LCPDelta

Designing a European Clean Heat Standard

Work package 3

EXPLORING THE FEASIBILITY OF A EUROPEAN CLEAN HEAT STANDARD

Contents

Introduction 3-6
- Project overview
- Work package 3
- Background

Executive summary 7-10

Section 1: Policy review 11-19
- UK Clean Heat Market Mechanism
- Clean Heat Standards in the USA
- Additional mechanisms from the transport sector
- Conclusions

Section 2: Developing a European Clean Heat Standard – Core design elements (policy design stages 1 and 2) 20-26
- Design approach
- Role and policy objectives
- Core design options

Section 3: Developing a European Clean Heat Standard – detailed design elements (policy design stages 3 – 4) 27-45
- Overview of final policy design
- Detailed description of final policy design
- Key risks and challenges

Section 4: Additional design options and political framing (policy design stage 5) 46-55
- Incorporating market mechanisms
- Aligning to policy windows

Section 5: Conclusions 56-57
- Design strengths and preconditions for success

Annex A: General 58-60
- The wider policy mix
- UKCHMM – key design considerations

Annex B: Further detail on final policy design 61-64
- Treatment of appliance manufacturers vs importers
- Alternative reporting metrics
- Additional reporting requirements

Annex C: Further detail on policy windows 65-69
- Window 1 – Industrial competitiveness
- Window 2 – Electrification
- Window 3 – Climate
- Window 4 – Efficiency

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Project overview

Exploring the feasibility of introducing a Clean Heat Standard (CHS) into the European heating market

LCP Delta have been commissioned by Agora Energiewende to assess the feasibility of introducing a European Clean Heat Standard.

In most countries across Europe, fossil fuels are still used to provide space and water heating in buildings. Traditional policy tools such as purchase incentives, regulation and taxation have been introduced to drive the decarbonisation of the sector. Despite initial progress, over recent years intervention in the market has proved very challenging due to the tough economic conditions faced by European countries following recent and ongoing global events. This has created uncertainty over the future trajectory of the market.

Decarbonisation of the sector is imperative to ensure Europeans have access to sustainable, reliable and affordable heating. However, accelerating this transition is incredibly complex. Heating (and cooling) requirements, building types, heat distribution systems and heating appliances vary considerably across markets. Despite government intervention and cost reductions, low carbon heating appliances are still more expensive to install and, in some cases, run compared to traditional heating systems.

Clean Heat Standards are an emerging policy solution which could provide the heating industry with the conditions necessary for market actors to have confidence to invest in scaling up demand and supply for low carbon heating products and/or services. This policy could be used alongside traditional policy tools to accelerate the decarbonisation of the European heating sector.

The project is comprised of 4 complementary workstreams which consider the role such a policy can play, the optimal design and the impact it may have on society.

	WP1: Mapping the role of an EU Clean Heat Standard in the broader policy context An assessment of the potential role an EU Clean Heat Standard could play in the broader policy context based on literature reviews, as well as interviews with discussion and stakeholders.
	WP2: Analysis of the EU heating market A comprehensive overview of 8 European heating markets, providing insights on heating appliance sales, market segmentation, manufacturing sites and distribution channels. This evidence will inform the instrument design and establish a baseline for our analysis.
	WP3: Designing an EU Clean Heat Standard The development of an optimal EU Clean Heat Standard design, informed by the experience gained from existing measures, policy objectives, feedback from key industry players, an understanding of key market characteristics and learnings from our analysis.
	WP4: Assessing the impact of an EU Clean Heat Standard An assessment of how industry may respond to the introduction of an EU Clean Heat Standard and the potential impact the policy could have on consumers, manufacturers and wider society.

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Designing a European Clean Heat Standard

Work package 3

In this report we assess key design choices for the development of a European Clean Heat Standard and recommend the optimal design for an effective policy instrument.

To develop this instrument, we have utilised our in-depth knowledge of the European heating market and learnt from the experiences of implementing similar schemes around the world. We have also worked closely with key industry players to develop, test and verify the design.

Throughout this report we have considered the following key questions:

- What are the objectives of a European CHS and what role could it play in the context of the wider EU energy policy mix?
- What does the optimal design of a European CHS look like? Including; what heating appliances should be in-scope? how will the obligation be measured? how will the scheme be enforced?
- How could the European CHS enter the political discussion and what design alterations would be required to align the policy with wider EU objectives?
- What are the risks and potential market impacts associated with the European CHS? How could these factors be addressed in the policy design?

The report is structured in the following way:

- **Section 1 – Policy review:** Before designing the instrument, we reflect on the lessons that can be learnt from the development of the Clean Heat Market Mechanism in the UK. We also explore the design of CHSs in the USA and draw upon experiences from the development of similar market mechanisms from other sectors.
- **Sections 2 and 3 - Developing a European Clean Heat Standard:** This section of the report explains the core instrument design elements (2), before describing the final detailed design option (3). We also identify the risks associated with the European Clean Heat Standard and also consider the extent to which our design mitigates against these risks.
- **Section 4 – Additional design options and political framing:** This section considers two additional design options that could be developed further. It also, considers the design alterations that could be applied to align the policy instrument with wider EU objectives.
- **Section 5 - Conclusions:** Finally, the report will summarise the main conclusions developed across the entirety of this project.

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Heat Subscription Research from LCP Delta

Providing insights and analysis on Europe's heating transition for over 20 years

Decarbonisation of Heat Service

Core focus: Forecasting how and why the sales of residential heating appliances will evolve and identifying where the key growth opportunities for low carbon heating (heat pumps, low carbon / high efficiency gas heating) exist across Europe. Insights on the leading brands, their products, market shares.

Core deliverables:

- ***Detailed country reports***
- ***Historic and forecast sales datasets***
- ***Policy / regulation / subsidy information***

Heating Business Service

Core focus: Analysing how new consumer propositions and alternative business models – heat as a service / green finance / product leasing & rental – and the companies providing them (energy retailers / one-stop-shops / tech. start-ups) are shaping the future value chain and routes to market.

Core deliverables:

- ***Primary consumer research***
- ***Thematic reports and case studies***
- ***Stakeholder and propositions datasets***

Client groups:

- EQUIPMENT MANUFACTURERS
- SERVICE PROVIDERS
- INVESTORS & FINANCIERS
- POLICY MAKERS
- CONSULTANTS
- ENERGY SUPPLIERS
- DISTRIBUTORS
- NETWORK OPERATORS
- COMPONENT SUPPLIERS
- TECHNOLOGY DEVELOPERS

Both Services provide:

- REPORTS & INSIGHTS
- DATABASES & DATA SETS
- MODELLING & ANALYSIS
- EXPERT SUPPORT & TEAMS SESSIONS

For clients doing these types of jobs:

STRATEGY & SOLUTIONS	R&D / INNOVATION	MARKET INTELLIGENCE
PRODUCT MANAGEMENT	POLICY & ADVOCACY	PRODUCT MARKETING

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Background

What are the objectives and role of a Clean Heat Standard?

The Regulatory Assistance Project (RAP) define a clean heat standard (CHS) as a tool that places a performance requirement on heating market actors to increase the uptake of clean heat products and services, offering flexibility within a range of eligible actions.

Policy objectives

Fundamentally, the objective of a CHS is to provide the heating industry with a clear, stable policy framework. This will in turn create the conditions necessary for market actors to have confidence to invest in scaling up demand and supply for low carbon heating products and/or services. There are now several examples of markets from around the world that have adopted CHS style measures which complement their existing policy mix and support decarbonisation efforts.

Market mechanism

By placing performance targets on market actors, this provides certainty over the long-term trajectory of the market and in doing so, creates a strong and credible signal to industry to scale up demand and supply through identifying and addressing key barriers which prohibit or slow the uptake of low carbon heating products and/or services. In practice, this policy aims to achieve this by incentivising market actors to invest in the range of low carbon products available, business models, marketing, the number and quality of low carbon heating installers.

The role of a Clean Heat Standard

The policy mix in place is often not effective enough to drive decarbonisation at the pace needed to reach climate goals. A CHS can complement existing policy by providing a clear route for heat decarbonisation through the implementation of annual performance targets. For policy makers this is an attractive measure as it offers the following benefits:

- **Market led:** This policy aims to harness the power of industry to experiment with ways in which to build consumer demand and grow the market. As such, it is not relying solely on policy makers to identify and prioritise deployment barriers.
- **Sustainable:** Annual performance trajectories provide certainty over final market outcomes (e.g. equipment sales / greenhouse gas emissions reductions etc).
- **Voluntary:** Obligating businesses, rather than consumers ensures that end consumers are not forced to change their purchasing decisions.

Clean heat standards are innovative policy instruments that can be used in conjunction with traditional policy levers (e.g. regulation and subsidies). However, a CHS is not a silver bullet and in isolation will not drive a transition to low carbon heating. It is essential that the instrument is complemented with a robust and holistic policy framework that supports market actors to market barriers, especially those that they have limited ability to influence or control. An example of the types of traditional policy instruments can be found in the annex.

