



Department for  
Energy Security  
& Net Zero

# International Industrial Energy Efficiency Policy Case Studies

Baringa Partners LLP for the Department of  
Energy Security & Net Zero



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# 1.0 Executive Summary

In January 2023 the Department for Energy Security and Net Zero (DESNZ) commissioned Baringa to develop a set of international industrial energy efficiency (EE) policy case studies. The study was given a specific focus on EE policies within the five broad categories set out in the table below.

DESNZ policy category of interest	Description
<b>Funding for SMEs</b>	Providing grants and/or loans to Small and Medium Enterprises (SMEs) for EE measures
<b>Knowledge and awareness</b>	Improving firms' awareness and knowledge of appropriate EE technologies and measures
<b>Conditional tax relief and subsidies</b>	Tying tax relief or subsidies to specific targets for firms' reductions in energy use or improvements in EE
<b>Regulation</b>	Driving greater EE via regulations that are designed to account for the heterogeneity of firms
<b>Monitoring energy use</b>	Increasing industrial firms' monitoring of energy usage and/or EE

The objectives of the project were:

- To better understand the nature of OECD countries' policies (including any that have recently ended) that aim to improve the EE of industry, with a particular focus on policy design and implementation.
- To inform Government's development of new policies and/or improvements to existing schemes for UK industry, such as the Energy Savings Opportunity Scheme (ESOS), Climate Change Agreements (CCAs), Streamlined Energy and Carbon Reporting (SECR) and the Industrial Energy Transformation Fund (IETF).

To meet these objectives, the project was split into two main phases of research and analysis:

- An initial Rapid Evidence Assessment that identified 115 policies of potential interest and narrowed these down to 14 policies to be investigated in depth, based upon an assessment of which policies were most likely to provide useful insights.
- A second phase to investigate the 14 chosen case study policies in detail to gather further useful insights for UK policy.

The initial Rapid Evidence Assessment of 115 policies identified several insights into international policy landscape, including the following:

- There is an abundance of policies supporting industrial EE and therefore a lot of potential to learn from international policies, but the availability and quality of evidence on their impact is often weak.
- Similarly to the UK, many countries have a large number of policies supporting industrial EE.

The case study analysis provided a range of detailed insights relevant across several or all of the policy categories, including the following:

- A range of international regulations and conditional tax relief policies are more prescriptive in their requirements of firms than comparable UK schemes.
- Countries are incorporating wider decarbonisation objectives into policies that have historically focused on EE.
- Encouraging the implementation of EE measures rather than energy consumption targets can help to avoid conflicts between EE policies and decarbonisation policies.
- Some governments have imposed broader reporting requirements on firms than UK schemes and have been able to capture more data on firms' planned and implemented EE measures.
- Other countries are making more data on firms' EE progress available to stakeholders such as the public and financial institutions.
- Most G7 countries subsidise energy audits for SMEs.

Other insights from the case study analysis were relevant to specific policy categories. These are summarised for each policy category below.

Funding for SMEs:

- Rolling application windows (rather than limited windows) have made subsidies more accessible to firms, including SMEs.
- Aggregating multiple smaller bids into larger bids has helped SME investment into EE measures that are commonly recommended by energy audits and easier to implement.

Knowledge and awareness:

- Effective knowledge sharing between firms has been enabled by supporting networks of firms to engage on EE.
- Involving universities in EE policy implementation can increase EE skills in the workforce.

Conditional tax relief and subsidies:

- Some conditional tax relief schemes require firms to investigate energy saving and decarbonisation opportunities beyond measures commonly identified by energy audits, by requiring additional assessments.

- Long target periods of up to 8 years and energy audit requirements are used in some countries' conditional tax relief schemes, in contrast to the shorter timeframes used in recent extensions of the UK's Climate Change Agreements.

### Regulation:

- Many international regulations use energy consumption thresholds to define their scope and governments use different approaches to identify companies in scope.
- It is possible to regulate and monitor businesses' implementation of EE measures through a technology list, as shown in the Netherlands.

### Monitoring energy use:

- Other countries approach training and monitoring of energy auditors by involving educational institutions in policy implementation and introducing national certification of energy professionals.
- The introduction of DIN EN 16247-1 has improved the consistency and quality of energy audits reports in Germany.
- Conditional tax relief policies commonly require formal verification of energy savings before firms report these to government.

The report is accompanied by an Excel workbook that contains substantial details about the case study policies alongside some details of the 115 long-list policies.

## 2.0 Introduction

*In January 2023 DESNZ commissioned Baringa to develop a set of international industrial EE policy case studies, with a specific focus on policies within five broad categories: funding for SMEs, knowledge and awareness, conditional tax relief and subsidies, regulation and monitoring energy use.*

The objectives of the project were:

- To better understand the nature of OECD countries' policies (including any that have recently ended) that aim to improve the EE of industry, with a particular focus on policy design and implementation.
- To inform Government's development of new policies and/or improvements to existing schemes for UK industry, such as the Energy Savings Opportunity Scheme (ESOS), Climate Change Agreements (CCAs), Streamlined Energy and Carbon Reporting (SECR) and the Industrial Energy Transformation Fund (IETF).

This report summarises:

- the UK policy context (Section 3);
- the two-stage methodology used to develop detailed analysis of 14 policy case studies and a preceding longlist of 115 policies (Section 4);
- the key insights emerging from the longlist of 115 policies (Section 5);
- the key insights emerging from case studies (Section 6).

It is also accompanied by a Microsoft Excel workbook which contains substantial details on the case studies, including:

- each policy's design;
- the lessons from each policy;
- the potential transferability of each policy to the UK;
- broad indications of the effectiveness of the policies.

The workbook also contains information about the design of the 115 longlist policies and some initial analysis.

The study focusses on EE policies in the following categories, determined by DESNZ as areas of interest to current policy development.

Policy category	Description
<b>Funding for SMEs</b>	Providing grants and/or loans to SMEs for EE measures
<b>Knowledge and awareness</b>	Improving firms' awareness and knowledge of appropriate EE technologies and measures
<b>Conditional tax relief and subsidies</b>	Tying tax relief or subsidies to specific targets for firms' reductions in energy use or improvements in EE
<b>Regulation</b>	Driving greater EE via regulations that are designed to account for the heterogeneity of firms
<b>Monitoring energy use</b>	Increasing firms' monitoring of energy usage and/or EE



## 3.0 UK Policy Context

The UK policy landscape includes a range of policies that contribute to improving industrial EE:

- Climate Change Agreements (CCAs)
- Industrial Energy Transformation Fund (IETF)
- Energy Savings Opportunity Scheme (ESOS)
- Streamlined Energy and Carbon Reporting (SECR)
- Ecodesign standards
- Industrial Energy Efficiency Accelerator
- Transforming Foundation Industries challenge fund
- Industry of the Future Programme
- Building regulations Part L
- Non-domestic smart-metering
- Industrial Heat Recovery Support Programme (IHRS) and Enhanced Capital Allowances (ECAs) scheme (recently closed to applications).

The 2021 Net Zero Strategy<sup>1</sup> also set out several plans to drive industrial EE within the broader net zero transition. This included a key commitment to contribute to 11 MtCO<sub>2</sub>e worth of savings by 2035 through a combination of resource efficiency and EE, in addition to £289 million of funding available through the IETF to support deployment of EE and fuel-switching measures. Since developing the strategy, Government has brought forward several proposals:

- The aim to reduce final energy consumption from buildings and industry by 15 per cent by 2030 (against 2021 levels) set out by the Chancellor in the 2022 Autumn Statement.<sup>2</sup>
- A commitment to deliver a pilot energy advice service for smaller businesses that offers subsidised energy audits and potential grant funding.<sup>3</sup>
- Proposals on the future of CCAs, including options to change eligibility and mandate adoption of energy management systems for participants in future.<sup>4</sup>
- Consultation on strengthening ESOS, including by improving the quality of audits and requiring public disclosure of high-level recommendations.<sup>5</sup>
- A call for evidence to inform proposals for industrial product standards.<sup>6</sup>
- Additional funding of £185 million for the IETF.<sup>7</sup>

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<sup>1</sup> HM Government (2021) [Net Zero Strategy](#)

<sup>2</sup> HM Treasury (2022) [Autumn Statement 2022](#)

<sup>3</sup> HM Government (2023) [Powering Up Britain: Energy Security Plan](#)

<sup>4</sup> DESNZ (2023) [Climate Change Agreements: consultation on extension and future scheme](#)

<sup>5</sup> DESNZ (2022) [Strengthening the Energy Savings Opportunity Scheme](#)

<sup>6</sup> HM Treasury and DESNZ (2023) [Addressing carbon leakage risk to support decarbonisation](#)

<sup>7</sup> DESNZ (2023) [Future of the Industrial Energy Transformation Fund](#)

## 4.0 Methodology

To establish evidence about international industrial EE policies and subsequent insight, the project was split into two main phases:

- An initial Rapid Evidence Assessment that identified 115 policies of potential interest and narrowed this down to 14 policies to be investigated in depth.
- A second phase to investigate the 14 case study policies in detail and gather overall insights.

The methodologies for these two phases are described further in the following subsections.

### 4.1 Phase 1: Rapid Evidence Assessment

The purpose of the Rapid Evidence Assessment (REA) was to identify a wide range of international EE policies, in order to identify a shortlist of policies to undergo in-depth analysis as 'case studies' in Phase 2 of the project.

To identify and select the most useful policies to generate insights for the UK Government, the REA involved two Stages:

- Stage A: Identification of a longlist of policies and initial semi-systematic assessment to narrow scope.
- Stage B: Further semi-systematic assessment and narrowing to the final set of 14 case studies.

These stages are described in detail below.

#### 4.1.1 Stage A: Identification of longlist and initial assessment to narrow scope

##### 4.1.1.1 Identification of longlist

The aim of Stage A was to gather a longlist containing a wide range of insightful and relevant policies. The scope of OECD countries that these were drawn from was limited to 19 out of 38 OECD countries, which were identified as containing the most advanced policies supporting industrial EE and policies of prior interest to the UK Government. To develop the longlist, policy literature from academic and non-academic sources was reviewed. To ensure that the project captured a representative sample of policies, the final longlist was peer-reviewed by the International Energy Agency (IEA). The longlist of 115 policies is set out in Annex A.

The policies identified in this report and the accompanying Microsoft Excel workbook are based on EE-focused programmes delivered at a national scale through central governments identified at the time of investigation.

#### 4.1.1.2 Initial assessment of policies

Key elements of policy design and implementation were collected on each policy. These included policy period (start/end year); Status (Active/Ended); Jurisdiction; Eligible participants; Size of firms targeted (Large, SME, All, etc); Technology Readiness Levels (TRL) supported (where relevant); Total public or private cost; Policy design (including policy objective and/or key requirements); and Delivering institution(s).

Policies were assessed and scored using two main criteria (See Annex B for scoring criteria used for all stages of policy analysis, Annex A for scores):

- **High-level potential to offer lessons (0-2)** – policies were categorised as either an extension of existing UK policy or as an entirely different policy based on its overall mechanism, targeted participants and eligibility criteria. This allowed policies which were identical or highly similar to UK policies to be excluded from Stage B to ensure insights were supplementing existing knowledge.
- **Robustness of evidence (0-3)** – the availability, type and level of evidence was assessed to determine the overall quality of evidence for each policy. Evidence considered under these criteria included overall information on the policy's design, impact and approach to implementation.

An initial overall score was then calculated for each of the 115 policies by combining the two scores above with higher weighting given to the robustness of evidence score. As a result of this approach, 56 of the highest scoring policies were identified and selected for Stage B.

#### 4.1.2 Stage B: Further assessment and narrowing to final set

Stage B assessed the highest scoring 56 policies in greater detail in order to narrow these down to 14 policy case studies. This process used a multi-criteria assessment and then selection exercise to ensure the final set was diverse with respect to the type of policy and potential lessons.

##### 4.1.2.1 Multi-criteria assessment

This multi-criteria assessment was supported by additional data collection on each policy's overall mechanism, eligibility criteria and reporting and monitoring processes. Scores were assigned under each of the following criteria and combined to produce an overall 'case study suitability' score:

- **Robustness of evidence (0-3)** – the availability, type and quality of evidence was assessed to determine the overall strength of evidence for each policy. Initial scores assigned to the 115 policies collected under REA Stage A were updated for the 56 policies following a more thorough evidence review in Stage B.
- **High-level policy effectiveness (0-2)** – this criterion aimed to assess cost-effectiveness or energy savings. However, the availability and comparability of evidence for this was a significant challenge. To manage this in the time available for the REA, assessment against this criterion used a wider range of metrics based on what was

available (including uptake of policy, EE measures implemented as a result of the policy, firms' perceptions of support received, etc). High-level judgement was used to score these varying metrics.

