EE/DD projects. It is in this context that UK CBAM is offered as a solution, by levelling the playing field for domestic industries who face higher regulatory costs aligned to progressive national climate targets. However, many beneficiaries and wider stakeholders cautioned against an improperly design UK CBAM, which was seen to currently risk further disadvantaging UK industries.

IETF’s unique role in the landscape of UK subsidy schemes

The IETF is identified across all stakeholder groups as playing a unique role in the landscape of UK industrial energy efficiency and decarbonisation because of the following characteristics:

- Medium to large size grants (£100,000-£13,000,000) – rather than smaller innovation funds and capital allowance thresholds, or much larger and more selective schemes such as CCBM

- Technology neutral – allowing firms to identify the best solution for their setting (further strengthened by study grants), rather than predetermined such as HAR or CCBM
- Supporting implementation of established technologies, rather than innovation focused – enabling practical industrial applications
- Eligible for dispersed sites rather than limited to clusters, such as CCBM or the earlier Industrial Decarbonisation Challenge
- Provides a bridge for the establishment of HAR off takers as well as CCBM network users, by providing DEVEX funding via study grants and CAPEX via deployment grants. In the absence of the IETF, HAR off takers and Carbon Capture Business Model users would be required to self-finance

Electrification:

High UK electricity prices have been identified in the IETF evaluation as a non-programme factor negatively affecting industrial decision makers decision to pursue electrification, by increasing payback period and financial barrier. Volatility in energy prices, observed in recent years, also increases risk for investment. UK government electricity discount schemes⁸³, stand to reduce the financial barrier to electrification, and combined with higher carbon costs on gas and diesel, will further incentivise fuel switching. Cheaper electricity is anticipated to support UK industrial competitiveness.

However, cheaper electricity may also lead to increases in energy consumption and reduced energy efficiency practices (rebound effects), which may in turn increase carbon intensity as well as grid system costs. Therefore, a regulatory package aimed at industrial energy efficiency and decarbonisation needs to link electricity discounts to energy efficiency incentives.

Limitations of the IETF scheme:

While the IETF grants have been found to reduce the financial barrier to deployment, the IETF was not found to have system wide effects on reduced technology costs. It is not clear what the time period may be for the cost of these technologies to reduce to a point that would be viable for self-funding. Upstream interventions in technology costs, such as scaling support for supply chains and inputs for key technologies, may therefore also be beneficial, married with downstream signals such as the IETF and Energy Technologies List.⁸⁴

A further limitation of the IETF raised by government representatives and academics, is that the IETF may not deliver as high carbon cost effectiveness (CCE) and contribution to Carbon Budgets compared to larger cluster-based schemes such as CCBM, which may have great economies of scale compared to dispersed site investments. The CCE findings of this Interim Impact Evaluation, and eventually the final impact evaluation, may therefore feed into this assessment of cost effectiveness.

Finally, and as discussed in CC3, the success of IETF hydrogen projects is ultimately reliant on the availability of hydrogen via successful HAR producers. Current delays in the availability of hydrogen highlights this programme interdependency.

⁸³ DBT (2025) [‘British Industrial Competitiveness Scheme: consultation on scheme eligibility and approach’](#)

⁸⁴ DESNZ, [Energy Technology List \(ETL\)](#)

8. Conclusions

Interim impact evaluation conclusions

This comprehensive analysis of evidence on the interim impacts of the IETF demonstrates the programme is largely delivering on its intended primary benefits, [EH108.1][HR108.2] however its progress on secondary benefits is less evident. Important limitations do frame these findings, including the small interim sample of projects reporting M&V data, and a high representation of beneficiaries within the interview and survey sample.

Primary quantitative benefits

Interim analysis of M&V data from operational projects demonstrates a range of quantitative benefits in line with the programme's primary benefits, including reductions in energy consumption, costs and carbon intensity. The interim CCE and BCR of the scheme are found to present good value for money in line with Green Book benchmarks. Linked to fuel throughput, air quality damage costs have also been reduced at the installed equipment level (though significance of these impacts on wider local air quality is unclear). However, while the majority of projects are found to be progressing well, negative benefits and delivery challenges among some projects demonstrates a level of delivery risk which the final impact evaluation is anticipated to assess.

EE and DD deployment projects were demonstrated to lead to a reduction in energy usage and costs above a counterfactual. DD projects were found to lead to proportionately smaller positive impacts for energy use and cost, aligning with the expectation that electrification of LNG and diesel-powered processes tends to lower cost savings compared to optimisation of already electrified processes. However, the overall net improvement in energy usage and costs for these DD projects indicates that the installed equipment also achieves efficiency gains beyond simply fuel switching.

Support to overcome financial barriers

The IETF has been found to address financial barriers to investment in studies and deployment of EE/DD technology, demonstrating positive additionality where market, regulatory and other government programmes do not incentivise a similar pace and scale of investment.