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Executive Summary

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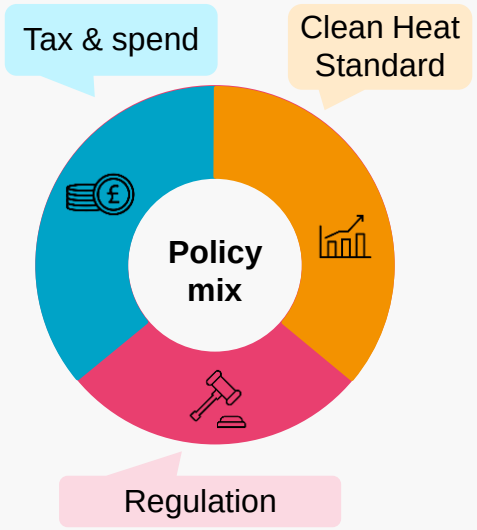
Executive summary

Clean Heat Standards are an emerging policy solution that are currently being explored across several markets around the world to accelerate the decarbonisation of the heating sector.

Market mechanisms have been used in policy making for several years and have been implemented in a variety of different sectors. Unlike other forms of intervention such as direct regulation or tax and spend measures, market mechanisms influence behaviour through economic incentives and trade. This is an attractive solution for policymakers as it avoids the need to put obligations on end consumers, it leverages market forces and it does not require additional financial support (e.g. subsidy).

A European CHS could be introduced to complement existing policy focussed on phasing out fossil fuels from heating in buildings. This would be achieved by providing a clear route for heat decarbonisation through the implementation of annual performance targets for industry actors.

However, a CHS is not a silver bullet. It is critical that industry is supported and this measure is combined with existing and new policies that help to reduce demand and supply side market barriers.



LCP Delta have explored the optimal design of a European Clean Heat standard *(the "performance-based incentive scheme")*

The European CHS could be introduced to deliver a sustained acceleration in the sale of low carbon heating appliances, supporting the market for the phase out of fossil fuels from heating in buildings by 2040. Our policy design is a pragmatic solution which is tailored to the European heating sector. The key strengths of our design are:

- **Provides certainty to manufacturers and wider industry:** The rules, requirements and parameters of the scheme (e.g. penalty levels) are clearly set out until the end of 2039. This certainty enables industry actors to strategize and plan their decarbonisation pathway to 2040.
- **Not overly prescriptive:** Unlike other market mechanisms, this scheme does not set arbitrary uniform market-wide targets. Instead, it relies on financial and non-financial incentives to encourage behaviour change.
- **Simplicity:** European heating markets are incredibly diverse. To ensure the practical feasibility of the scheme, the rules, requirements and mechanisms associated with the scheme are clear and simple to understand.
- **Financial penalties are proportionate to performance:** Penalty levels are set appropriately to achieve sustained behaviour change, not to impose unnecessarily high costs which could impact the credibility of the scheme or damage the industry.

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Executive summary

The optimal design has been informed by a range of factors including; the stated policy objectives, our deep understanding of European heating markets, experience from existing mechanisms, feedback from many key industry players and economic analysis.

In practice, the policy would work by obligating HVAC manufacturers to report heating appliance sales to the European Commission each year.

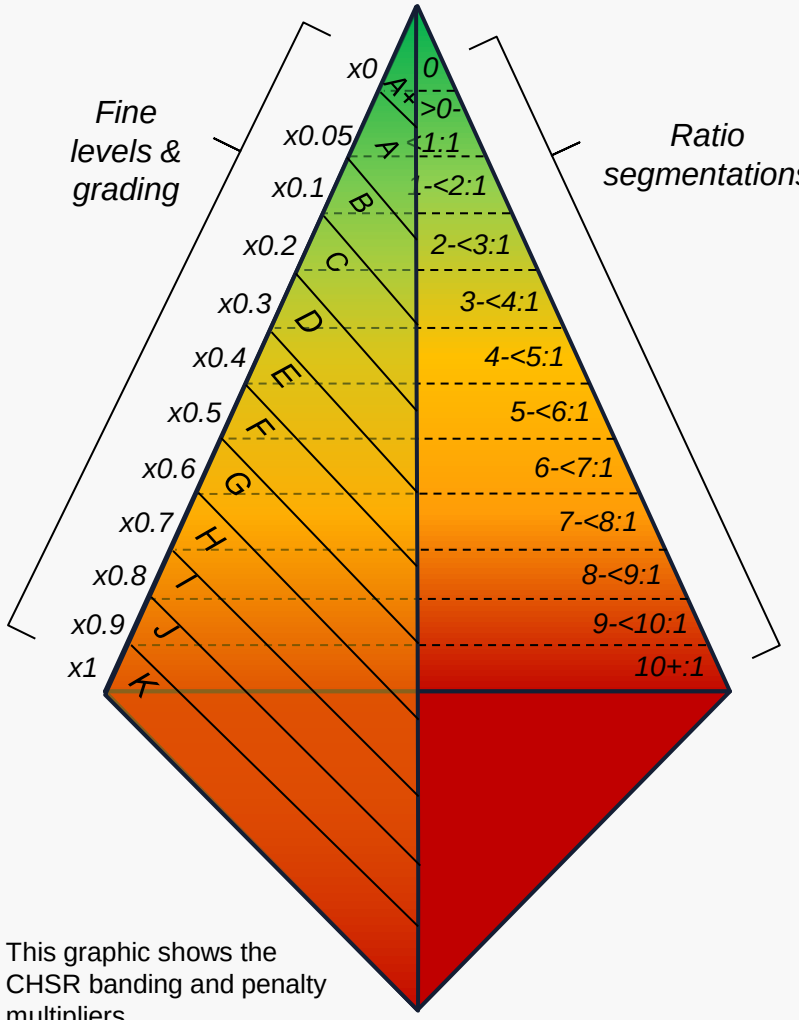
For each manufacturer, a 'Clean Heat Sales Ratio' (CHSR) would be calculated which would measure the share of low carbon heating appliances sold vs standalone boilers powered by fossil fuels into the EU market.

Each manufacturer would be placed in one of twelve bands (A+ to K) based upon their CHSR. This band determines the level of penalty that the manufacturer would incur each year. Manufacturers that demonstrate an improvement in their CHSR can recoup a portion of the previous year's penalty. **The step-by-step process is described on the next slide.**

Under this proposed design, key parameters (such as the categorisation of heating technologies) can be easily adjusted in order to align the scheme to meet different EU policy objectives on electrification, climate or efficiency.

Although not a feature of the core design, credit-based trading (similar to the UK Clean Heat Market Mechanism) or a cap-and-trade mechanism (similar to the EU Emissions Trading Scheme) could be developed and integrated into the design in order to provide more flexibility for industry. Although these elements could be appealing, they would increase the overall complexity of the scheme and could be incredibly challenging to implement effectively across multiple heating markets.

Throughout the policy design process, we have considered the potential risks associated with the design choices we've made. Where possible, the policy design has been adjusted to reduce or completely mitigate risks. However, this is not always possible without applying wholesale changes to the design or adding significant complexity.



This graphic shows the CHSR banding and penalty multipliers

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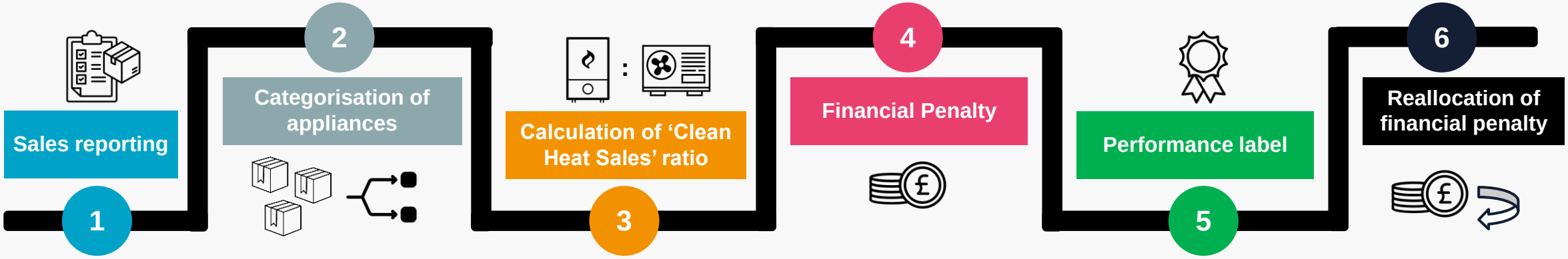
Step-by step walkthrough of the scheme design

Heating appliance **sales are categorised into three groups**:

1. *Compliant* – low carbon appliances
2. *Non-compliant* – standalone boiler powered by fossil fuels
3. *Neutral*

Each manufacturer will receive a financial penalty for every non-compliant appliance that is sold into the market. Fine levels are **higher for manufacturers in poorer performance bands** and will increase over the decade.

Manufacturers can recoup a portion their annual penalty fines in the subsequent year. This amount will be dependent on their performance improvement and will not extend beyond 100% of what they have been fined.



From 2030, all HVAC manufacturers (and importers) that sell heating appliances into the European market must **report total European 'first' sales volumes to the EU Commission annually**.

An annual clean heat sales ratio (CHSR) is calculated for each manufacturer based on its sales of compliant and non-complaint appliances sold across all European markets. Each manufacturer is then graded into 12 performance bands, based upon its ratio.

Manufacturers will also be required to display their CHSR grade prominently on their website so that consumers / installers / investors etc. can see how each company performs.

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Section 1: Policy review

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The UK Clean Heat Market Mechanism

Policy overview

The incoming Clean Heat Market Mechanism (CHMM) has been developed to strengthen the conditions for investment in the UK heat pump market, putting it on a pathway to achieve 600,000 installations per year by 2028 – a target set by the (previous) government.