- **Lessons learned (0-2)** – this criterion aimed to determine the extent or scale of insights each policy could provide to the UK Government. This involved identifying differences in the design and implementation of international policies against UK policies (or the UK policy landscape), and assessing how differences could offer insights to UK industrial EE policy objectives.

In calculating the aggregated 'case study suitability' score the 'lessons learned' score was given a higher weighting, as this was a key objective of the research project. The final case study suitability score was used to provide an initial indication of policies to proceed to the case study stage.

### 4.1.3 Final case study selection

The final selection of case studies was decided by the overall 'case study suitability' scores along with an exercise to:

- ensure a balance of case studies across DESNZ' five policy categories of interest
- ensure case studies would optimise lessons learned, informed by collaborative knowledge sharing and discussions with DESNZ analyst and policy colleagues.

## 4.2 Phase 2: Case study assessment

Phase 2 involved in-depth assessment of the 14 case studies and gathering of insights. The following subsections set out:

- the framework for the assessment
- the key steps in the case study assessment: literature review, expert interviews and expert review.

### 4.2.1 Case study assessment framework

An expanded research framework was developed to capture broader information at greater depth for each case study. This approach aimed to assess the following elements of each policy:

- **Policy design:** This included a summary of the key requirements or support measures under each policy, including eligibility criteria and reporting, monitoring and verification, and enforcement and compliance requirements.
- **Policy effectiveness:** This included quantitative and qualitative inputs. The quantitative assessment of effectiveness aimed to calculate energy savings as a share of the energy consumption of the target scope of each policy. Due to significant data gaps in the

energy consumption of the policy scope, the quantitative assessment instead calculated incremental annual energy savings as a share of each country's national average energy consumption. Other quantitative information was also collected where available, including quantitative measures of additionality and degree of uptake of EE measures by targeted participants. Qualitative information on policy impact was also collected, such as the applicability of policies for SMEs.

- **Policy transferability:** This assessed the potential barriers associated with implementing the policy in the UK context.
- **Lessons for UK policy:** Taking inputs from policy design, impact and transferability, the overall insights from each policy were assessed, including learnings for UK policy from specific elements of design and implementation.
- **Robustness of evidence:** The robustness of evidence for policy transferability, policy effectiveness and lessons learned were assessed. This included limitations in evidence of policy effectiveness such as low response rates for surveys used in policy evaluations, or the incomplete availability of achieved energy savings across the entire policy period.

Numerical scores were used to support the assessment of policy effectiveness, transferability and lessons for UK policy (see Annex B for full criteria). However, the main aim of the case study phase was to gather substantial information to produce detailed insights for government on how international policies differ from UK policy approaches. Following the gathering of these outputs, insights were combined to form the insights presented in Section 6 of this report.

### 4.2.2 Sources of evidence for case studies

#### 4.2.2.1 Literature review

The main sources of evidence used to assess case studies were evaluations of policies, monitoring reports and government websites. These included the 73 sources listed in column BC of the "All Policies" tab in the spreadsheet published alongside this report. Official policy monitoring and evaluation reports were sourced from government websites, while other evaluations were sourced from independent research institutions including the European Council for an Energy Efficient Economy (ECEEE) conference proceedings and reports from the Evaluation into Practice to Achieve Targets for EE project (EPATEE). These provided detailed information about policy impact and lessons learned.

Government websites were the main sources of information on policy design, including eligibility criteria, eligible measures and monitoring, evaluation and compliance.

The majority of sources were written in foreign languages (German, Austrian, Italian, Danish, Dutch, French, Korean and Japanese) and were translated to English during the assessment.

#### 4.2.2.2 Interviews with policy experts

Interviews with policy stakeholders were a vital information source for the study. Of the 10 countries represented by the case studies, interviews were successfully conducted for nine

countries. Each interview took a semi-structured format, and interview questions were specifically designed to fill information-gaps and clarify any unclear insights in the literature review.

To identify the most appropriate policy stakeholders, contacts were pursued through two channels: an academic channel, through which authors of the reviewed literature were contacted; and a government channel, through which representatives of policies were contacted, as well as diplomatic contacts through engagement with each country's embassies by DESNZ colleagues.

### **4.2.2.3 Expert review**

To ensure the quality of the study's findings and supporting evidence, a spreadsheet collating assessment material was shared with all policy stakeholders interviewed during the case study phase for review and their comments integrated. This report has been peer-reviewed by six international EE policy experts from:

- the Institute for European Energy and Climate Policy,
- the US Department of Energy,
- the Austrian Ministry of Climate Action and Energy,
- EcoStandard,
- the Institute of Energy Economics Japan,
- the Central Research Institute of Electric Power Industry Japan.

## 5.0 Insights from the international policy landscape

The REA identified a total of 115 policies supporting industrial EE across the 19 OECD countries of focus for the project. The following section sets out two key insights from the REA:

- There is an abundance of policies supporting industrial EE and therefore a lot of potential to learn from international policies, but the availability and quality of evidence on their impact is often weak.
- Similarly to the UK, many countries have a high volume of policies supporting industrial EE.

5.1 There is an abundance of policies supporting industrial EE and therefore a lot of potential to learn from international policies, but the availability and quality of evidence on their impact is often weak.

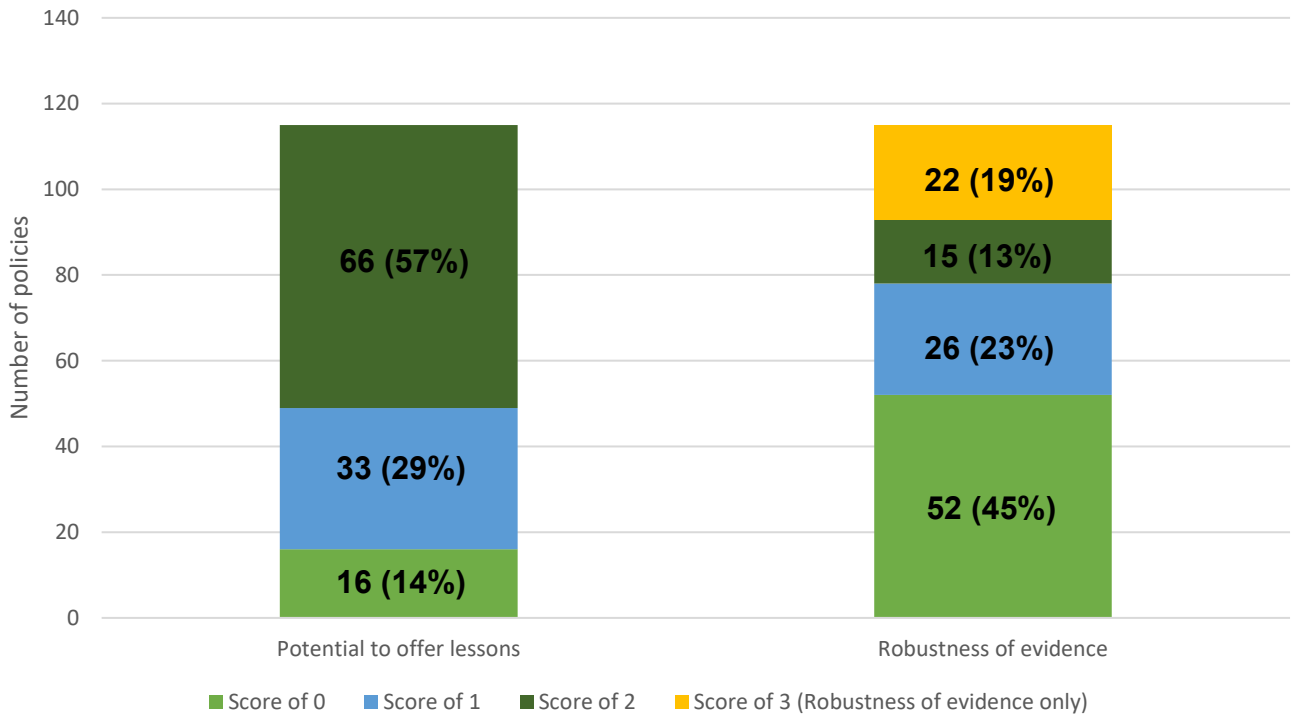
There is an abundance of policies supporting industrial EE across OECD countries. Despite the scope being narrowed to 19 from 39 OECD countries, the REA identified 115 policies of various types.

We assessed that most of these policies could have some useful lessons to offer to the UK – either because these policies are similar to existing UK policies with some interesting differences in design and implementation, or because they are totally different mechanisms which do not exist in the UK. This is reflected by our assessment in Figure 1, where 66 policies (57%) received a score of 2 in our high-level assessment of potential to learn lessons.

However, many policies which potentially offered useful insights to the UK were found to have a lack of readily available evidence to investigate their impact (Figure 2). Out of the 66 policies which scored 2 for ‘potential to offer lessons’, 39 policies (59%) received a score of 0 or 1 for ‘robustness of evidence’ meaning either ‘no evidence’ or ‘limited evidence’ on whether the policies had been or will be effective. The lack of evidence available for policies was driven by multiple factors, including low policy maturity which meant there were not yet published evaluations, or because energy savings were not reported at the level of the identified policy.

This finding implies that there are likely to be many further insights that could be gathered from policies outside of the 14 focused on in this report.

**Figure 1: Potential of policies to provide lessons to the UK (assessed between 0-2) and Robustness of evidence (assessed between 0-3).**





## 5.2 Similarly to the UK, many countries have a high volume of policies supporting industrial EE.

All 19 OECD countries in scope of this project contain at least one policy supporting industrial EE, based on the programmes identified during the time of the investigation. Similarly to the UK, other countries have a high volume of policies supporting this area, with 7 out of 19 countries containing more than 9 policies (Figure 2). Driven by the introduction of new policies and renewed funding for existing policies under the Inflation Reduction Act, the United States showed the highest number of industrial EE policies (20 policies), followed by Korea and France (11 policies), Japan (10 policies), Germany, Italy and Australia (9 policies).