The main market and policy factors contributing to the business case for investment in EE/DD technologies are recent high (and volatile) energy prices and carbon costs (namely UK ETS and CCLs). Consumer demand for low carbon products provides a relatively weak signal for investment. Surrounding energy efficiency reporting (ESOS, SECR) and standards (MEES, ISO) do also provide incentives and reinforcement of EE/DD behaviours. Collectively, however, these wider market and regulatory incentives are viewed as insufficient, in isolation, to drive the scale of transformative investment enabled by the IETF.

The IETF is also found to play a unique role in the landscape of subsidy and tax relief programmes. It supports projects across a range and maturity of technologies, across distributed sites, and at a scale of funding not available elsewhere in the policy space. Other industrial decarbonisation programmes are either innovation focused, cluster focused or technology deterministic, while capital allowance schemes are more limited in their range of technologies and scale/scope of eligible investment.

The high representation of large companies within the IETF portfolio frames the distribution of observed impacts of the scheme as mostly benefiting larger UK and international companies. As presented in the Final Process Evaluation report, this is in part a result of a perceived burdensome application process and high matched funding thresholds making participation from SMEs less attractive.

Support for decision making on deployment

Study grants have been found to support informed decision making about the viability of EE and DD technologies, which has often strengthened confidence and capabilities to progress to deployment. However, the ability to progress to deployment is still inhibited by financial barriers, and therefore there is limited evidence of the development of a pipeline of EE and DD projects outside of IETF support. Where study grants are progressing to deployment, they have either i) accessed a subsequent IETF deployment grant, ii) are reliant on HAR or CCBM funding, iii) are progressing in another country subsidiary, or iv) are progressing at a smaller scale without government support.

While study grants moderately strengthened capabilities and reduced perceived risk of EE and DD technologies (and a greater contribution to capabilities for DD studies), deployment grants are found to have modest impact on the development of capabilities necessary for EE and DD. As reported in the Final Process Evaluation, this aligns with the scheme design which requires applicants to possess the necessary capabilities to deploy mature technologies. Some positive impacts on knowledge and capability were, however, identified as beneficiaries implemented and optimised the use and integration of equipment within their production processes. Spillovers of capabilities and reduced perceived risk to the wider sector were found to be modest reflecting that the financial barrier was the main barrier to deployment. Diffusion of knowledge and capability was found to primarily occur through interactions of consultants, suppliers, project partners and subsidiaries. DESNZ and Innovate UK events were found to play a positive role in generating awareness about the opportunity of IETF grants and eligible technologies, but did not significantly support the spillover of capabilities or lower perceived risks beyond beneficiaries or potential applicants.

Contribution to competitiveness and jobs

The IETF was found to contribute positively to beneficiary competitiveness by enabling savings on energy costs, and to a lesser extent UK ETS costs, which together are viewed as the main barrier to UK industrial competitiveness. However, the scheme's impact on competitiveness through increased revenues linked to enhanced low-carbon product offerings and brand image was found to be limited. Similarly, job impacts, as a result of IETF grants, were found to be modest, with grants primarily supporting the strengthening of existing roles engaged in project delivery, and the hiring of temporary contractors to support project construction. The scale of impact on jobs reflects the scale of the IETF projects relative to wider factors driving commercial and staffing decisions.

Lessons for achieving Net Zero by 2050

The IETF is identified as playing a unique role in the landscape of industrial decarbonisation policies and programmes, by providing grant funding for a broad range of mature technologies, as well as supporting a pipeline of HAR and CCBM off takers/participants. As there has been no commitment to extend IETF beyond Phase 3.1, incentivising the same scale of investment requires balancing regulatory incentives with implications for competitiveness, as UK industries face among the highest energy and regulatory costs in the world, limiting their capacity and appetite for further investment.

If correctly implemented, UK CBAM stands to level the playing field against international producers where regulatory costs are lower, reducing the risk of carbon leakage and loss of UK industry, at lowest cost to UK taxpayers.

Evaluation methodology

The mixed method evaluation approach has provided a generally good strength of evidence upon which to base conclusions. The use of quantitative analysis of equipment performance, qualitative interview and survey responses from a wide set of stakeholders, and programme monitoring data has enabled a rigorous, triangulated assessment of the programme's benefits and mechanisms.

Limitations of the evidence are focused around the reliance on primary evidence gathered from beneficiaries which introduces a degree of bias around beneficiaries' propensity to exaggerate the contribution of the IETF to observed benefits. A low response rate from unsuccessful/withdrawn applicants has also resulted in a relatively weak direct counterfactual for comparison, however, this is somewhat mitigated through engaging study beneficiaries that ultimately did not progress to deployment.

Annexes

- Annex A: Interim Impact Evaluation research methodology
- Annex B: Theory of Change Supplement
- Annex C: Quantitative Benefit Assessment methodology
- Annex D: Contribution Analysis and Process Tracing (CAPT) framework

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