Market background

In order to achieve its 2050 carbon targets, the UK must decarbonise virtually all heat in buildings and most industrial processes. As set out in the Heat and Buildings Strategy, the deployment of electric heat pumps has a crucial role to play in this.

The current market for heat pumps in the UK is small; only 66,000 heat pumps were sold in the UK in 2023 in comparison to around 1.6m fossil fuel boilers. In 2021 the UK set a target to achieve 600,000 heat pump sales per year by 2028. This target is supported by regulatory and subsidy-based support from government which has been introduced to overcome both demand and supply side barriers and grow the market. This includes financial support for adopters of hydronic heat pumps, manufacturer support and installer training funding.

Policy design

In 2021 the UK government conceived the CHMM which aims to provide the heating appliance industry with a *"clear, stable policy framework that will create the conditions necessary for market actors to invest in confidence in scaling up the consumer market for heat pumps".* Under this design, a small number of heating appliance manufacturers that traditionally sell fossil fuel boilers will be obligated to meet targets for the proportion of heat pumps they sell. These targets will increase each year and will be set to correspond to the deployment of heat pumps in line with the UKs targets. The core elements of the design are presented below:

Targets

For the first year of the scheme (2025/26), manufacturers will need to hold low-carbon heat pump credits corresponding to 6% of their relevant gas and oil boiler sales. 'Small' manufacturers are exempt.

Eligible technologies

Credits will be awarded for the installation of domestic sized hydronic heat pumps. Hybrid heat pumps are also rewarded but receive 0.5 credits. Any other types of heat pumps and installations in new build properties do not qualify for credits.

Enforcement and administration

Manufacturers will be required to pay a fine of £500 per missing credit, which will go into the UK Treasury. The scheme will be administered by the Environment Agency.

Flexibilities

Credits are to be tradeable amongst other scheme participants – including with non-obligated heat pump specialist brands, who will accrue credits for their own sales. Up to 35% of a manufacturers target can be carried-over to subsequent years.

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The UK Clean Heat Market Mechanism

Industry response and challenges

The CHMM was driven by the relevant Minister and been developed in consultation with a wide range of industry participants, mostly via two public consultations.

UK Government report that 75% of stakeholders expressed support for an obligation on fossil fuel heating appliance manufacturers with many stating that it would likely drive heat pump cost reductions and grow the market.

However, no fossil fuel heating appliance manufacturers supported this lead proposal with some arguing that the mechanism should be completely abandoned. The initial consultation response highlighted the following concerns:

Reporting burden: Collecting heat pump installation data (rather than reporting factory gate sales) is complex and adds a significant burden on manufacturers.

Scope for cost reductions: A mature, globally commoditised heat pump market already exists, and that therefore significant cost reduction on component parts which the UK government is anticipating is unlikely to be achieved.

Inability to influence sales: Weak demand for heat pumps is primarily driven by demand side barriers which manufacturers have little control over.

Unachievable targets: Sales targets are not proportionate to the size of the total heating market*. The introduction of the ban on the sale of new oil and LPG boilers in 2026 would have helped stimulate demand, however, this policy has been delayed to 2035.

*let alone the restricted retrofit-only portion of the market where obligated manufacturers would need to generate their credits.

Following the announcement of the scheme design in November 2023, the leading boiler manufacturers, announced price increases on their gas boilers by **£90 - £120** in anticipation of significant financial penalties they were soon to incur for missing their first-year heat pump sales quotas**.

Leading heat pump specialists operating in the UK market were naturally more supportive of the proposed CHMM, though not universally. Some feared losing market share to their competitors via a ‘race to the bottom’ on heat pump pricing – something that was both seen to be a very real prospect, and a very unsustainable / supply chain-damaging outcome.

As a result of this industry response, UK government announced its intention to delay the introduction of the scheme until 1 April 2025. Since this announcement, obligated boiler manufacturers have adjusted their position and announced their intent to not increase their prices and / or have begun working with their wholesale partners to refund installers who had paid an increased price. Alongside the announced delay, UK government have also requested the Competitions Market Authority (CMA) to consider carrying out a review of this market to assess how competition is working.

In late November 2024, UK government confirmed the mechanism would be introduced in April 2025 and that the fines have been revised down from £3,000 to £500.

**In this context, it is important to note that the majority of gas boilers in the UK are delivered via wholesale and so the direct customer of the manufacturer is invariably its wholesale partners, and prior notice must be given for an impending price increase.

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The UK Clean Heat Market Mechanism

Key learnings from the design process and the response from industry

The UK experience provides valuable insights into the policy development process and how key design choices were made. A review of the public consultation documents highlighted the following design options that gained almost complete cross-industry agreement*:

- **Providing flexibility for manufacturers:** allowing manufacturers to carry forward 35% of their obligation target to the following period allows parties to manage peaks and troughs in consumer demand.

- **Ensuring UK manufacturing is protected:** Obligations should apply to manufacturers of all fossil fuel boilers sold in the UK market, including non-UK companies. This is required to maintain a level playing field and prevent UK manufacturing from being undercut from an influx of lower cost, potentially lower quality imported products.

- **Restricting credit ownership to obligated parties:** allowing third parties to own credits significantly increases the risk of international market distortion, credit hoarding, shortages and inflated prices.

- **Applying obligations at the corporate group level:** It is strongly believed that this approach will simplify scheme administration and reduce the risk of international group restructuring to game the obligation.

*further design considerations included in the annex

The CHMM is a radically innovative policy approach that the government believes will provide a clear market signal on the future of the heating market in the UK. As discussed, the successful implementation of this policy could drive market benefits, however, the future of the scheme is uncertain and the subsequent industry response following the scheme announcement highlights the potential risks that could materialise. The following design changes should be considered to reduce this risks.

- **More appropriate targets and penalties** – As set out by a number of manufacturers, given the composition of the UK heating market, the uptake targets and initial penalty levels would result in significant fines for non-compliance. A subsequent reduction in the penalty levels have reduced the risk of penalty pricing, however the risk of cross-subsidisation or unsustainable cuts to heat pump prices (dumping) remains. None of these outcomes would have long-term positive impacts on the market.

- **Credit trading mechanism** – A credit trading mechanism is unlikely to be successful as manufacturers will not want to pay their competitors. The introduction of a 3rd party broker, which the government hopes will emerge to take advantage of a new market opportunity, may help to alleviate this risk but this remains to be seen. With this being the case, this form of flexibility is unlikely to be used by manufacturers, which therefore increases the risk of non-compliance or of the funds raised from fines not being put to best use (fines paid directly into the Treasury will not be re-distributed into the heating sector e.g. in the form of subsidies).

- **Use of fine revenue:** As mentioned, redistributing this money back into the market could have been used to support the market in other areas, for example funding installer training programmes etc.

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Clean Heat Standards in the USA

Policy overview

Vermont *(policy in development)*

Vermont has ambitions to reduce emissions from heating by 40% by 2030. Currently, over 77% of Vermont's 332,000 households use fossil fuel heating.

Vermont's proposed clean heat standard is another market-based approach which aims to reduce GHG emissions in Vermont's heating sector. As per other standards, this requires market actors to deliver a gradually-increasing percentage of low-emission heating products or services to customers. However, there are some design features that make this standard significantly different to the proposed UK CHMM:

- Targets under the CHS are based on the amount of greenhouse gas emissions reduced rather than specific technology installations. Thus it is more akin to the UK's Renewables Obligation scheme, which has been used to decarbonise the power generation sector instead.
- Vermont's heating marking is entirely dependent on imports of fossil fuel. The obligation has been placed on the small number of upstream providers of fossil fuel heating fuels (i.e. wholesale distributors of kerosene, fuel oil, propane and other fossil fuels) – not heating appliance manufacturers. By obligating upstream providers, emissions from the entire heating sector are captured by this measure. A proportion of the obligation target must come from low-income households.
- Credits can be awarded by reducing the carbon intensity of the fuel they sell or by selling a range of different clean heat solutions including heat pumps, energy efficiency measures, district heat and hydrogen.

Massachusetts *(policy in development)*

In late 2022, the Massachusetts Commission on Clean Heat recommended the development of a Clean Heat Standard. Subsequently in 2023, a draft program framework was published which addresses key policy design topics and initiated feedback from stakeholders. A review of the initial policy design highlights the key choices that were made.

- Standards would be established to require annual emissions reductions while ensuring ongoing progress toward full electrification of buildings.
- The policy requires retailers of natural gas, heating oil, propane and electricity to demonstrate compliance each year, leveraging their existing commercial relationships with end-use customers to support them with choices for heating that reduce emissions.
- Similar to the UK CHMM and Vermont designs, compliance would be demonstrated using clean heat credits. Regulated energy suppliers would obtain CHCs by implementing clean heat themselves or purchasing credits from third parties, such as heat pump installers.
- In addition to credit trading, further flexibility would also be provided through banking and alternative compliance payments.

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Additional mechanisms from the transport sector

Zero Emission Vehicle (ZEV) mandate (UK) – *introduced 2024*

The ZEV mandate is a trading scheme that has been developed to regulate the sale of new petrol and diesel cars and vans in the UK. The scheme establishes annual sales targets for the percentage of new vehicles that emit zero GHG emissions. These targets steadily increase over time with 80% of car registrations and 70% of van registrations targeted to be zero emission by 2030. Each year, the administrator will provide allowances for the share of vehicles not covered by the ZEV target, based on the manufacturer's total vehicle sales that year. These allowances can be traded amongst manufacturers.