**Figure 2: Number of industrial EE policies per country**

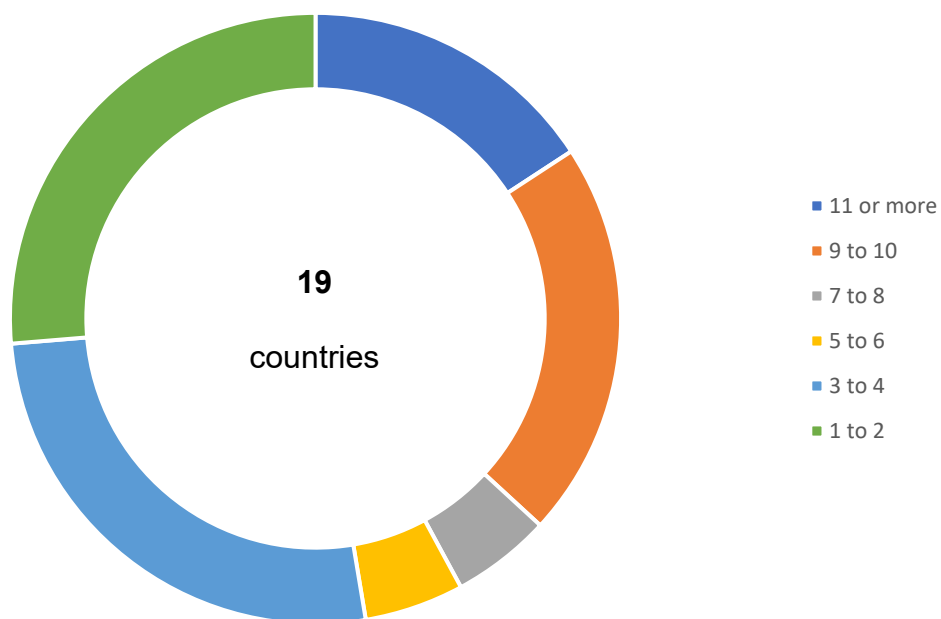
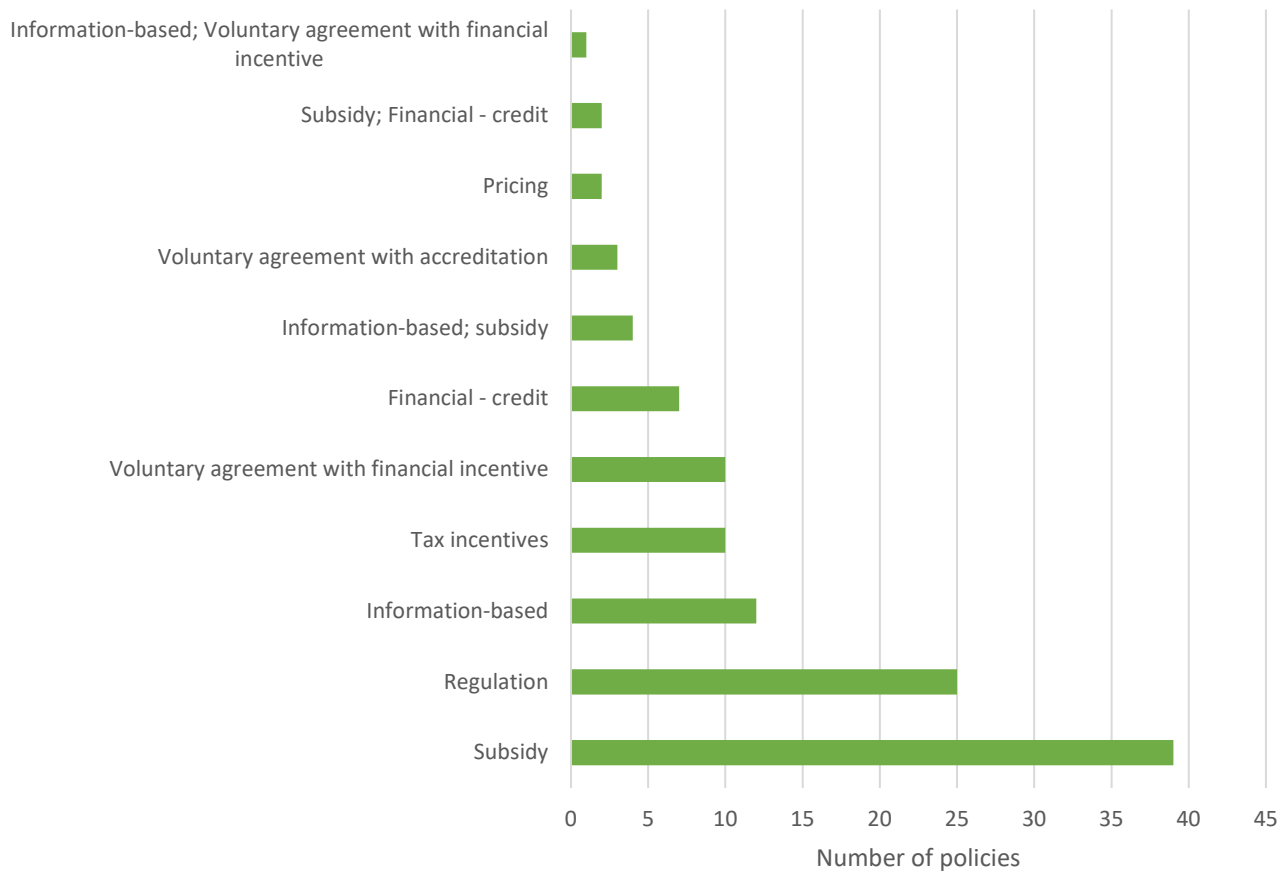


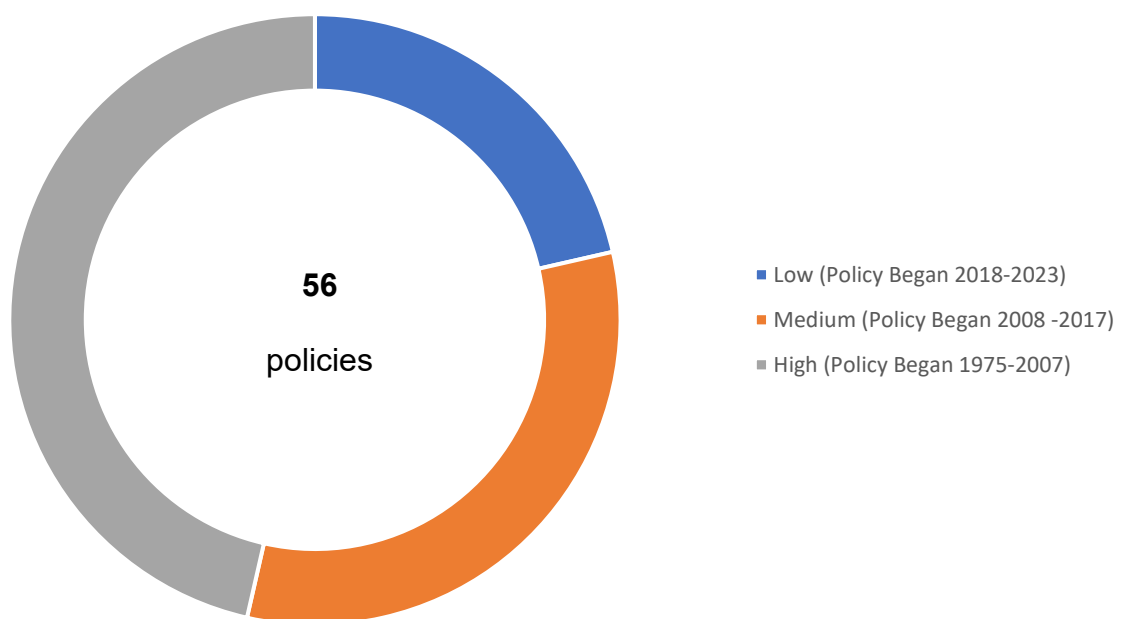
Figure 4 shows the most common types of policy supporting industrial EE were subsidies (34%, 39 policies), regulations (22%, 25 policies) and information-based policies (10%, 12 policies). Tax incentives (9%, 10 policies) and voluntary agreements with financial incentives (referred to in this report as ‘conditional tax relief or subsidy’) (9%, 10 policies) were also commonly identified. The REA also identified mixed schemes using more than one policy mechanism, including information and subsidy schemes, as well as financing schemes providing both grants and loans.

There was a large range in policy maturity identified in the study, with policy start years ranging between 1991 and 2023. Just under half (46%) of policies assessed under REA Stage B were in the upper maturity range (starting between 1975-2007), while approximately a fifth of policies (21%) were in the lower maturity range (starting between 2018-2023).

**Figure 3: Types of policies identified in REA stage A (115 in total).**



**Figure 4: The maturity of policies investigated in REA stage B.**



## 6.0 Insights from international policy case studies

The following section explains the key findings from the assessment of 14 international policy case studies, which were selected upon completion of the REA. It contains:

- An overview of the 14 policies selected as case studies, including how these were mapped to the five industrial EE policy categories of interest to DESNZ: *funding for SMEs, knowledge and awareness, conditional tax relief and subsidies, regulation and monitoring energy use* (Subsection 6.1).
- Insights relevant to several or all the five policy categories considered, or ‘cross-cutting insights’ (Subsection 6.2).
- Insights specifically relevant to each of the five policy categories (Subsection 6.3 - 6.7).

These insights frequently demonstrate actions or outcomes that have proven to be feasible internationally, and how they differ from UK policy. They aim to equip the UK Government with an understanding of different industrial EE policy options. This analysis alone does not allow for clear conclusions on the best policy approaches and therefore the report does not make recommendations to UK policy. To identify the best policy approaches, more comprehensive and holistic analysis is required, which was beyond the scope of this study.

### 6.1 Overview of case study policies

Before exploring insights from the 14 case studies, this subsection sets out an overview of the selected policies.

Table 6.1 describes the 14 policies selected as case studies and sets out how these are spread across the five policy categories. Overall, each industrial EE policy category contained three policies, apart from funding for SMEs, which contained two policies.

**Table 6.1 Description of policies**

Category	Policy	Policy Description
<b>Funding for SMEs</b>	<b>ProKilowatt</b> <i>2010 – present</i> <i>Switzerland</i>	Subsidy of up to 30% of investment costs into electricity-saving measures, awarded through weekly competitions to individual and aggregated projects providing the highest electricity savings per Swiss franc of subsidy. The source of funding is an electricity network charge which generates up to 70 million Swiss francs per year.

		This policy targets businesses of all sizes.
	<b>National environmental support (UFI)</b> <i>1993 - present</i> <i>Austria</i>	One of Austria's main environmental subsidies supporting EE, renewable energy and research. It partially supports private companies and public institutions with subsidies for environmental deployment and demonstration. This policy targets businesses of all sizes.
<b>Knowledge and awareness</b>	<b>Energy Efficiency Networks Initiative (IEEN)</b> <i>2014 - present</i> <i>Germany</i>	Voluntary scheme to encourage industry associations to establish networks consisting of 8-15 companies, who set common EE targets and share information on energy management to reach targets. Since 2021, the initiative has expanded to become the Energy Efficiency and Climate Protection Networks Initiative, with a target of 300-350 new networks to be initiated by 2025. This policy targets businesses of all sizes.
	<b>Industrial Assessment Centers (IACs)</b> <i>1976 - present</i> <i>United States</i>	Free energy audits for SMEs conducted by university students. The scheme is enabled through competitive 5-year grants from the US Department of Energy, which are awarded to 39 universities to establish an IAC which trains and employs current students (including undergraduate and postgraduate students) to undertake industrial energy audits. This policy targets industrial SMEs.
	<b>Subsidised energy audits</b> <i>2008 - present</i> <i>Germany</i>	Direct subsidy of up to 80% for SMEs to purchase energy audits from approved auditors. The policy subsidises light touch audits (approx. two days) at 80% of the total cost and comprehensive audits (approx. 10 days) at 60% of the cost, with eligibility based on energy costs. From 2020, the program has been updated to provide subsidised energy audits and energy consulting for industrial refurbishments and renovations. This policy targets SMEs.
<b>Conditional tax relief</b>	<b>Voluntary Agreement Scheme for Large Industries</b>	A 3-year agreement which grants 30-50% electricity tax relief to firms who successfully complete a package of requirements, including energy audits, action plans, implementation of ISO 50001 energy

<b>and/or subsidies</b>	<b>(‘Danish Industry Agreements’)</b>  <i>1992 - 2020</i>  <i>Denmark</i>	management systems and EE measures with a payback of less than (or equal to) 5 years and investigations into other EE-related topics.  This policy targets large energy users.
	<b>Branch Agreements (‘Walloon Industry Agreements’)</b>  <i>2003 - present</i>  <i>Wallonia, Belgium</i>	An 8-year agreement which grants relief from energy and CO2 taxes to firms who commit to energy and CO2 targets, complete annual energy audits and feasibility studies for renewable energy. Subsidies are also provided to complete energy audits and studies.  This policy targets companies in industry sectors of all sizes.
	<b>Benchmarking Covenant (‘Flemish Industry Agreements’)</b>  <i>2002 - 2012</i>  <i>Flanders, Belgium</i>	A 9-year agreement which granted electricity and gas tax relief and access to subsidy to firms who commit to meeting challenging EE technology benchmarks and complete annual energy audits.  This policy targets companies in industry sectors, with a focus on large energy consumers.
<b>Regulation</b>	<b>White Certificates</b>  <i>2005 - present</i>  <i>Italy</i>	An obligation for electricity and gas distributors with over 50,000 customers to meet annual primary energy savings targets through end-user energy savings (residential, services, public sector, industry and transport). Energy savings are certified and traded on a marketplace.  This policy targets electricity and gas distributors with over 50,000 customers, and end-users across industrial, commercial and domestic sectors.
	<b>Energy saving obligation</b>  <i>2019 - present</i>  <i>The Netherlands</i>	A requirement on firms to implement all sustainable energy-saving measures with a payback period of up to 5 years, according to the Recognised Measures List (RML). This list contains 149 EE measures with a payback time of 5 years or below, and it is categorised into Buildings, Facilities and Processes. All measures must be reported to government every 4 years. Larger energy users must undertake EE

		<p>studies for processes and report outcomes to the government every four years.</p> <p>This policy targets companies consuming more than 50,000 kWh/year electricity or 25,000 m<sup>3</sup> gas or equivalent.</p>
	<p><b>Mandatory energy audits</b></p> <p><i>2014 - present</i></p> <p><i>Italy</i></p>	<p>A requirement for large firms and energy consuming companies including SMEs to undertake energy audits every four years and implement one of the measures identified. All energy audits must comply with UNI CEI EN 16247-1 and all energy professionals certified by Italy's national accreditation body. A database, Audit 102, enables reporting of all audit outcomes to government.</p> <p>This policy targets large companies and companies consuming more than 2.4 GWh/year, including SMEs.</p>
<b>Monitoring energy use</b>	<p><b>Mandatory energy audits</b></p> <p><i>1979 - present</i></p> <p><i>Korea</i></p>	<p>A requirement for large energy consumers to undertake energy audits every 5 years. The Korean government introduced additional requirements on what technologies and programs should be used to monitor energy consumption and EE opportunities.</p> <p>This policy targets large energy consumers.</p>
	<p><b>Target Management System</b></p> <p><i>2010 - present</i></p> <p><i>Korea</i></p>	<p>A requirement for large companies to set short-term legally binding energy consumption and GHG emissions reduction targets, develop annual implementation plans, submit progress reports and participate in monitoring and evaluation of reports.</p> <p>This policy targets large energy consumers and high emitters across multiple sectors.</p>
	<p><b>Energy Conservation Law</b></p> <p><i>1979 - present</i></p> <p><i>Japan</i></p>	<p>A requirement for companies to implement energy management systems and report annually on alignment of energy management practices with the government standard and the EE of operations with government benchmarks.</p> <p>This policy targets large energy consumers.</p>

Table 6.2 provides a high-level assessment of the policies through estimates of their energy savings, transferability to the UK and lessons for the UK. The metric used to quantify energy

savings is the average incremental energy savings per year as a % of national industrial energy use. The 'average incremental energy saving' reflects the % increase in energy savings for each single year, averaged over the series of years of the policy, rather than the average energy savings relative to a baseline year further in advance. National industrial energy use is used as the comparator for energy savings because data was rarely available, or found, for the level of energy use within scope of each policy. Therefore, the metric only gives an indication of the magnitude of the policy rather than substantial insight into the policy effectiveness.

**Table 6.2 Assessment of each policies energy savings, policy transferability and potential lessons for the UK.**

Policy name	Average incremental energy savings per year as a % of national industrial energy use (estimated) <sup>8</sup>	Policy transferability (out of 4)	Lessons for the UK (out of 4)
<b>ProKilowatt</b>	1.23%	3	2
<b>National environmental support (UFI)</b>	0.47%	3	2
<b>Energy Efficiency Networks Initiative (IEEN)</b>	0.34%	3	3
<b>Industrial Assessment Centers (IACs)</b>	0.22%	2	3
<b>Subsidised energy audits</b>	0.01%	3	4
<b>Danish Industry Agreements</b>	0.89%	2	4
<b>Walloon Industry Agreements</b>	1.05%	3	3
<b>Flemish Industry Agreements</b>	0.13%	2	2
<b>White Certificates (Italy)</b>	0.65%	2	3
<b>Energy saving obligation</b>	0.01% <sup>9</sup>	2	4

<sup>8</sup> Energy savings included in calculations do not account for additionality.

<sup>9</sup> This figure represents estimate of expected energy savings under the previous narrow scope of the scheme, which for example did not include industrials under the scope of the EU ETS. [TNO \(2021\)](#) states that these are 'rough' estimates due to limited information available at the time on the savings potential of the target group.

<b>Mandatory energy audits (Italy)</b>	0.63%	3	4
<b>Mandatory energy audits (Korea)</b>	1.25%	2	1
<b>Target Management System</b>	Data not found	2	3
<b>Energy Conservation Law</b>	Data not found	2	3

## 6.2 Cross-cutting insights

This subsection sets out policy insights that are relevant to several or all of the five policy categories considered within this study.

### 6.2.1 A range of international regulations and conditional tax relief policies are more prescriptive in their requirements of firms than comparable UK schemes.

Many of the international regulatory and conditional tax relief policies require greater action from firms than current ESOS or CCA requirements. These policies require greater action through two main ways: requirements for firms to implement EE measures and requirements to complete energy audits as well as setting EE or carbon targets. For example, both the Danish industry agreements and Dutch energy saving obligation require the implementation of specific categories of EE measures:

- Denmark:** The Danish Industry Agreements imposed a broad package of EE and energy management requirements on participating companies. It required firms to identify EE measures through completion of energy audits at the outset of and during each year of the 3-year agreement. Each year, all EE measures identified with up to a 5-year payback period had to be implemented. The policy also required firms to implement and certify an ISO 50001-certified energy management system, develop an EE action plan and ensure EE policies and accountabilities were in place. Through this requirement to implement measures with a specific payback time, participants achieved a weighted average payback period of 4.7 years, with 73% of completed projects at a payback period of 5 years or less, and the remaining at 6 to 10 years. In terms of requirements to implement energy management systems, 62% of participants strongly agree that this has promoted EE<sup>10</sup>.
- The Netherlands:** The Energy Saving Obligation requires firms consuming more than 50,000 kWh electricity or 25,000 m<sup>3</sup> gas or equivalent to implement all EE measures with up to a 5-year payback period. Instead of requiring measures to be identified through energy audits, the government's Recognised Measures List (RML) dictates all

<sup>10</sup> [Viegaand Maagoe \(2021\) Evaluation of Subsidies for Electricity-Intensive Companies](#)



the measures with a 5-year payback period that businesses must implement.<sup>11</sup> The list contains 149 measures, categorised into Buildings, Facilities and Processes. While measures under Buildings are relevant to all participants, businesses must determine whether measures under Facilities and Processes are relevant to them. For each measure in the RML, a description of the 'current situation' is provided to help firms determine its applicability to the business.

The above approaches differ from UK industrial EE policy, which does not currently require firms to implement actions and measures. However, recent changes to ESOS show that UK policy has moved partly in this direction, with new requirements for firms to develop action plans from Phase 3. The recent ESOS consultation also showed that government has considered the suitability of requiring the implementation of measures. Under the above policies, firms are also required to report implemented EE measures in detail to government, which is discussed further in Section 6.2.4.

The second way case studies require greater action from firms is through requiring energy audits to be completed on top of setting EE or carbon targets. These approaches are described below:

- **Wallonia, Belgium:** Walloon Industry Agreements have required participants to meet 8-year targets (2004-12) and 9-year targets (2014-23). Participants must report progress towards these targets annually. A recent evaluation of the scheme found that participants preferred long-term goals, which provide security and better integration into company decarbonisation strategies.<sup>12</sup> To enable them to meet the required targets over a longer timeframe, the agreement requires companies to complete an energy audit at the start of the period and then each year during the period. Audits must cover all sites over which companies have direct control, including those owned by the company itself and third parties<sup>13</sup>. The Walloon government offers subsidies to complete energy audits (as well as feasibility studies for renewable energy sources and CO<sub>2</sub> mapping studies, which are discussed further in Section 6.5.1.).
- **Germany:** While participants of Germany's IEEN must set joint network-level energy consumption targets (for a minimum period of 2 years), these are backed by requirements for firms to conduct an energy audit, participate in joint exchange to share knowledge on energy management and EE, and fully participate in monitoring and reporting of energy savings, implemented measures.

As a target-based conditional tax relief scheme, Wallonia's Branch Agreements go further than CCA's current requirements, which do not require participants to complete energy audits on top of setting targets to gain eligibility for tax relief. One consideration for transferability is the implication on future crossovers between compliance for CCAs and ESOS, which is already under consideration (Government has proposed making CCA targets compliant with new ESOS reporting requirements for EE action plans).

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<sup>11</sup> [Recognised lists of measures \(EML\) from 2023 \(rvo.nl\)](#)

<sup>12</sup> Wallonie Service Public (2021) Analysis report on the functioning of the 2<sup>nd</sup> generation branch agreements and preparation of future 2030 agreements

<sup>13</sup> Methodological note branch agreement 2013-2020. [Les accords de branche 2014-2020-2023 - Site énergie du Service public de Wallonie](#)

## 6.2.2 Countries are incorporating wider decarbonisation objectives into policies that have historically focused on energy efficiency.

Several countries have redesigned EE policies to incorporate decarbonisation objectives, including case studies from The Netherlands, Belgium, Germany and the United States.

- **The Netherlands:** From July 2023, the Energy Saving Obligation has been updated following the transfer of all environmental legislation into the framework of the Dutch Environment and Planning Act (which focuses on achieving a healthy physical environment and meeting societal needs and enters into force in January 2024). The obligation now requires firms to implement measures which ‘make energy use more sustainable’ rather than measures which save energy only. This means that in addition to energy saving measures required under the previous legislation, renewable energy and switching energy carriers has also become mandatory, provided the measures reduce carbon emissions and pay back in five years or less. This change is expected to affect all companies within scope of the regulation, including newly targeted companies under the EU ETS who must take efforts to reduce carbon emissions. It will also affect larger energy users (>10 million kWh/year) who have an obligation to investigate measures to make energy use more sustainable across their processes (while implementing and reporting all EE measures related to buildings).
- **Belgium:** After the first round of Walloon Industry Agreements (2004 -12), the regional government of Wallonia expanded the scope of the second round of agreements (2014-2023) to focus on decarbonisation as well as EE. Firms are required to set both energy and CO2 targets and undertake CO2 mapping studies, pre-feasibility and feasibility studies for renewable energy sources, as well as reporting these to the government. Ahead of developing the next round of voluntary agreements, the Walloon government is considering the separation of performance indices for energy consumption and greenhouse gas emissions.
- **Germany:** Since 2021, Germany’s IEEN has been redesigned as the Energy Efficiency and Climate Networks Initiative (IEEKN), which now allows networks to set CO2 reduction targets as well as energy saving targets. This update is in response to Germany’s Climate Action Programme 2030 and Climate Change Act adopted in 2019.
- **United States:** Until recently, the IAC program supported industrial SMEs to identify EE measures through energy audits, along with their potential energy savings, cost effectiveness and corresponding CO2 emissions. Following the announcement of the national commitment to reach net zero by 2050 and an emissions reduction target of 50-52% by 2030 (against 2005 levels), the program is expanding its scope to provide SMEs with cost-effective CO2 abatement measures. To enable this, the US Department of Energy is developing a decarbonisation tool for engineering students/auditors to apply within the energy audit<sup>14</sup>.

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<sup>14</sup> Stakeholder Interview (2023) Interview with policy stakeholder for US IAC program

These policies indicate a trend towards combining policy objectives, reflecting the increased attention on decarbonisation.

### 6.2.3 Encouraging the implementation of energy efficiency measures rather than energy consumption targets can help to avoid conflicts between energy efficiency policies and decarbonisation policies.

The UK typically uses energy consumption as a key metric for targets under the CCAs, or in some cases carbon. The use of energy consumption as a metric for targets can create conflicts with decarbonisation policies/objectives, where decarbonisation actions increase the energy use measured by an EE target (which sometimes happens when overall energy use is reduced).

The Dutch and Danish policy approaches described in Section 6.2.1 and Section 6.2.2 encourage the implementation of measures rather than energy targets, which can help to avoid conflicts between EE policies and decarbonisation policies and ensure that their policy frameworks promote both EE and decarbonisation. They focus on the implementation of more efficient measures (with up to a 5-year payback period) rather than using a sole energy consumption target. The Walloon (Belgian) approach of setting both energy and CO<sub>2</sub> targets takes the conflict into account during the target setting stage to a limited extent. However, to avoid the conflict companies must have a clear view of the combination of decarbonisation and efficiency measures they plan to implement, which may not always be feasible in advance.

### 6.2.4 Some governments have imposed broader reporting requirements on firms than UK schemes and have been able to capture more data on firms' planned and implemented EE measures.

Assessing the reporting requirements of case studies revealed broader requirements than current UK industrial EE policies or more detailed requirements (in the case of implemented EE measures as required under SECR). These requirements include EE action plans, implemented EE measures, energy audit recommendations and evidence of energy management. Following the latest changes to ESOS announced in July 2022, many of these areas will be required from Phase 3 and 4. Case studies also showed that information is often reported directly to government or the delivering institution(s) through platforms and tools which make information accessible to government and other stakeholders. This is discussed further in Section 6.2.5. The broader areas of reporting found across case studies are outlined below.