The scheme design features many similarities to the UK CHMM.

- Sales based obligation placed on manufacturers with a credit system which includes weightings to drive additional policy outcomes
- Controls are in place to maintain product and service quality
- Flexibility is provided to manufacturers, with target carry over as well as credit trading and banking
- Compliance is enforced via penalties made to UK Government

Two key differences between the designs is that the ZEV mandate provides manufactures more options to earn credits (efficiency improvements of ICE vehicles) and the obligation is calculated as a proportion of total sales, rather than of the non-compliant technology.

The ZEV mandate became effective in the UK from 1st January 2024. Without a full year of vehicle sales data, it's difficult to assess it's impact, however, public announcements made by leading vehicle manufacturers provides some indication of how industry are responding to the measure.

- **Discounting for battery electric vehicles:** Firstly, the announcement by Renault to reduce the price of their Megane E-Tech range suggests some major OEMs are discounting their battery electric vehicles. This is further supported by price guide experts Parkers who report significant discounting from Stellantis.
- **Restrict the sale of internal combustion engine (ICE) vehicles:** Earlier in the year Ford warned that they will restrict the sale of petrol models in the UK or order to comply with the ZEV mandate (a move that may also push up the price of ICE vehicles). It is also rumoured that one German OEM has written to key fleet customers warning them of a similar eventuality.

No evidence has yet been found of penalty pricing, which was the initial response from major manufacturers in the UK heating market. It is too early to observe any impact the measure may have had on increased marketing or new partnerships.

Despite similarities in scheme design, the EV and low carbon heating markets in the UK are very different. As such, caution should be applied when transferring learnings between markets.

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Additional mechanisms from the transport sector

CO_2 emission reduction targets for new passenger cars and light commercial vehicles (EU) – *introduced 2019*

To help reduce transport emissions, the EU has introduced regulations that set annual CO_2 emission performance standards for new passenger cars and light commercial vehicles. In 2023, the original 2020 regulations were strengthened to reduce emissions by 100% and effectively ban the sale of new combustion cars and light commercial vehicles from 2035.

The mechanism shares many similarities with standards from other sectors. However, there are some key differences.

- This mechanism places an annual performance-based obligation on manufacturers. However, rather than a sales target, manufactures must achieve a CO_2 emission reduction target.
- Flexibility is provided to manufacturers with the option to form pools with other manufacturers to collectively meet their obligation. Furthermore, there is the option for manufacturers to earn 'super credits' for the sale of zero emission vehicles and eco-innovations. There is also a clause which protects the manufacturer from exceptional circumstances such as economic crises or supply chain disruption.
- Compliance is enforced via penalties €95 per g/km of target exceedance. The Commission considered the possibility of allocating this revenue to a specific fund. However, in its 2023 review it concluded that this would significantly increase the administrative burden. As such, this revenue is allocated to the general budget of the Union. In addition to financial penalties, every manufacturer's performance is published each year.

The EUs new car and van CO_2 emission standard, provides a good example of a standard that is applied and adopted across multiple countries. Below is a summary of some of the additional challenges with this design.

- **Accounting for different technologies:** The scheme received significant pushback from Germany's transport ministry which demanded an exemption for combustion engine cars that run on e-fuels. In March 2023, the European Commission agreed to propose a legal route to provide this exemption.
- **Union level targets:** Manufacturers' compliance with the targets set out in the regulation are assessed at the Union level, rather than country level. As such, this mechanism does not impose country-level targets.
- **A CO_2 based performance metric increases scheme complexity:** Reporting CO_2 emissions requires manufacturers to accurately measure the performance of all their vehicle models. To facilitate this, a robust testing procedure is required which can be consistently applied across manufacturers. Furthermore, the effectiveness and environmental integrity of this mechanism is strongly dependent on the real-world representativeness of the official test procedure.

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Conclusions

A summary of key learnings from the policy review that can be applied to our study

This is an emerging policy area and currently there is no evidence of the impact Clean Heat Standards have had on market outcomes. Despite this, insights have been developed from observing the policy design process reactions from industry participants. This evidence has been supplemented with the experience of introducing similar market mechanisms in other sectors.

- **A CHS must be supported by a holistic policy framework:** The effectiveness of a CHS is dependent on the ability of the obligated party to address key market barriers and grow demand. To facilitate this, it is imperative that market actors are supported by government with appropriate policy measures, especially for barriers that the obligated party has little control or influence over. For example, it is incredibly challenging for manufacturers to influence the fully-installed or running costs associated with owning a heat pump. As such, they support in these areas could be required.

- **Scheme flexibility and complexity are important to consider to minimise the impact on obligated parties:** Across all mechanisms that have been reviewed, there are many flexibilities which manufacturers can use to manage their obligations. This is critical to ensure that parties have time to pivot their business and the scheme is sensitive to wider economic shocks. In addition to this, the complexity of the scheme will also have implications on the administrative burden associated with managing the scheme.

- **CHS design should be shaped by clear policy objectives:** Existing mechanisms demonstrate that a CHS is a flexible instrument that policymakers can tailor to suit the needs of different markets or to achieve certain objectives. Clear scheme objectives and a deep understanding of market conditions are needed from the outset to guide key design choices such as which party the obligation is placed on, what heating technologies are in scope and how the scheme should be administered. Credit weightings are a useful tool that can be used to encourage additional outcomes, however bring with them a significant amount of added complexity.

- **Accounting for the diversity of heating markets across EU Member States is an additional challenge:** All previously designed CHS schemes obligate actors selling into one market. An EU-level obligation would cover 27 Member States and would therefore need to account for the significant variation in market size (e.g. appliance sales), composition (e.g. players) and other characteristics (e.g. appliance cost, running costs, wider policy framework). In this context, some of the design choices made in existing schemes may be unfeasible or incredibly challenging to implement without adding significant complexity to the design or increasing the risk of unintended market outcomes. For example, setting an appropriate EU-wide appliance sales target, tracking installations and having a narrow technology scope would be more challenging when applied at the EU level.

*for example, putting the obligation on energy suppliers

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Conclusions

A summary of key learnings from the policy review that can be applied to our study

- **CHS design should be monitored:** Mechanisms typically have review points, or built in flexibility to ensure that adjustments can be made and the instrument can evolve with the fast development of low carbon technology markets.

- **Key scheme parameters (targets, penalty levels etc) should be carefully considered and appropriate to market conditions:** Evidence from the UK CHMM highlights the risk of non-compliance. It is essential that scheme parameters are sensitive to market conditions as well as any burden on market players is minimised and flexibilities are provided.

- **Controls should be considered to maintain product and/or service quality:** There is a risk that a CHS could reduce the quality of products or installations if competitive pressures are strong. This could have a significant impact on the consumer experience and perception towards low carbon heating. In all mechanisms considered, controls have been put in place to maintain quality. This risk is highlighted in our market analysis (WP2), which concluded that availability of high-quality low carbon heating installers is an issue in many markets.

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Section 2: Developing a European Clean Heat Standard - Core design elements

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Policy design approach

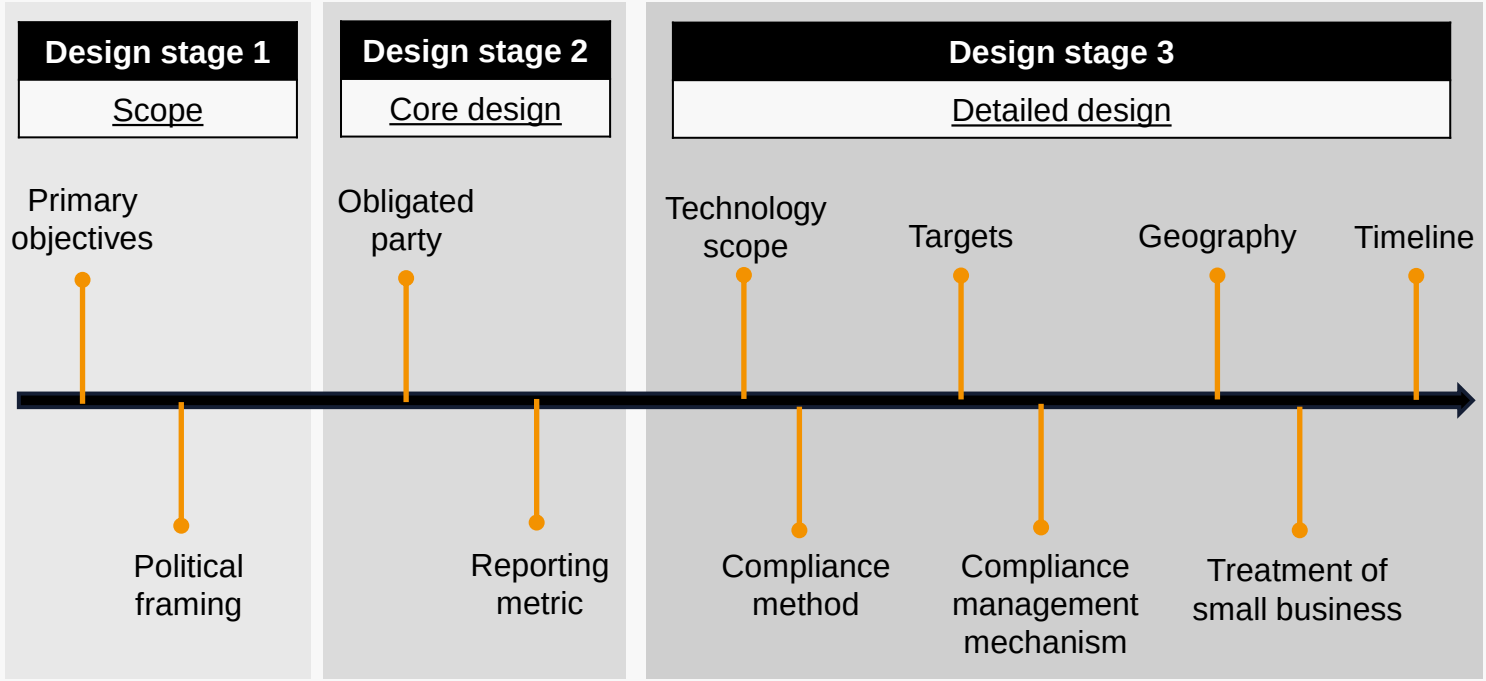
CHS is a flexible instrument that can be tailored to suit different markets and achieve specific policy outcomes

We have developed a five-stage approach to the policy design process.