**Energy intensity metrics:** In the UK, energy intensity metrics are due to be reported by all ESOS participants from Phase 3 onwards. In Japan, these have been required under annual reporting:

- **Japan:** Large energy consumers (>2000 toe/year) are required to submit 'Periodic Reports', in which energy intensity achieved in the previous year is reported against sector-specific benchmarks set by government (using sector-specific units of physical output). Benchmarks for industrial sectors were introduced in 2009-10 and provide a minimum voluntary level of energy intensity firms should aim to meet and report against

on an annual basis<sup>15</sup>. Firms' performance against this benchmark is then ranked under the Business Operator Classification Evaluation System, with companies meeting the benchmark rated as 'excellent' and poorly rated businesses subject to potential site visits.

**EE action plans:** Under current UK industrial EE policies, forward-looking plans on EE are not required from firms. In future, firms will be required to provide 'next steps for implementing recommendations' from energy audits, publicly reported action plans and annual progress updates from Phase 3 of ESOS onwards (though participants will not be penalised for not implementing the measures in the action plan). In contrast, several case studies already require this type of information:

- **Japan:** Large energy consumers (>2000 toe/year) are obliged to annually submit a 'Medium to Long-Term Plan' report of planned investments and implementation schedules (3 to 5 years). This information must be reported directly to government with MS Excel templates available to firms. Companies are exempt from reporting this annually if they achieve a classification of 'excellent' under the Business Classification Evaluation System described above.
- **Denmark:** The Danish Industry Agreements required EE action plans including existing and planned projects, energy audit recommendations and a 'screening list' of identified measures with a 5-year payback period or less. In contrast to the Japanese regulation, it was mandatory for companies to implement EE measures included in the plan with up to a 5-year payback period. Companies who did not fulfil requirements of the agreement were subject to repaying the subsidy, however this rarely happened in practice as the Danish Energy Agency sought to allow consideration for barriers faced by participants to implement EE measures by providing exemptions and further advice<sup>16</sup>.

**EE potential and implemented EE measures:** Current ESOS, SECR and CCA reporting requirements allow government to collect some information on implemented EE measures. SECR requires narrative descriptions of 'principal' EE measures taken in the previous year. Under ESOS, this includes basic company information (name, sector, location, structure), the extent of ISO 50001 coverage across operations, whether boards have visibility of audit reports, whether coverage and inputs comply with requirements and whether firms have EE targets (the latter is also collected through CCA reporting).

However, new reporting requirements for ESOS Phase 3 mean government will begin to collect information on EE opportunities and achieved savings broken down by type of opportunity. This more closely reflects approaches used by case studies to collect highly detailed information on EE audit recommendations and implemented EE measures, as shown below:

- **The Netherlands:** The Dutch energy saving obligation requires energy consumers (>50,000 kWh/year, 25,000 m<sup>3</sup>/year or equivalent) to report all EE measures taken with 5-year payback period every 4 years, according to the RML. Reporting must be

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<sup>15</sup> [EZAWA \(2021\) Energy Efficiency Benchmark System of Japan \(windows.net\)](#)

<sup>16</sup> Stakeholder Interview (2023) Interview with policy stakeholder for Danish Industry Agreements

completed via a government portal (eLoket), which allows government to monitor the extent of EE implementation across industry. To increase granularity of information, some EE measures (but not all so as to reduce burden) have additional questions related to usage.<sup>17</sup> Firms are also required to report alternative EE measures with up to a 5-year payback period taken as alternatives to those in the RML.

- **United States:** The IAC database contains the types of facilities assessed (size, industry, energy use, etc) and the resulting recommendations, including type of measure, status of implementation, gross energy savings, and dollar savings from over 20,800 assessments.<sup>18</sup> The data is stored and managed by Rutgers, the independent delivery partner for the policy. Crucially, it is the responsibility of energy auditors (university students) to collect this data and verify it with their SME 'clients' through a routine post-assessment follow-up call (6-9 months after the audit) in which companies are asked which recommendations they have implemented or are planning to implement within 1 year.
- **Italy:** The Italian National Agency for New Technologies, Energy and Sustainable Development (ENEA) Audit Database (Audit102) contains the outcomes of all energy audits completed in accordance with Italy's mandatory energy audits. This includes over 28,000 audits from nearly two phases, including information from over 2,000 energy intensive SMEs. The database contains production volumes, energy consumption, implemented and planned EE measures, and financial indicators such as CAPEX and simple payback times.<sup>19</sup> As seen in the US example, auditors themselves (certified energy managers or consultants) upload this information on behalf of the audited sites. This database is incorporated into the National Portal on Building Energy Performance, which supports the Italian government's overall monitoring of EE across domestic and non-domestic buildings and sites.

The approaches outlined above demonstrate international governments' strong focus on collecting detailed information on companies' EE performance and plans through comprehensive reporting requirements. A key characteristic of the above approaches is the requirement for energy auditors to report and upload information, rather than firms only. Overall, these reporting and data collection frameworks are supported by clear accountabilities for data to be collected, uploaded and stored by institutions.

### 6.2.5 Other countries are making more data on firms' energy efficiency progress available to stakeholders such as the public and financial institutions.

The previous section demonstrated that international governments have been able to collect broader and more detailed information than current UK policies for Government use. Several

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<sup>17</sup> Stakeholder Interview (2023) Interview with policy stakeholder for Dutch Energy Saving Obligation

<sup>18</sup> [Industrial Assessment Centers \(iac.university\)](https://iac.university)

<sup>19</sup> Bruni, G.; Martini, C.; Martini, F.; Salvio, M. (2023) On the Energy Performance and Energy Saving Potential of the Pharmaceutical Industry: A Study Based on the Italian Energy Audits. *Processes*, 11, 1114. <https://doi.org/10.3390/pr11041114>

international policies also make data on firms' EE progress available to stakeholders such as the public and financial institutions:

- **Japan:** The Japanese government makes EE data available to investors through the Voluntary Disclosure System for Periodic Reports which is currently being piloted. This would mean that information submitted in companies' annual 'Periodic Reports' will be available, such as annual energy consumption, energy intensity, alignment to energy intensity benchmarks and status of energy management systems. The system aims to increase the availability of corporate sustainability information to investors. Companies will be able to voluntarily disclose information from their compulsory annual EE reporting into the system, with those choosing to disclose being recognised on a league table<sup>20</sup>.
- **Netherlands:** The Dutch government makes energy consumption data available to the public through the VUE monitoring tool<sup>21</sup>. This aggregates and anonymises EE data, such as the status of implementation of measures from the RML and electricity and gas consumption of businesses, as well as other data made available upon request (such as planned costs). Data is sorted at sector and regional level, and leverages information reported by companies through eLoket, the reporting platform of the energy saving obligation<sup>22</sup>.
- **United States:** All energy audit outcomes for SMEs completed under the IAC program are available to the public. There is substantial data on energy audit outcomes available to the public (see Section 6.2.4). This is anonymised by Rutgers, the program delivery partner, and stored as the IAC database, which can be downloaded. All company data in the IAC database (see Section 6.2.4) is anonymised by Rutgers to ensure it is usable by government and public users.

The level of data disclosed through these international policies is greater than currently disclosed through UK industrial EE policies, such as ESOS. However, information currently reported under ESOS is made available to the public, and the majority of the information provided under the scheme's new reporting requirement will be publicly disclosed from Phase 3 onwards. This includes EE actions plans and high level ESOS information.<sup>23</sup>

### 6.2.6 Most G7 countries subsidise energy audits for SMEs.

Several countries including Germany, the US, Italy, Austria, France, Korea, Japan, Sweden and Finland offer subsidised energy audits to SMEs. This study looked in detail at the German and US case studies, which differ in the way they subsidise SMEs. These examples have increased SME EE investments and helped to address financial and knowledge barriers to EE

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<sup>20</sup> METI (2023) [Voluntary Disclosure System for Periodic Reports | Energy-saving information for business operators | Energy-saving portal site \(meti.go.jp\)](#)

<sup>21</sup> [VUE-Database - New \(databank.nl\)](#)

<sup>22</sup> [Monitoring system implementation of energy saving and information obligation - Knowledge Centre InfoMil](#)

<sup>23</sup> [Strengthening the Energy Savings Opportunity Scheme \(ESOS\): government response \(publishing.service.gov.uk\)](#)



improvements. They also demonstrate that energy audits are often only accessible if subsidised.

- **United States:** Since 1976, the Industrial Assessment Centre (IAC) program has gained strong uptake from SMEs, delivering an average of 400 audits per year, primarily through promotion of energy audits to SMEs as an energy cost reduction measure. Typically, assessments identify over \$130,000 in total potential energy savings, nearly \$50,000 of which are realised from measures implemented within the first year after an assessment.<sup>24</sup> The subsidy program has also successfully removed SMEs' barriers to accessing energy audits, with 75% of companies stating that they would not have sought an energy audit had the IAC program not been available to them<sup>25</sup>.
- **Germany:** The German energy audit subsidy differs from the US example by directly funding SMEs to undertake short audits (max. 1,200 EUR) and comprehensive audits (max 6,000 EUR). Only SMEs with energy costs above 10,000 EUR/year are eligible for comprehensive energy audits. Energy audits under the scheme have successfully incentivised EE investments among SMEs, with a 2016 evaluation showing that SMEs who received subsidised energy audits implemented an average of 4.5 measures, versus a control group of companies who did not undertake audits (2.5 measures)<sup>26</sup>.

In comparison, the UK does not currently offer a national subsidy scheme for energy audits. However, Government has commitment to piloting a new audit scheme for SMEs at the regional scale this year.

### 6.3 Funding for SMEs

The following section draws insights from Swiss and Austrian case studies which provide grants to SMEs (note that subsidy schemes providing loans to SMEs identified in the REA were not selected for case study assessment). These case studies provide two insights into how international policies have delivered subsidies to SMEs:

- Rolling application windows (rather than limited windows) have made subsidies more accessible to firms, including SMEs.
- Aggregating multiple smaller bids into larger bids has helped SME investment into EE measures that are commonly recommended by energy audits and easier to implement.

As both case studies target large firms as well as SMEs, this section draws some comparison between approaches taken in the UK's IETF as the most comparable grant scheme. However, the IETF is primarily focused on large organisations given the grant sizes offered. The studies may also inform the development of plans for pilot SME grant scheme, which Government has committed to this year.

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<sup>24</sup> [Industrial Assessment Centers \(IACs\) | Department of Energy](#)

<sup>25</sup> SRI International (2022) Industrial Assessment Centres Impact. ([IAC Technical Documents](#))

<sup>26</sup> Schleich, J., Fleiter, T., (2017) Effectiveness of energy audits in small business organizations. Resource Energy Econ. <http://dx.doi.org/10.1016/j.reseneeco.2017.08.002>

### 6.3.1 Rolling application windows have made subsidies more accessible to firms than limited windows, including SMEs.

Currently, IETF provides two to three application and funding windows per year. Case study analysis showed that a different, rolling approach is taken to application windows for some international EE deployment schemes:

- **Switzerland:** In the last year, the Swiss Federal Office of Energy launched 24/7 rolling application windows for project applications under the ProKilowatt scheme.<sup>27</sup> This change came in response to negative feedback from participants who had to postpone EE investments to align with the two to three application windows and competitions per year. Funding rounds were also increased to run on a weekly basis, where projects with the highest subsidy ratios (electricity saved per Swiss franc of subsidy) are selected. Each week, unsuccessful applications from previous weeks' funding rounds are included to maintain competitive conditions. This high-frequency application process is operated by 8 full time staff, split between the Swiss government and an external delivery partner.
- **Austria:** UFI provides deployment grants on a rolling basis. These are managed by the scheme's delivery partner, Kommunal Kredit Consulting, and made accessible to firms on a designated website for the grant scheme. As a broad environmental subsidy, end-users can apply to different programs (which range between EE and other topics such as circular economy and biodiversity).

One factor that has made the rolling approach feasible for ProKilowatt has been a constant flow of funding through a surcharge on grid electricity. Similarly, UFI has benefitted from a recent increase in budget from approximately EUR 200 million per year to EUR 1.5 billion per year<sup>28</sup>. The IETF does not have the same level of long-term funding certainty or level of funding, which may limit the transferability of the approach.

### 6.3.2 Aggregating multiple small bids into larger bids has helped SME investment into energy efficiency measures that are commonly recommended by energy audits and easier to implement.