In this slide we describe the individual steps we have taken to design the policy. This design has been be informed and shaped by the following information developed across this project:

- ✓ **Clear policy objectives and an understanding of wider EU energy objectives**
- ✓ **Feedback from key industry players gathered through several stakeholder interviews.**
- ✓ **Observing the design process and the industry responses from the introduction of similar mechanisms in other markets (detailed in Section 1).**
- ✓ **A deep understanding of local market characteristics (detailed in WP2).**
- ✓ **Analysis of the impact the policy design could have on consumers, manufacturers and wider society (detailed in WP4)**

Five-stage policy design process



Design stage 4

Risks and challenges

We identified the risks associated with the policy design and any mitigations that have been implemented or considered.

Design stage 5

Additional design options and political framing

We considered additional design options and identify the design changes required to align the policy with four different policy windows that could be exploited to frame our instrument in the pollical landscape.

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Design stage 1

Policy objectives and role of a European CHS

We propose that a European CHS should work alongside existing regulations and policy to support the market as it transitions to low carbon heating.

Objectives and role of a European CHS

The primary objective of our European CHS is to achieve a sustained acceleration in sales of low carbon heating appliances across the EU. This policy would be introduced to work alongside the EUs indicative target for the phase out of fossil fuels from heating in buildings by 2040*. It will achieve this by restricting the use of standalone boilers powered by fossil fuels as a means of compliance by obligated parties, shifting the market before they are removed from sale. Manufacturers and installers can increase their capacity in an orderly manner, avoiding additional transition costs and reducing the risk that policymakers postpone the point at which the end of sales is scheduled to come into force. Secondary outcomes achieved by the scheme will need to be balanced through the design of the policy.

Political framing

We have identified four policy windows which represent potential entry points for the policy to introduce it into the political discussion and EU legislation. Once the detailed design of the European CHS has been established, in stage five of the policy development process we will demonstrate how key design components can be adjusted to align the policy with these four policy windows.

*Note 2040 is not a binding target. It is an indicative target date for Member States to put in place effective policies and measures to phase out the use of fossil fuels in boilers by 2040.

Instrument
European Clean Heat Standard

Primary Objective
Create the conditions necessary for market actors to invest with confidence in scaling up demand and supply for low carbon heating appliances with the intended outcome of achieving a sustained acceleration in the sale of low carbon heating appliances.

Secondary outcomes

- Promote EU manufacturing
- Maximise carbon savings
- Reduce costs to consumers and maintain choice
- Minimise scheme complexity

Political framing

Window 1: Industrial competitiveness

Window 2: Electrification

Window 3: Climate

Window 4: Efficiency

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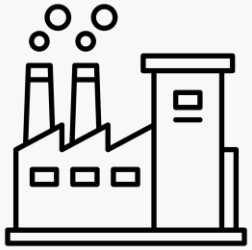
Design stage 2

Core design options – Obligated party (1/2)

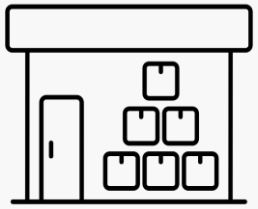
Which industry actor will be obligated under our scheme?

The first policy design decision that needs to be made is which industry actor will be obligated under the scheme. Following the analysis of common European heating appliance distribution channels (presented in WP2), we have identified and consider the following groups of organisations.



Manufacturers and importers

Heating appliance manufacturers in the EU are a diverse group, ranging from large multinational corporations that produce a wide range of heating appliances to specialized regional companies. There is also a smaller group of 'importers' – companies that bring in heating appliances produced outside of Europe and sell them on by themselves, either as they are or after labelling / packaging them in their own brand*.

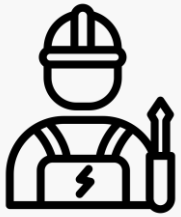


Distributors and wholesalers

Distributors are responsible for logistics, warehousing, and managing large inventories. They also fulfil a vital role in providing guidance – and credit – to installers. As identified in our market analysis (WP2), in all markets included within this study, the majority of manufacturers sell their products to an intermediary (wholesaler or distributor) before reaching the end consumer.

Energy retailers

Some energy retailers sell energy *and* heating appliances to end consumers. The market is diverse, featuring both large multinational corporations and smaller, regional providers, with competition varying significantly across member states due to differences in market liberalization.



Installers

Installers are specialized technicians with the specific training and certification needed to safely fit and optimize heating systems. There are approximately 1.5 million installers of heaters in the EU. This number covers a wide range of roles, from independent contractors and small businesses to employees of larger installation firms.

*See Annex B for more details of how the design treats both company types.

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Design stage 2

Core design options – Obligated party (2/2)

Which industry actor will be obligated under our scheme?

We propose the European Clean Heat Standard will be placed on heating appliance manufacturers.

Rationale

- **Feasibility / complexity:** 'Heating appliance manufacturer' is a well-defined group of organisations. The clear characteristics of heating appliance 'importer' companies also allows them to be easily grouped within the manufacturer category. Obligating installers is not feasible due to the vast number of organisations (most of which are small, independent businesses), whilst obligating energy retailers adds complexity as these organisations are typically not involved with either the production or sale of heating appliances to the end consumer.
- **Market leverage:** The influence market actors have on addressing uptake barriers and accelerating market growth varies depending on their position in the value chain. Typically, major appliance manufacturers are well positioned to manage supply chain constraints, train installers and determine manufacturing costs. Downstream actors such as installers and energy retailers can build on their pre-existing relationship with the end-consumer to influence their purchasing decisions by raising awareness, providing different purchasing options (e.g. finance) or offering other complementary products (e.g. specialist tariffs). Although retailers are well placed to influence demand, historically they have not utilised this relationship.
- **Cost burden:** By placing the obligation on manufacturers, any compliance costs would be passed through to a select group of consumers (those currently in the market for a standalone boiler). By placing the obligation on energy suppliers, compliance costs could be reflected in higher energy bills, impacting all energy customers.

Further considerations

In the detailed design we refine our definition of HVAC manufacturers to clarify the exact type of organisations that would be obliged under this mechanism. Further considerations include;

- **Manufacturer type:** Does the obligation apply to low carbon heating specialists in addition to organisations that manufacturer fossil fuelled heating appliances?
- **Manufacturer location:** Does the obligation apply to manufacturers located outside the EU?
- **Manufacturer size:** Does the obligation apply equally to all manufacturers, regardless of size? If concessions are made for small manufacturers, how would this threshold be determined? E.g. sales volumes, active markets etc.
- **Organisational structure:** Does the obligation apply at the corporate group level, or subsidiary level?

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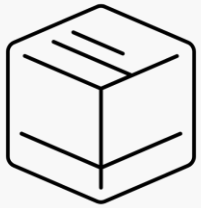
Design stage 2

Core design options – Reporting metric (1/2)

What is the appropriate reporting metric?

The second core design considers the appropriate reporting metric which is used to measure the performance of the obligated party. We have considered two high level options informed by approaches taken in similar policy mechanisms and consideration of the data that is currently reported by manufacturers under existing policy requirements. Across both options manufacturer performance is informed by the number and type of heating appliances sold or installed across a given period. However, there are various specific metrics which could be used to measure performance.

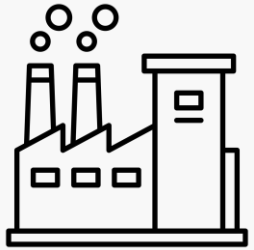


Heating appliance sales or installations

Under this option manufacturer performance would be measured according to the number or proportion of low carbon heating appliances sold or installed over a given period.

For example, a manufacturer may sell a variety of different heating appliances. Targets could be introduced to increase the number of proportion of low carbon heating appliances sold or installed by every manufacturer each year.

Sales information will be routinely collected by manufacturers. However, additional reporting would be required to monitor actual installations as it is not typically the manufacturers themselves who install the devices for end customers.



Weighted carbon intensity (gCO_{2e}/kWh heat) or product efficiency (%)

Under this option, manufacturer performance would be measured according to the weighted average carbon intensity (gCO_{2e}/kWh) or efficiency (%) of all appliances sold or installed over a given period. A maximum average carbon intensity or efficiency cap could be introduced to drive improvements over time.

Information on product efficiency and energy use (already provided by manufacturers and contained within the EPREL* database) could be combined with additional data provided by manufacturers and external sources to estimate the average carbon intensity of all products sold by an individual manufacturer. See Annex B for further consideration of the practical implementation of this option.