Aggregated bids for subsidies allow funding to be provided to multiple sites under one application. While IETF is currently eligible for bundles of up to 5 projects per application, with no limit on the total numbers of applications, it is not possible to bundle together projects owned by different companies. ProKilowatt takes a different approach to project eligibility and investment thresholds. This is outlined below:

- **Switzerland:** ProKilowatt provides funding to both individual projects and aggregated projects ('programs'). Aggregated projects bring together groups of households and/or companies investing in EE measures with lower investment costs (less than CHF 300,000 per project or approximately GBP 270,000). An intermediary supports these

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<sup>27</sup> 24/7 rolling application windows were described as a 'recent change' during a stakeholder interview in May 2023

<sup>28</sup> Stakeholder Interview (2023) Interview with policy stakeholder for Austrian National Environmental Support



bids from these projects by promoting the investment program, coordinating project applications, and supporting end-users in calculating expected energy savings. As opposed to weekly competitions for projects, the Swiss Federal Office of Energy runs one competition per year for aggregated bids, selecting those with highest subsidy ratios. The Swiss government incentivises intermediaries to run programs by allocating them approximately 30% of the total awarded subsidy. Programs have successfully incentivised investments into EE measures across lighting, boilers, electric motors and refrigeration that are commonly recommended by energy audits and easier to implement.<sup>29</sup>

## 6.4 Knowledge and awareness

The following section provides insights into how international policies seek to improve awareness of EE among firms and to upskill the workforce in EE. The case studies showed that:

- Effective knowledge sharing between firms has been enabled by supporting networks of firms to engage on EE.
- Involving universities in EE policy implementation can increase EE skills in the wider workforce.

These insights may provide useful learnings as information-based approaches such as Government-initiated networks and involvement of educational institutions are yet to play a significant role in UK industrial EE policy.

### 6.4.1 Effective knowledge sharing between firms has been enabled by supporting networks of firms to engage on EE.

The German IEEKN has improved firms' awareness and knowledge of EE measures and energy management through knowledge sharing between firms. Knowledge sharing is facilitated through voluntary agreements between the government and trade associations, who agree to promote, establish and coordinate networks of between 8-15 firms. These firms must set common EE targets over a minimum of two years and are not awarded financial incentives from government for participating. Between 2018 and 2021, the scheme successfully enrolled 1,881 companies (68% from industry sectors), 73% of which were 'exceptionally' or 'very' satisfied with their participation, and 83% rating the cost-benefit ratio of participating 'quite good' or 'very good'<sup>30</sup>.

The successful uptake of networks and positive feedback demonstrates that companies can be encouraged to share knowledge on EE without financial incentives from Government. However, a key consideration with the German approach is the time and resources required to engage participants and promote the scheme. At the outset of the initiative, network

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<sup>29</sup> Monitoring report ProKilowatt – 2010 to 2022. [SFOE Publications \(admin.ch\)](https://www.sfoe.admin.ch)

<sup>30</sup> Fraunhofer & adelphi (2022) Monitoring of the Energy Efficiency Networks Initiative. [https://www.effizienznetzwerke.org/app/uploads/2022/04/Monitoring-IEEN-5.-Jahresbericht\\_web.pdf](https://www.effizienznetzwerke.org/app/uploads/2022/04/Monitoring-IEEN-5.-Jahresbericht_web.pdf)

coordinators reported an average of 4 working days a year per company to secure engagement. Direct engagement with UK companies to promote the scheme, as in the German case, would need to focus on the benefits of participation on improving EE and reducing energy costs.

### 6.4.2 Involving universities in energy efficiency policy implementation can increase energy efficiency skills in the wider workforce.

Two case studies demonstrated examples of governments involving universities in policy implementation to increase EE skills in the wider workforce, outside of industrials subject to regulations or incentives:

- **United States:** The IAC program has increased valuable skills in the workforce through training undergraduate and post graduate students involved in the program to complete energy audits. Training is coordinated by a Field Manager across all IAC universities, and comprehensive guidance on completing SME energy audits is available on the IAC program website. Participating students acquired 72% more valuable skills (both general skills and EE skills such as energy audits, data analysis, EE, optimisation, boilers, industrial engineering) than members of their academic cohort who did not participate, and 138% more than non-IAC professionals in energy-related jobs. They are also likely to have higher pay, with IAC students' average salaries reaching \$67,000, which is above those of their academic cohort (\$63,000) and non-IAC energy professionals (\$44,000)<sup>31</sup>.
- **Germany:** Germany's updated subsidised energy audit scheme launched a program which partners with educational institutions to deliver training in energy consulting for industrial and commercial businesses. It also runs the Energy Consulting Qualification Exam to certify trained consultants to provide advice under the subsidy program<sup>32</sup>. This means that all energy consultants delivering energy advice which is subsidised by the German government are trained and approved continuously under the program.

The US and German approaches highlight the ways governments involve universities in EE policy implementation to increase EE skills in the workforce. Another opportunity of the above approaches is that governments can actively ensure adequate training for energy auditors to increase and maintain the quality of energy audits for businesses, which is discussed further in Section 6.7.1.

## 6.5 Conditional tax relief or subsidy

So far, this report has addressed some ways that international conditional tax reliefs/subsidies (also referred to as industry agreements) place greater requirements on firms to implement EE measures and energy audits (see Section 6.2.1), and to report on some broader areas than UK

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<sup>31</sup> SRI International (2022) Industrial Assessment Centres Impact ([IAC Technical Documents](#))

<sup>32</sup> BAFA (2023) Qualification exam for energy consulting. ([BAFA - Qualification Exam Energy Consulting](#))

CCAs (see Section 6.2.4). This section highlights some further insights on the implementation of conditional tax relief/subsidy schemes.

- Some conditional tax relief schemes require firms to investigate energy saving and decarbonisation opportunities beyond those measures commonly identified by energy audits by requiring additional assessments.
- Long target periods of up to 8 years and energy audit requirements are used in some countries' conditional tax relief schemes, in contrast to the shorter timeframes used in recent extensions of the UK's CCAs.

### 6.5.1 Some conditional tax relief schemes require firms to investigate energy saving and decarbonisation opportunities beyond measures commonly identified by energy audits, by requiring additional assessments.

On top of requiring firms to conduct energy audits (which is discussed in Section 6.2.1), the case studies of conditional tax relief require participants to complete additional EE and decarbonisation option assessments.

- **Denmark:** Under Danish Industry Agreements, companies were required to complete 'special investigations' or deeper analysis beyond mapping general energy conditions and identifying EE opportunities in energy audits. The Danish Energy Agency set mandatory topics for participants to investigate, such as energy supply strategy, LEAN productivity, control and automation, refrigeration, compressed air and HVAC systems, electric motors and transmissions, excess heat and heat pumps<sup>33</sup>.
- **Wallonia, Belgium:** Under Walloon Industry Agreements, companies are required to carry out pre-feasibility and feasibility studies for renewable energy supply within a year of entering the agreement. Additionally, they must complete a CO<sub>2</sub> mapping study to determine hotspots. The results of these studies must be sent to the relevant association no later than 18 months after entry. In this case, additional assessments into renewable energy have been an important tool to diversifying the goals of the agreement from energy to climate transition<sup>34</sup>.

These requirements differ from the current format of UK CCAs, which do not require standard energy audits or additional assessments.

### 6.5.2 Long target periods of up to 8 years and energy audit requirements are used in some countries' conditional tax relief schemes.

In contrast to the current 2-year target periods required under the CCA extensions, both Belgian Industry Agreements that provide conditional incentives require participants to commit to longer EE target periods of up to 8 years. These longer periods do however reflect the

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<sup>33</sup> [Viegaand Maagoe \(2021\) Evaluation of Subsidies for Electricity-Intensive Companies](#)

<sup>34</sup> [av2030-rapportanalyse-20210617-en.pdf \(wallonie.be\)](#)

approach in earlier stages of the UK's CCAs, when for example a target period ran from 2013-2020.

Participants under the Walloon Industry Agreements specifically requested long term target-setting as this was seen to support long-term business planning, provide clear policy direction and allow businesses' strategies to align with long-term national climate goals<sup>35</sup>. Businesses highlighted that the positive effect of this was aligning agreements to businesses' long-term planning, and subsequently making EE a business priority.

To monitor progress across longer target periods, companies are required to complete annual energy audits (using approved auditors) and other types of assessments (as discussed in Section 6.2.1) during the agreement. Firms must also report progress to their associations on an annual basis, who then report sector-level progress to government.

## 6.6 Regulation

This section explores two key insights from the three regulations analysed in the study.

- Many international regulations use energy consumption thresholds to define eligibility, and governments use different approaches to identify companies in scope.
- It is possible to regulate and monitor business' implementation of EE measures through a technology list, as shown in the Netherlands.

The discussion of technology lists falls under 'Regulation' as the study found the most notable use of these within the Dutch Energy Saving Obligation.

### 6.6.1 Many international regulations use energy consumption thresholds to define eligibility, and governments use different approaches to identify companies in scope.

Currently, UK EE regulations define eligibility on company size (including number of employees, turnover and balance sheet), with some use of energy consumption thresholds. Five out of six regulatory case studies use energy consumption or greenhouse gas emissions thresholds to target participants, as shown in the table below. In European countries, for example, energy consumption thresholds are expected to continue to be used for audit and energy management regulations. This is driven by requirements under the EU Energy Efficiency Directive to increase the sensitivity of policies in 'identifying relevant opportunities to for cost-effective energy savings'<sup>36</sup>.

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<sup>35</sup> [av2030-rapportanalyse-20210617-en.pdf \(wallonie.be\)](#)

<sup>36</sup> European Parliament (2023) [Recast Energy Efficiency Directive approved by co-legislators.pdf \(europa.eu\)](#)

Policy	Minimum threshold(s) above which policy applies	Unit	MWh/year
Mandatory energy audits (Korea)	2,000	Tonnes of oil equivalent per year	230,000
Mandatory energy audits (Italy)	2.4	Gigawatt hours per year	2,400
Energy saving obligation (The Netherlands)	50,000 OR 25,000	Kilowatt hours (electricity) OR cubic meters (natural gas or equivalent) per year respectively	50
Target Management System (Korea)	50,000 (companies); OR 15,000 (facilities)	Tonnes of carbon dioxide equivalent per year	Not applicable
Energy Conservation Law (Japan)	1,500	Kilolitres of oil equivalent per year	150,000

A difficulty with this approach is determining the energy consumption of companies in order to develop the threshold and target firms above it. The different case study policies used different methods to resolve data gaps, including accessing this data through other policies and new legislation.

- In Italy, a separate provision to the mandatory energy audits allows companies with a total energy cost higher than 3% of their turnover to benefit from tax breaks. To qualify for this, companies must report their energy consumption to government, thereby providing the Italian government with SMEs and non-SMEs' energy demand.
- To support the Dutch Energy Saving Obligation, additional legislation was drafted to allow governments' access to energy suppliers' data on energy consumers. This was especially important for targeting the remaining 30% of companies failing to report to government and comply with the regulation.

### 6.6.2 It is possible to regulate and monitor business' implementation of energy efficiency measures through a technology list, as shown in the Netherlands.

The core component of the Dutch Energy Saving Obligation is the Recognised Measures List (RML). Companies are required to comply with the obligation by implementing all relevant measures on the list and report on what measures have been implemented every 4 years. The list contains 149 EE measures and all have payback periods of less than or equal to 5 years.

The RML was developed to be accessible yet sufficiently applicable to firms across the business population consuming more than 50,000 kWh/year or 25,000 m<sup>3</sup>/year natural gas or equivalent.<sup>37</sup> To ensure measures can be adopted as easily as possible by firms, the list provides the below factors for each measure:

- **Description of measure:** A qualitative description of the measure to be taken.
- **Current state:** A qualitative description of the technology currently in place which is to be replaced or upgraded.
- **Economic framework conditions:** An outline of how the measure is expected to pay for itself within five years.
- **Technical preconditions:** A description of some necessary preconditions required to allow the measure to pay for itself within 5 years or less (e.g. sufficient space needed near the compressed air compressor to place a compressed air buffer tank). Due to the difficulty of providing all necessary preconditions across individual businesses, the regulation allows firms to declare a measure as technically infeasible, for example if expensive adjustments are needed to implement a measure.

To ensure companies are complying with the obligation, the Dutch government has invested heavily into regional supervisory and enforcement capacity after finding that regional municipalities did not have the required expertise or capacity to supervise the obligation. An additional EUR 56 million was earmarked for upskilling municipalities and appointing specialists in industrial regions to support and oversee compliance amongst large industrials. The compliance and enforcement framework has also been strengthened by investing in support from regional environmental services due to strengthened enforcement.<sup>38</sup>

Since the introduction of the RML to the obligation and changes to the enforcement framework discussed above, approximately 70% of target participants have reported their implemented EE measures to government<sup>39</sup>.