*European Product Registry for Energy Labelling

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Design stage 2

Core design options – Reporting metric (2/2)

What is the appropriate reporting metric?

We propose that manufacturer performance will be measured according to the first sales* of heating appliances, not average efficiency or carbon intensity of their heating appliances sold.

- **Reporting complexity:** Accurately calculating CO_2 emissions from heating appliances is a complicated process. Although some product data is already reported through other means, additional assumptions would be required to produce the necessary calculations to estimate average CO_2 emissions. To avoid overcomplicating the calculation, it is likely that assumptions used (such as carbon intensity of the energy input) would rely on EU averages. As such, the calculation would not capture the additional carbon intensity of heating appliances sold in markets with a more carbon intense electricity grid (e.g. Poland) vs. a market with a cleaner system (e.g. France). Assumptions are likely to vary considerably across products and markets adding an additional level of complexity.

- Measuring and reporting appliance 'first sales*' on the otherhand is more straightforward – it is based on information which will be readily available from manufacturers. It may also be possible to gather installation data, however additional data collection mechanisms may be required.

* 'first sales' captures the initial sale of appliances – most often this will be sales out of the factory gate typically to an intermediary e.g. wholesaler, distributor or installer – but also covers the first sale of an imported device on European soil by such 'importer' companies.

- **Market signal:** A sales-based obligation provides a clear link to the primary objective of the policy – *to accelerate the uptake of low carbon heating appliances*. By reporting appliance sales, it would be easier to monitor progress against this objective over time.

- **Political framing:** Potentially challenging to get political buy-in given similarities to the EU vehicle emissions policy.

Further considerations

In the detailed design we provide further detail on the reporting requirements and metric. This includes:

- **Geography:** Is manufacturer performance measured according to sales levels across all EU Member States, or is it measured on an individual country basis?

- **Administration**: How often will manufacturers need to provide sales information, and which body will they be reporting to?

- **Compliance management mechanism:** What mechanism will be used to encourage performance improvements – e.g. fines, certificates, credits? Will the mechanism impose strict performance targets?

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Section 3: Developing a European Clean Heat Standard – Detailed design

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Policy option 1 – Performance-based incentive scheme

An overview of the core policy design

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Design stage 3

Key scheme design features

We have developed a European Clean Heat Standard (the *"performance-based incentive scheme"*) which utilises financial penalties and non-financial incentives to deliver a sustained increase in the sale of low carbon heating appliances across EU Member States.

In line with the core design choices made in the previous section, the performance-based incentive scheme focusses on HVAC **manufacturers** and requires these companies to report **sales** of heating appliances every year.

In this section we explain the detailed design choices made to develop a practical and workable scheme that can be applied across the European Union. Core to the design is its simplicity which we believe is fundamental for the scheme to be effective.

It should be noted that our design represents a blueprint. Exact scheme details and parameters (e.g. technology scope, performance banding and penalty level) will be closely scrutinised, reviewed and refined with stakeholders through the typical policy making process.

	The primary aim of the scheme is to achieve a sustained acceleration in the uptake of low carbon heating appliances across the EU.
	The scheme would become effective in 2030 – 2040, complementing the European Commission's indicative target for the phase out of fossil fuels from heating in buildings by 2040.
	HVAC manufactures are obligated to report heating appliance "first sales" out of the factory, not appliance installations.
5:1	Manufacturer performance is measured by a 'Clean Heat Sales Ratio' (CHSR) which indicates the share of low carbon heating appliances each manufacturer sells vs traditional fossil fuel appliances into the EU market.
	A wide range of low carbon heating appliances are compliant ensuring choice for consumers and a degree of flexibility for manufacturers.
	The scheme does not impose any explicit targets on HVAC manufacturers. Instead, it relies on a financial penalty framework and non-financial incentives to encourage performance improvements over time – giving manufacturers all of the information required to set their own targets based on what is acceptable / achievable for each.
	In our core design, in order to reduce complexity, there is no credit system and therefore no weightings applied across different appliances or markets.

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Design stage 3

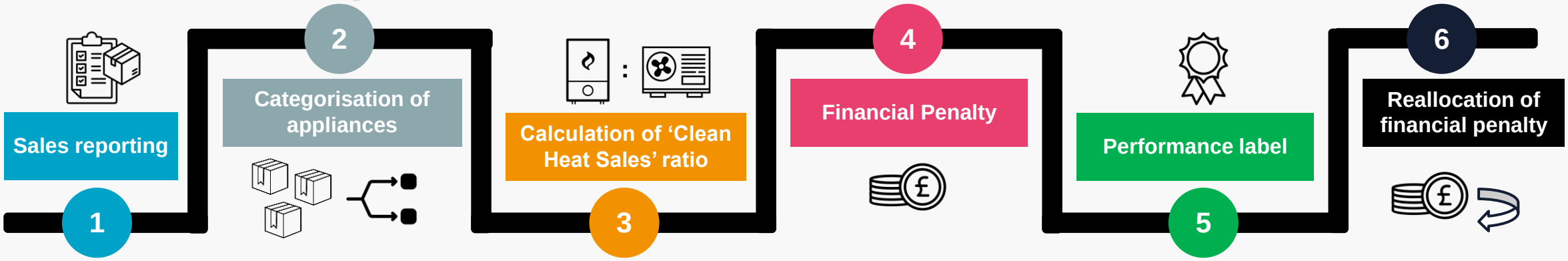
Step-by step walkthrough of the scheme design

Heating appliance **sales are categorised into three groups**:

1. *Compliant* – low carbon appliances
2. *Non-compliant* – standalone boiler powered by fossil fuels
3. *Neutral*

Each manufacturer will receive a financial penalty for every non-compliant appliance that is sold into the market. Fine levels are **higher for manufacturers in poorer performance bands** and will increase over the decade.

Manufacturers can recoup a portion their annual penalty fines in the subsequent year. This amount will be dependent on their performance improvement and will not extend beyond 100% of what they have been fined.



From 2030, all HVAC manufacturers (and importers) that sell heating appliances into the European market must **report total European 'first' sales volumes to the EU Commission annually**.

An annual clean heat sales ratio (CHSR) is calculated for each manufacturer based on its sales of compliant and non-complaint appliances sold across all European markets. Each manufacturer is then graded into 12 performance bands, based upon its ratio.

Manufacturers will also be required to display their CHSR grade prominently on their website so that consumers / installers / investors etc. can see how each company performs.

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Design stage 3

Categorisation of heating appliances

HVAC manufacturers must report the sales of all appliances in scope of the scheme. Appliances are then categorised, (non-compliant, compliant, neutral) and a Clean Heat Sales Ratio (CHSR) is calculated for every manufacturer

In Scope			
	Heat pumps (all – except air-air)	Coal boiler	Pure hydrogen boiler
	Natural gas boiler	LPG boiler	Low carbon liquid fuel boiler
	Oil boiler	Biomass boiler (pellet, logs, chip)	Low carbon 'ready' boiler
	Electric boiler	Micro-CHP (engine, turbine and fuel cell)	Low carbon gas or liquid conversion kit

1 - Non-compliant
Natural gas boiler
Oil boiler
Coal boiler
LPG boiler
Low carbon 'ready' boiler

:

2 – Compliant
Air-source heat pump
Hybrid heat pump
Thermally driven heat pump
Ground & water-source heat pump
Exhaust-air heat pump
Micro-CHP (engine, turbine and fuel cell)
Pure hydrogen boiler
Renewable liquid fuel boiler
Low carbon gas or liquid conversion kit

Clean Heat Sales Ratio (CHSR)
The ratio of non-compliant heating appliances sold vs compliant heating appliances.

3 - Neutral
Electric boiler
Biomass boiler (pellet, logs, chip)

HVAC manufacturers must report the sales of 'neutral' appliances as these are in-scope of the scheme. However these sales do not count towards their CHSR.

Out of scope		
	All individual room heaters (electric, LPG, etc)	Resistive / storage heating
	All fireplaces and stoves	Air-air heat pumps – single and multi split*
	Heat interface units (e.g. District Heat)	Water heaters

Manufacturers are not required to report the sales of any appliances out of scope

*while we foresee much potential for air-based / DX heat pumps as a solution to decarbonise heating across Europe, tracking the sales of such devices where the primary use will be for heating rather than cooling is currently problematic, and thus we have excluded them from the initial set of compliant technologies.

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Policy option 1 – Performance-based incentive scheme

Further detail on key scheme parameters

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Design stage 3

Scope

The scheme would be effective from 2030 and would cover all manufacturers that sell heating appliances into the EU.

Start date

The scheme would be effective from the beginning of 2030 and run until the end of 2039.

A pilot version of the scheme will be introduced at least 1 year prior to the commencement date.

As set out in the core design options, this measure will be implemented to accelerate the transition to low carbon heating in the period up to 2040.

The pilot version of the scheme will provide an opportunity for the relevant agencies to be established, data to be collected and for the general operation and parameters of the scheme would be tested. It would allow all manufacturers to understand what the outlook for them will be once the scheme does go live and help them to plan their strategies accordingly. No penalties would be issued during this period (although manufacturers would be informed of what level of penalty they would have faced were the scheme to have been officially live).

Obligated parties and geography

All manufacturers of heating appliances sold into any market within the European Union's 27 Member States* will be obligated by this mechanism.

By extending the obligation to all HVAC manufacturers, this ensures that the reporting burden is placed fairly across industry players, including specialists, which focus on one technology type, and HVAC generalists which manufacture multiple appliance types. By providing a wide coverage, this obligation will provide the scheme administrator with a comprehensive (anonymised) dataset of up-to-date market information which would be highly valuable to inform future policy making.

The inclusion of non-EU manufacturers ensures that the reporting burden is applied to all manufacturers selling into the European market, irrespective of their manufacturing location.

*A manufacturer that imports and sells appliances would be in scope

Small business concession

An extended grace period of 2 years provided to businesses that only sell into one European market.

Given the diversity of European heating markets it is not appropriate to set a small business threshold according to the number of appliance sales. By categorising businesses according to the number of European markets that they sell into, this is a way of identifying small businesses which may need more time to pivot their business in order to comply with the standard.

During the first 2 years of the scheme, these manufacturers would be obliged, with the rest of the European heating industry, to submit their sales numbers but they would not incur fines during this time – nor be graded / be given a CHSR to display on their website.

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Design stage 3

Reporting requirements

The scheme requires obligated parties to provide information on the number of heating appliances sold, not installed.

Each year all obligated parties are to report and submit the 'first sales*' of any heating appliance sold into any EU Member State market which meets the following conditions:

1. **Capable of providing central (whole home) central heating; and**

2. **Capable of generating heat (rather than solely distributing or transferring heat from another source, for example).**

This definition incorporates heating appliances from Lots 1, 2 and 15 from the EUs EcoDesign policy which sets energy efficiency and environmental performance standards for products. All appliances from the remaining lots are out of scope and therefore do not have a reporting requirement. Sales data is to be provided at the company group level. To aid scheme administration and enforcement, scheme participants who are part of a wider corporate group will be required to appoint a single Responsible Undertaking who will be the legally responsible entity for ensuring the group is complying with the scheme.

The appliance scope has been guided by EcoDesign to maintain consistency across EU policy. By applying the conditions set out above, we can be sure that the scheme is focussed on decarbonising whole home heating.

Unlike other mechanisms, the scheme requires manufacturers to report heating appliance sales data, not installations. There are no ready-made mechanisms that could be used to report heating installations across all European markets. By reporting appliances sales, policy makers avoid the cost of setting up such a system. In addition to this benefit, manufacturers have 100% oversight of this data and have total control over what quantities of products it replaces.

In Scope	Heat pumps** (all types – except air-air)	Coal boiler	Pure hydrogen boiler
	Natural gas boiler	LPG boiler	Low carbon liquid fuel boiler
	Oil boiler	Biomass boiler (pellet, logs, chip)	Low carbon 'ready' boiler
	Electric boiler	Micro-CHP (engine, turbine and fuel cell)	Low carbon gas or liquid conversion kit

Out of scope	Individual room heaters (all types - electric, LPG, etc)	Resistive / storage heating
	Fireplaces and stoves	Air-air heat pumps – single and multi-split
	Heat interface units	Water heaters

**Hydronic, ground source, thermally driven, hybrid, exhaust air. Although multi split A/A heat pump systems may meet the scheme conditions, there is no accurate way of collecting sales data for systems that are primarily used for heating. As such, they are out of scope.

*first sales captures the sale of appliances out of the factory gate typically to an intermediary e.g. wholesaler, distributor or installer.

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Design stage 3

Categorisation of heating appliances

Heating appliances are grouped into three categories; Non-compliant, compliant and neutral

The sales of all heating appliances in scope of the scheme are grouped into three categories;

- **Category 1 – Non-compliant: This category includes all appliances that do not generate 'low carbon heat' from the point of installation. This therefore includes all traditional fossil fuel heating appliances, including low carbon 'ready' boilers.**
- **Category 2 - Compliant: This category includes all appliances that generate 'low carbon heat' (and/or on-site low carbon electricity) from the point of installation.**
- **Category 3 – Neutral: This category includes appliances that have wider system implications, despite potentially emitting lower carbon than some appliances included in the 'Compliant' category.**

Within the proposed scope of this policy design there is a wide range of compliant appliances. The reason for keeping a wide scope is to ensure that the scheme considers the diversity of different heating markets and decarbonisation strategies across Europe.

The following appliances have been included in the neutral category for the following reasons:

- Electric boilers: Wider electricity system considerations. Electric boilers are inefficient and could have implications on the amount of network reinforcement required.
- Biomass: Environmental sustainability considerations. Treating biomass in this way is consistent with the approach taken in other EU policies including EcoDesign and Energy Labelling.

1 – Non-compliant
Natural gas boiler
Oil boiler
Coal boiler
LPG boiler
Low carbon 'ready' boiler

2 – Compliant
Heat pumps
Micro-CHP (engine, turbine and fuel cell)
Pure hydrogen boiler
Renewable liquid fuel boiler
Low carbon gas or liquid conversion kit*

Hydronic
Hybrids*
Thermally driven
Exhaust air
Ground-source

3 – Neutral
Electric boiler
Biomass boiler (pellet, logs, chip)

*Additional reporting requirements – described in the annex

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Design stage 3

Reporting metric

Manufacturer performance is measured by the calculation of a Clean Heat Sales Ratio

Heating appliance sales are to be aggregated across all European Member states (Union level) and provided at the company group, rather than subsidiary level. For each manufacturer, an annual clean heat sales ratio (CHSR) is calculated from their sales of non-compliant and compliant appliances sold. The sale of neutral appliances and those out of scope are not counted towards the ratio.

Manufacturers will be graded according to 12 bands (A+ to K) depending on their CHSR. This information will be published by the European Commission in the form of a heating industry league table. In addition to this. each manufacturer will receive a performance label (relevant to their band), which they will be required to display on their website so that consumers / installers / investors etc. can see how each company performs.

Band	Non-compliant appliances		Compliant appliances
A+	0	:	1
A	0 - 1	:	1
B	1 - 2	:	1
C	2 - 3	:	1
D	3 - 4	:	1
E	4 - 5	:	1
F	5 - 6	:	1
G	6 - 7	:	1
H	7 - 8	:	1
I	8 - 9	:	1
J	9 - 10	:	1
K	10+	:	1

The CHSR bandings were informed by European sales data (provided by the EHI and LCP Delta's own information) and analysis of a sample of existing manufacturers. We believe that the level of granularity is sufficient to encapsulate the vast majority of industry players.

The performance label utilises competitive pressures to act as a non-financial instrument which aims to incentivise manufacturers to improve their performance year on year. For already high performing manufacturers (e.g. low carbon heating specialists), this additional instrument adds extra encouragement to comply with the scheme, despite already achieving strong CHSR.

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Design stage 3

Penalty matrix

Financial penalties vary according to manufacturer performance and increase over time

Each manufacturer will receive a financial penalty for every non-compliant appliance that is sold into the European market.

The size of the penalty is determined by the penalty matrix which demonstrates how the penalty level varies by band (i.e. CHSR) and by year. Manufacturers that are selling a low proportion of compliant appliances (i.e. in a low band) will face a higher penalty than manufacturers that are selling a high proportion of compliant appliances (i.e. in a high band).

In addition to this, the penalty level will increase over time to ensure maintained performance improvements. This should also mitigate a 'boom' in non-compliant sales in the last few years of the scheme, due to the ever-increasing size of the fine.

Band	Non-Compliant			Compliant	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
A+	0		:	1	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -	€ -
A	0.00	0.99	:	1	€ 5	€ 6	€ 6	€ 7	€ 7	€ 8	€ 8	€ 9	€ 9	€ 10
B	1.00	1.99	:	1	€ 10	€ 11	€ 12	€ 13	€ 14	€ 16	€ 17	€ 18	€ 19	€ 20
C	2.00	2.99	:	1	€ 20	€ 22	€ 24	€ 27	€ 29	€ 31	€ 33	€ 36	€ 38	€ 40
D	3.00	3.99	:	1	€ 30	€ 33	€ 37	€ 40	€ 43	€ 47	€ 50	€ 53	€ 57	€ 60
E	4.00	4.99	:	1	€ 40	€ 44	€ 49	€ 53	€ 58	€ 62	€ 67	€ 71	€ 76	€ 80
F	5.00	5.99	:	1	€ 50	€ 56	€ 61	€ 67	€ 72	€ 78	€ 83	€ 89	€ 94	€ 100
G	6.00	6.99	:	1	€ 60	€ 67	€ 73	€ 80	€ 87	€ 93	€ 100	€ 107	€ 113	€ 120
H	7.00	7.99	:	1	€ 70	€ 78	€ 86	€ 93	€ 101	€ 109	€ 117	€ 124	€ 132	€ 140
I	8.00	8.99	:	1	€ 80	€ 89	€ 98	€ 107	€ 116	€ 124	€ 133	€ 142	€ 151	€ 160
J	9.00	9.99	:	1	€ 90	€ 100	€ 110	€ 120	€ 130	€ 140	€ 150	€ 160	€ 170	€ 180
K	10+		:	1	€ 100	€ 111	€ 122	€ 133	€ 144	€ 156	€ 167	€ 178	€ 189	€ 200

The penalty level is applied to the sale of non-compliant appliances. This is required because this scheme does not place an explicit performance target on manufacturers. As such, it is not possible for us to apply the penalty per appliance sold over/above a performance target (as per other similar schemes). In this format, each manufacturer will set its own target.