A challenge for the UK developing such a list would be deciding who to authorise to determine that measures pay back in 5 years, and the method for choosing measures with a 5-year payback period. The UK does have an Energy Technology List (ETL), however this differs substantially from the RML. Firstly, the measures are not limited to those with a 5-year payback period. Secondly, the UK ETL is primarily a voluntary scheme and is provided as a

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<sup>37</sup> Stakeholder Interview (2023) Interview with policy stakeholder for Dutch Energy Saving Obligation.

<sup>38</sup> Stakeholder Interview (2023) Interview with policy stakeholder for Dutch Energy Saving Obligation

<sup>39</sup> Stakeholder Interview (2023) Interview with policy stakeholder for Dutch Energy Saving Obligation

'trusted' information tool, although the use of the ETL is mandated for central government procurement under the UK Government Buying Standards. Thirdly, the list covers highly energy efficient components, rather than actions to install components. The aim of the UK list is to provide businesses with the assurance that the plant and machinery assets they acquire deliver best-in-class EE performance. This is as part of the UK's energy-related products (ecodesign/energy labelling) policies. ETL eligibility criteria can be understood as voluntary 'Higher Energy Performance Standards' which complement the 'Minimum Energy Performance Standards' regulated for under Ecodesign. The ETL previously defined eligible investments for Enhanced Capital Allowances (ECAs) but this policy ended in 2020.

## 6.7 Monitoring energy use

This section explores key learnings from international policies to improve firms' monitoring of energy use:

- Other countries approach training and monitoring of energy auditors by involving educational institutions in policy implementation and introducing national certification of energy professionals.
- The introduction of DIN EN 16247-1 has improved the consistency and quality of energy audits in Germany.
- Conditional tax relief policies commonly require formal verification of energy savings before firms report these to government.

The examples highlighted below offer insights into ensuring high quality energy audits and reporting of EE information to government.

### 6.7.1 Other countries approach training and monitoring of energy auditors by involving educational institutions in policy implementation and introducing national certification of energy professionals.

Case studies demonstrated a strong focus on regulating the quality of energy audits. The two main approaches identified were energy auditor training, approval and certification, as well as involving educational institutions in policy implementation. Specific examples are highlighted below:

- **Germany:** The Federal Office for Economic Affairs and Export Control (BAFA) takes an active role in certifying energy consultants delivering subsidised energy advice (including energy auditors), by requiring professionals to train and take exams at appointed educational institutions<sup>40</sup>. Centrally, the German Energy Agency coordinates the Energy Efficiency Expert list, which contains over 13,000 certified experts who must renew their certification every three years and whose work is subject to random on-site checks<sup>41</sup>. The list organises experts into residential buildings and non-residential

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<sup>40</sup> BAFA (2023) Qualification exam for energy consulting. ([BAFA - Qualification Exam Energy Consulting](#))

<sup>41</sup> [Energy Efficiency Experts \(EEE\) About the list of experts | \(energie-effizienz-experten.de\)](#)



buildings. All subsidised energy audits for SMEs are required to be completed by approved auditors from this list.

- **Italy:** Under the Italian Energy Decree, all professionals carrying out ‘energy diagnosis’ (including energy auditors and energy managers) are required to be certified under a national standard in Italy (UNI CEI 11339) or be an Energy Auditor. These professionals must complete 3 examinations to gain accreditation which lasts for five years, a process managed by the Italian accreditation body ACCREDIA. This requirement falls under an entirely separate obligation to mandatory energy audits. This has improved the quality of energy audit reports and provided companies with more reliable data to invest in EE<sup>42</sup>. All energy audits are required to be completed by certified auditors.
- **Denmark:** In response to concerns from companies about the quality of energy audits<sup>43</sup>, the Danish Energy Agency introduced stringent criteria for energy auditors and launched an initiative to approve auditors for government incentives. This process successfully resolved issues of poor-quality audits, as well as establishing greater trust towards qualified energy auditors. Despite rolling back requirements to use approved energy auditors, the original set of approved energy auditors have remained as companies’ preferred provider of energy audits<sup>44</sup>.

The above approaches to ensure appropriate skills in energy auditors differ from current ESOS requirements. Firstly, the compliant audits must *either* be carried out *or* signed off by Lead Assessors, which differs from requirements across case studies that energy audits must be *carried out* by Lead Assessors at minimum. In terms of approving auditors, the UK’s Lead Assessors reflect a similar approach to that taken in Germany and Denmark to publicly disclosing approved auditors, although Germany’s approach has centralised all energy experts into one national platform. In terms of official standards for energy auditors, the use of PAS 51215 under ESOS differs from Italy’s approach to requiring under a separate regulation that *all* energy auditors and managers operating in industry and the energy services market be certified by a national standard.

Following changes to ESOS Phase 3, however, UK policy is moving towards playing a greater role in ensuring appropriate training and monitoring of energy auditors. Through standardising entry requirements, understanding specific skills shortages and increased monitoring of Lead Assessors’ work as announced in government’s response to the latest ESOS consultation<sup>45</sup>, UK policy will more closely reflect the case studies’ approaches highlighted above.

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<sup>42</sup> Interreg Europe (2022) [UNI CEI 11339 – Italian Certification Scheme for Experts in Energy Management | Interreg Europe - Sharing solutions for better policy](#)

<sup>43</sup> Stakeholder Interview (2023) Interview with policy stakeholder for Danish conditional tax relief scheme

<sup>44</sup> Stakeholder Interview (2023) Interview with policy stakeholder for Danish conditional tax relief scheme

<sup>45</sup> [Strengthening the Energy Savings Opportunity Scheme \(ESOS\): government response \(publishing.service.gov.uk\)](#)



### 6.7.2 The introduction of DIN EN 16247-1 has improved the consistency and quality of energy audit reports in Germany.

The latest ESOS consultation considers a shift to introducing standards for ESOS audit reports, such as ISO 50002 or BS EN 16247-1<sup>46</sup> from Phase 4 onwards<sup>47</sup>. Qualitative evidence collected under German subsidised energy audits suggests that the introduction of standards to ensure high quality energy audit reports produced positive outcomes for firms:

- **Germany:** The German Government requires all energy audits for large energy users and SMEs to follow DIN EN 16247-1. Introduction of these standards came about because firms were reported to be dissatisfied with audit reports when it was relatively 'easy' to become an approved auditor. As a result of the introduction of standards, energy audit incentives have benefitted from increased acceptance and adoption as useful tools to improve EE<sup>48</sup>. Generally, this standard has been found to be useful for identifying standard measures (such as building EE measures)<sup>49</sup>, and an evaluation of the scheme also found that under this standard, the areas of focus in the audit can vary greatly, depending on businesses' activities and the skillset of the energy auditor.

### 6.7.3 Conditional tax relief policies commonly require formal verification of energy savings before firms report these to government.

Case studies demonstrated a strong focus on expert verification of information reported to government. This includes not only audit reports to be verified, but other types of reporting such as progress on EE under voluntary agreements or greenhouse gas reporting.

- **Establishing verification offices within delivering institutions:** Under the Flemish Industry Agreements, company reports were verified by an independent full-time team of energy experts (the Verification Office). This team was staffed with one manager and 10 senior engineers with strong understanding of industrial processes, who were able to have detailed conversations with participants during the verification process. Close dialogue between the Verification Office and participating firms was also possible due to Flanders being a small geographical region, which supported site visits. This team was also responsible for providing guidance and advice to participants where necessary, with 19 issuances of guidance between 2003-13 on topics such as the calculation of progress indicators under the agreement.
- **Third party verification requirements:** A common requirement within international policies is for company reporting to be signed off by third parties before being sent to Government. For example, all three voluntary agreement case studies require energy savings (including calculations of EE indicators and audit report) to be verified by third

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<sup>46</sup> BS EN 16247-1 is the British version and DIN EN 16247-1 of the same European-level energy auditing standard. ISO 50002 is a similar international energy auditing standard

<sup>47</sup> [Strengthening the Energy Savings Opportunity Scheme \(ESOS\): government response \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/consultations/strengthening-the-energy-savings-opportunity-scheme-esos)

<sup>48</sup> Stakeholder Interview (2023) Interview with policy stakeholder for German subsidised energy audit program

<sup>49</sup> Stakeholder Interview (2023) Interview with policy stakeholder for German subsidised energy audit program

parties. Industrial voluntary agreement participants in Wallonia, Belgium and Denmark must have results verified by approved consultants. Reporting under the Korean Target Management System regulation was also required to be signed off by energy consultants.

These international conditional tax reliefs have different verification requirements to UK CCAs. Firstly, the Walloon and Danish approaches require information to be verified before it is reported to government, whereas CCAs require verification afterwards (through site audits). The former approach is designed to focus on data quality across sites, whereas the latter is focused on driving compliance. Secondly, the Walloon and Danish approaches require reporting on all sites to be verified, whereas CCA (site audits) only verify a subset of sites. Other UK policies take approaches similar to the Walloon and Danish approaches. ESOS and UK ETS require information to be verified before it is reported to government and require information on all sites within scope to be verified.

## Annex A: List of REA policies

This annex sets out the list of 115 policies identified as part of the REA, as well as their respective scores in REA stage A and B.

#	Policy Name	Policy Type	Country	Stage A Score	Stage B Score
1	ProKilowatt	Subsidy	Switzerland	7	9
2	Energy Efficiency Agreement	Voluntary agreement with financial incentive	Finland	7	9
3	Voluntary Agreement Scheme for Large Industries	Voluntary agreement with financial incentive	Denmark	7	9
4	Energy Efficiency Networks (EEN)	Voluntary agreement	Germany	7	9
5	Industrial Assessment Centers (IACs)	Information-based; subsidy	United States	7	9
6	Wallonia Long Term Agreements	Voluntary agreement with financial incentive	Belgium	7	9
7	White Certificates - Italy	Regulation	Italy	7	9
8	Energy Investment Allowance (EIA)	Tax incentives	Netherlands	5	9
9	Auditing Covenant (Flanders)	Voluntary agreement with financial incentive	Belgium	7	9

10	Klimaaktiv Energieeffiziente Betriebe - Energy Efficient Businesses	Information-based; Voluntary agreement with financial incentive	Austria	7	8
11	Kaidanren Voluntary Agreements	Voluntary agreement with accreditation	Japan	7	7
12	UFI - Environmental Assistance	Subsidy	Austria	7	9
13	Mandatory energy audits (Korea)	Regulation	Korea	7	9
14	Energy Champion Program	Voluntary agreement with financial incentive	Korea	6	7
15	Subsidised energy audits	Subsidy	Germany	7	8
16	Energy saving obligation	Regulation	Netherlands	5	7
17	White Certificates - Poland	Regulation	Poland	7	6
18	Canadian Industry Partnership for Energy Conservation (CIPEC)	Information-based	Canada	6	6
19	Multi-Annual Agreement on energy efficiency (MJA3)	Voluntary agreement with financial incentive	Netherlands	7	6
20	Benchmarking Covenant (Flanders)	Voluntary agreement with financial incentive	Belgium	7	8

21	Swedish energy efficiency networks	Information-based	Sweden	6	8
22	Energy investment Deduction	Tax incentives	Belgium	6	5
23	Target Management System	Regulation	Korea	7	6
24	Energy Efficiency Act (Act on the Rationalisation etc. of Energy Use) - Energy Management Reporting	Regulation	Japan	5	6
25	Energy Conservation Center Japan (ECCJ)	Information-based	Japan	6	6
26	Eco Tax Cap And Energy-Saving Efficiency System Regulation (SPAEFV)	Tax incentives	Germany	4	5
27	Voluntary agreements on energy intensity	Voluntary agreement with financial incentive	Turkey	5	4
28	Mandatory energy audits (Germany)	Regulation	Germany	7	6
29	Energy Efficiency Information Grants (EEIG) program	Information-based	Australia	6	6
30	Inflation Reduction Act - Advanced Industrial Facilities Deployment Program	Subsidy	United States	5	5

31	CHP Technical Assistance Programs	Information-based	United States	5	5
32	Green Growth Strategy - Investment Promotion Tax System	Tax incentives	Japan	4	4
33	French White Certificate (WC) Scheme	Regulation	France	6	5
34	Italy in Class A	Information-based	Italy	4	5
35	EED Energy Audit	Regulation	Netherlands	3	5
36	Inflation Reduction Act - Funding for Department of Energy Loan Programs Office	Financial - credit	United States	4	4
37	Refund of energy tax	Tax incentives	Netherlands	4	2
38	SME Initiative Energy Transition and Climate Protection (MIE)	Information-based	Germany	4	4
39	Subsidy sustainable energy production and climate transition (SDE++)	Subsidy	Netherlands	5	4

40	Energy manager Obligation	Regulation	Italy	5	4
41	German Ordinance to Secure Energy Supply via Measures Effective in the Medium Term (EnSimiMaV)	Regulation	Germany	4	4
42	Inflation Reduction Act - Low Embodied Carbon Labeling for Construction Materials	Subsidy; Information-based	United States	5	3
43	Energy Efficiency Fund	Subsidy	Italy	7	3
44	Regional energy counselling	Information-based	Finland	4	3
45	Better Climate Initiative	Voluntary agreement with accreditation	United States	4	3
46	Federal funding for energy and resource efficiency in the economy – grant and credit	Subsidy; Financial - credit	Germany	5	3
47	Mandatory energy audits (Italy)	Regulation	Italy	6	6
48	Capital goods support scheme "Nuova Sabatini"	Financial - credit	Italy	5	3

49	Energy Efficiency Regulations	Regulation	Canada	5	2
50	Business Energy Savers Program (BESP)	Subsidy	Australia	5	2
51	Soft Loan for Energy Saving Facilities & Tax Incentives	Financial - credit	Korea	5	4
52	Energy Supporter	Subsidy	Korea	4	0
53	Industrial Cluster Project	Information-based	Japan	4	0
54	Energy Efficiency Improvement Scheme (EEIS)	Regulation	Australia	4	0
55	Regional SME support	Subsidy	Italy	4	0
56	Energy Use Rationalisation Act - Reporting	Regulation	Korea	4	0
57	Onsite Energy Program	Information-based	United States	4	
58	Inflation Reduction Act - Clean Energy and Sustainability Accelerator	Financial - credit; Subsidy	United States	2	



59	Inflation Reduction Act - Greenhouse Gas Reduction Fund	Subsidy	United States	3	
60	Inflation Reduction Act - Advanced Technology Vehicle Manufacturing Loan Program	Financial - credit	United States	3	
61	Mandatory energy management	Regulation	Turkey	4	
62	Energy efficiency improvement projects (EEIPs)	Subsidy	Turkey	2	
63	Advanced Manufacturing Office Multi-Topic Funding Opportunity Announcement	Subsidy	United States	2	
64	Rapid Advancement in Process Intensification Deployment (RAPID) Institute	Subsidy	United States	0	
65	Industrial Heat Shot	Subsidy	United States	4	
66	Industrial Technologies Program	Subsidy	United States	4	
67	Carbon tax	Pricing	Japan	4	
68	GHG Reporting	Regulation	Japan	2	

69	Energy and Investment Aid	Subsidy	Finland	4	
70	Subsidy for energy efficiency investment - Ministry of Economy, Trade and Industry	Subsidy	Japan	3	
71	Energy tax	Pricing	Netherlands	0	
72	Moonlight Program	Subsidy	Japan	5	
73	Diag Eco-Flux	Subsidy	France	4	
74	Federal Funding for Energy and Resource Efficiency in the Economy - Funding Competition	Subsidy	Germany	4	
75	Obligation of Energy Consuming Companies	Regulation	Austria	1	
76	Subsidies for Heat recovery and efficient use of energy	Subsidy	Austria	2	
77	MEASUR	Information-based	United States	2	
78	Energy audits	Regulation	France	1	
79	France 2030 - The Heat Fund	Subsidy	France	2	

80	Green Industrial Facilities and Manufacturing Program	Subsidy	Canada	4	
81	Waste heat recovery fund	Subsidy	France	0	
82	ADEME Green Loan	Financial - credit	France	2	
83	Decarbonisation Accelerator Program	Information-based	France	2	
84	Green ETV Program	Subsidy	France	2	
85	PRO-SME Program	Subsidy	France	3	
86	Energy management system scheme	Voluntary agreement with financial incentive	Korea	4	
87	SME Energy Audit Assistance	Subsidy	Korea	4	
88	Inflation Reduction Act - Section 45X Advanced Manufacturing Production Tax Credit (PTC) (Amendment)	Tax incentives	United States	3	
89	Green Growth Partnership	Information-based	Korea	4	

90	Energy Saving Scheme (ESS)	Regulation	Australia	0	
91	Energy Efficient Communities Program	Subsidy	Australia	0	
92	Energy Efficiency Opportunities (EEO) program	Regulation	Australia	1	
93	Energy Intensity Reduction Agreement	Voluntary agreement with financial incentive	Korea	3	
94	Industrial Efficiency and Decarbonisation Funding Opportunity Announcement	Subsidy	United States	2	
95	Backing business investment - accelerated depreciation	Tax incentives	Australia	4	
96	Green Growth Strategy - Green Innovation Fund	Subsidy	Japan	4	
97	Carbon tax exemption	Subsidy	Germany	2	
98	Inflation Reduction Act - Section 48C Investment Tax Credit (ITC) (Amendment)	Tax incentives	United States	3	

99	Guarantee fund for SMEs	Financial - credit	Italy	2	
100	Enterprises and Competitiveness 2014-2020 (PON IC) and the OP SME Initiative 2014-2020	Subsidy	Italy	2	
101	Greenhouse Gas Reporting Program (GHGRP)	Regulation	United States	4	
102	Mandatory reporting for large firms - Chilean Law on Energy Efficiency (CLEE)	Regulation	Chile	0	
103	Energy management systems for CCGEs	Regulation	Chile	0	
104	Tax incentives for energy efficiency upgrades	Tax incentives	Australia	4	
105	Smart Factories Initiative	Information-based; subsidy	Korea	3	
106	Instant asset write-off	Tax incentives	Australia	4	
107	Better Buildings Initiative - Better Plants	Voluntary agreement with accreditation	United States	3	
108	France 2030 - Industrial Decarbonisation Fund	Subsidy	France	4	

109	Infrastructure and Environment Operation Programme 2014-2020	Subsidy	Poland	0	
110	National Energy Efficiency Fund	Subsidy	Spain	2	
111	Aid program for SME and Large Companies in the Industrial sector	Subsidy	Spain	0	
112	Energy audits and management systems	Regulation	Spain	1	
113	Aid Program for R&D projects in the manufacturing industry	Subsidy	Spain	0	
114	Productive Industrial Investment Support Fund ("FAIIP")	Financial - credit	Spain	2	
115	Energy price support	Subsidy	France	2	

## Annex B: Scoring criteria

This annex sets out the scoring criteria used in Phase 1, encompassing stages A and B, and Phase 2.

## Phase 1

### Stage A

In Stage A of Phase 1, the overall policy score was calculated by summing the robustness of evidence score with twice the value of the potential to offer lessons score. This Stage A score played a role in the selection process, determining which 56 policies advanced to Stage B.

#### Potential to learn lessons

Criteria for similar policies	Score	Criteria for different policies	Score
Policy is very similar to UK policy with no substantial additional elements that could be applied in UK.	0	Policy would not be suitable for addition to the UK industrial energy efficiency landscape.	0
The policy contains elements that are modest extensions/additions to the equivalent similar UK policies, in terms of the potential to improve energy efficiency in UK industry.	1	There is evidence showing that policy could fill a gap but may have limited additionality e.g. may not fit well with UK institutions or industrial sectors.	1
The policy contains elements that are substantial extensions/additions to the equivalent similar UK policies, in terms of the potential to improve EE in UK industry.	2	There is positive evidence showing that policy fills a gap and that the UK has the institution to deliver it.	2

#### Robustness of evidence

Criteria	Score
<b>No Evidence:</b> Neither quantitative or qualitative evidence on whether the policy has been or will be effective.	0
<b>Limited Evidence:</b> 1) only provides estimated/expected energy reductions as result of intervention; 2) sample size is limited/unrepresentative of target population.	1

<b>Clear Evidence:</b> 1) provides evidence to show impact on energy use/emissions at scale of policy; 2) provides qualitative data from representative sample who were exposed to intervention.	2
<b>Robust Evidence:</b> 1) provides % of energy/emissions saved as result of intervention; 2) impact assessment tests against baseline assumptions; 3) provides qualitative data from representative sample who were exposed to intervention.	3

## Stage B

In Stage B, the scoring methodology sums three key elements: the policy's effectiveness score, the robustness of evidence score and twice the lessons learned score. This gave a higher weighting to the lessons learned score.

### Robustness of evidence

Criteria	Score
<b>No Evidence:</b> Neither quantitative or qualitative evidence on whether the policy has been or will be effective.	0
<b>Limited Evidence:</b> 1) only provides estimated/expected energy reductions as result of intervention; 2) sample size is limited/unrepresentative of target population.	1
<b>Clear Evidence:</b> 1) provides evidence to show impact on energy use/emissions at scale of policy; 2) provides qualitative data from representative sample who were exposed to intervention.	2
<b>Robust Evidence:</b> 1) provides % of energy/emissions saved as result of intervention; 2) impact assessment tests against baseline assumptions; 3) provides qualitative data from representative sample who were exposed to intervention.	3

### IEE Effectiveness

Policy effectiveness criteria	Score
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Policy has achieved or is expected to achieve little or no cost-effective EE improvements e.g. <1% energy reduced or >£50/tCO <sub>2</sub> abatement.	0
Policy has achieved or is expected to achieve moderate cost-effective EE improvements, or has some other drawbacks or limitations e.g. 1-5% energy reduced or £5-50/tCO <sub>2</sub> abatement.	1
Policy has achieved or is expected to achieve substantial cost-effective EE improvements, or has some other drawbacks or limitations e.g. >5% energy reduced or <£10/tonne abatement.	2

### Lessons learned

Policy effectiveness criteria	Score
Policy does not offer any lessons for UK policy design.	0
Policy offers limited lessons for future UK policy design.	1
Policy offers substantial lessons for future UK policy design.	2

## Phase 2

### Transferability

Criteria	Score
Lessons could not be implemented in the UK.	1
Lessons would take three+ years to implement, because of barriers to overcome or substantial political capital to overcome the barriers to implement this policy.	2
Lessons could either be implemented within two years, or by adjusting existing policies and without expending substantial political capital.	3

There are minimal barriers to implementing the lessons from this policy in the UK - they could be implemented within a year.	4
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### Robustness of evidence (transferability)

Criteria	Score
No Evidence: no clarity on the steps required to implement the policy in the UK and whether there would be barriers.	1
Limited Evidence: Limited information gathered about the about the steps that would be required to implement lessons and potential barriers.	2
Clear Evidence: Substantial information gathered about the steps that would be required to implement lessons and potential barriers.	3
Robust Evidence: Assessment of the barriers to implementation in the UK available.	4

### Robustness of evidence (% of savings)

Criteria	Score
No Evidence: Neither quantitative or qualitative evidence on whether the policy has been or will be effective.	1
Limited Evidence: 1) only provides estimated/expected energy reductions as result of intervention; 2) sample size is limited/unrepresentative of target population.	2
Clear Evidence: 1) provides evidence to show impact on energy use at scale of policy; 2) uses data from a representative sample who were exposed to intervention.	3
Robust Evidence: 1) provides % of energy saved as result of intervention; 2) uses data from a representative sample who were exposed to	4

intervention; 3) impact assessment tests against baseline assumptions to demonstrate clear additionality.	
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### Robustness of evidence (£/t)

Criteria	Score
No Evidence: Neither quantitative or qualitative evidence on whether the policy has been or will be effective.	1
Limited Evidence: 1) only provides estimated/expected £/t as result of intervention; 2) sample size is limited/unrepresentative of target population.	2
Clear Evidence: 1) provides evidence to show impact on energy use/emissions at scale of policy; 2) uses data from a representative sample who were exposed to intervention.	3
Robust Evidence: 1) provides £/t as result of intervention; 2) based on data from a representative sample who were exposed to intervention; 3) impact assessment tests against baseline assumptions to demonstrate clear additionality.	4

### Lessons for UK policy

Criteria	Score
Policy does not offer any lessons for UK policy design.	1
Policy offers some novel ideas. However, it is not clear whether it improves on UK policy.	2
Policy offers some novel ideas. There is evidence that these could improve in the outcomes of UK policy. Indications are that the size of the impact would be small (based on quantitative assessments and potentially burden),	3
Policy offers some novel ideas. There is evidence that these could improve in the outcomes of UK policy. Indications are that the size of the	4

impact would be substantial (based on quantitative assessments and potentially burden).	
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