The penalty level faced by a poor performing manufacturer in 2030 has been set at €100 per non-compliant appliance. This penalty level is in the order of the typical profit margin associated with the sale of a natural gas boiler. We believe this is appropriate because this will make the sale of standalone fossil fuel boilers increasingly unprofitable for the company, in doing so, reducing the incentive to continue manufacturing this appliance. However, we also believe that this level is not too severe that it risks putting the company out of business, therefore it gives the company time to adjust their strategy to improve their performance.

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Design stage 3

Reallocation of financial penalties

Manufacturers that demonstrate performance improvements can recoup a portion of last year's penalty

Each year manufacturers will have the opportunity to recoup a portion of the penalty fine incurred in the previous year. To earn this opportunity, manufacturers must demonstrate an increase in their performance (i.e. an improvement in their CHSR). The amount they can recoup will be tied to the scale of their improvement. For example, if a manufacturer was able to reduce their clean heat ratio by 25%, then 25% of the financial penalty incurred in the previous reporting would be deduced from this year's penalty.

Any excess penalty revenue which is not reallocated back to manufacturers (via the deduction) will be primarily used to fund the administration and general operation of the scheme. If the revenue is substantial, it will be at the discretion of the EU Commission as to how it allocates the remaining share. Potentially this could be used to support decarbonisation efforts in particular less developed markets e.g. by topping up the existing national government's subsidy schemes for low carbon heating installations and energy efficiency improvements.

As explained in the policy review, the inclusion of financial penalties within the scheme design will result in the collection of revenue which could be used to support the wider market or industry.

We have considered multiple ways in which this penalty revenue could be utilised.

The first option, considered giving Member States access to this revenue to top-up existing or create new subsidies which supported the uptake of low carbon heating appliances. Although this would be positive for the market, it would be incredibly challenging to develop a way of allocating this money across Member States in a fair and equitable way.

A second option was to allow manufacturers to bid against each other to claim part of the fine revenue back, with conditions attached on how that money could be spent (e.g. providing more training to installers). The main issue associated with this approach is ensuring that the money manufacturers spend is additional to what they would have spent anyway, in the absence of the scheme.

We believe that the option to allow manufacturers to receive part of their penalty back is a pragmatic approach which ensures that penalty revenue is used to help support industry players.

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Design stage 3

Administrative details

The scheme design will be reviewed at least once, and an appropriate scheme administrator would need to be appointed.

Review mechanism

The scheme design will be reviewed in year 3 (2033) and potentially at another point following this date prior to the end in 2039.

This review mechanism is essential to ensure policymakers have the flexibility to adjust the scheme design in line with evolving market situations. We recommend that the review mechanism is primarily used to assess the categorisation of heating appliances. For example, if a mechanism is developed for tracking the sales of A/A heat pumps for heating, they could be introduced into the scheme. Similarly, policy makers may want to limit or exclude certain appliances over time (e.g. high efficiency gas [HEG] heating appliances such as thermally driven heat pumps or hybrid heat pumps – which generate less renewable heat).

In principle, penalty levels could be addressed e.g. if the scheme is not driving the expected outcomes or if necessary to account for the effect of inflation. However, this kind of policy change could create uncertainty for manufacturers and we believe that giving manufacturers as much clarity over as long a timeframe as possible will ultimately lead to a more positive outcome from the scheme. We recommend that policy changes are only made if essential, in order to maintain clarity and reduce policy uncertainty across industry players.

Administration and enforcement

The scheme administrator, will be responsible for managing and enforcing the scheme.

A standard auditing process is incorporated into the scheme, whereby each year the data provide by a random sample of manufacturers will be audited. In addition to this, the administrator will review all data submitted by the manufacturers. If the administrator suspects any issues with the data, they can request more information from the manufacturer and potentially issue an audit procedure.

The administrator will impose civil penalties for failure to make a required payment by the required date, the submission of inaccurate data, failure to notify change of corporate status or structure, failure to comply with information.

There are several organisations that could take the role of the administrator. This decision would be made by relevant EU policymakers.

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Design stage 3

Worked example

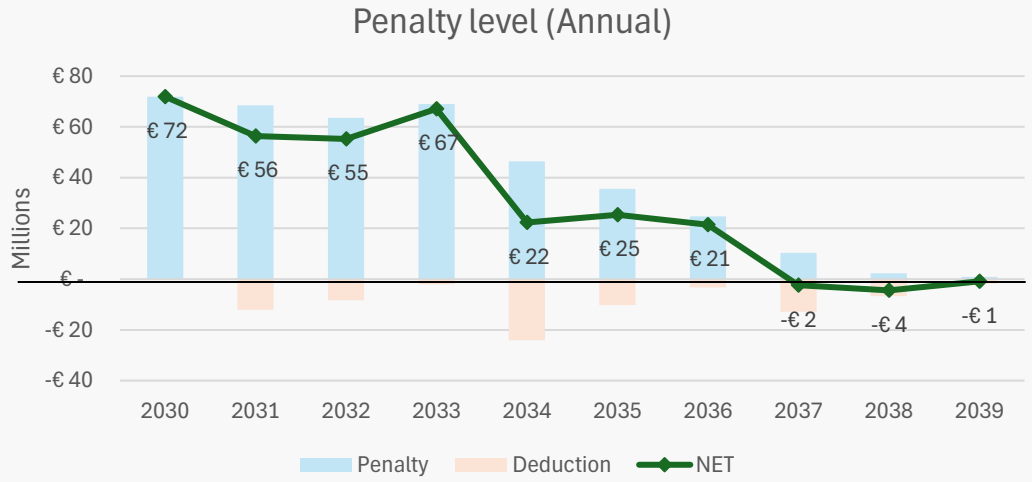
Manufacturer A sells a total of 1 million heating appliances each year, across 3 European markets. The share of non-compliant and compliant appliances sold across each market varies.

- YEAR 1: In 2030, Manufacturer A sells 101k hydronic heat pumps and 890k natural gas boilers in total across three European markets. Its calculated union-level CHSR is 8.9 : 1, placing it in **Band I.** This manufacturer receives the relevant sales performance label and incurs a financial penalty of **€71M** (890k * €80).

- YEAR 2: In 2031, Manufacturer A improves its performance, selling proportionately more qualifying appliances and reducing its CHSR to 7.4 : 1. This represents a 17% improvement on the previous year and thus places it up a level, into **Band H**. In this year, the manufacturer incurs a **penalty of €68m** from new non-compliant sales, however receives a **deduction of €12M** on this due to improving its ratio. This is equivalent to 17% of the penalty it incurred in the previous year.

- YEAR 3+: Manufacturer A improves its performance year on year, selling an increasing proportion of qualifying heat pumps and rising through the performance bands. In doing so, the financial penalties it faces fall each year (with the exception of 2033 due to slow progress), whilst the manufacturer continues to receive reimbursements. As shown by the graphs, in 2037 and 2038, due to high levels of performance, the deduction the manufacturer receives is slightly greater than the penalty it incurs, therefore the manufacturer receives a payment in these years.

	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
A+										
A									0.5 : 1	0.1 : 1
B								1.4 : 1		
C							2.9 : 1			
D						3.2 : 1				
E					4.1 : 1					
F										
G			6.5 : 1	6.3 : 1						
H		7.4 : 1								
I	8.9 : 1									
J										
K										



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Risks and challenges

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Design stage 4

Key challenges and risks (1/4)

Pre-empting the possible challenges on the CHS design and how to resolve them.

A number of risks have been identified through the policy design process. Where possible, design choices have been made to mitigate or reduce certain risks. However, in some cases, these risks are not addressed through the CHS. If policymakers are to address these risks, additional intervention could be required.

Risk table

Risk	Description	Solution
Reduced installation quality	By reporting appliance sales, rather than installations, the scheme does not put any conditions on where appliances are installed (e.g. new build vs retrofit), or the quality of the installation. Without these conditions, there is a risk that competitive pressures cause manufacturers and installers to reduce installation quality in order to reduce the final cost to consumers and gain market share.	In order for manufacturers to report appliance installations, a European-wide mechanism would be required to verify installations. We have considered various existing schemes (such as utilising EPCs), however, none of these options are suitable due to inconsistencies across countries with regards to how they are used. As such, our scheme does not directly mitigate against this risk and additional intervention would be required to reduce this risk. However, we are also confident that industry is already committed to providing high quality installations and there are many pre-existing regulations.
Disproportionate impact on small or domestic focussed businesses	There is a risk that this measure could have a disproportionate impact on smaller manufacturers, or those that only sell into one market. An example of this could be a French fossil fuel heating specialist serving a small proportion of the domestic market for low carbon liquid fuel.	We have incorporated an additional grace period for small businesses to provide them with more time to pivot their business strategy. In addition to this, we have ensured that any administrative burden placed on businesses is minimal.

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Key challenges and risks (2/4)

Risk	Description	Solution
Distributional impact across Member States	Manufacturer performance is determined by their CHSR calculated at the Union level. There is a risk that manufacturers could focus their efforts on more attractive low carbon heating markets. In practice, this could lead to manufacturers withdrawing from less developed markets and/or investing less capital in growing demand in these areas where low carbon heating remains fledgling.	We have considered the introduction of market weightings which would provide manufacturers with a greater incentive to sell in less developed markets. However, there is no way to address this without increasing scheme complexity (e.g. by introducing a credit system and applying weightings). It should be noted that no provisions are put in place in the EU's new car and van CO_2 regulations to protect from this.
Omission of some low carbon gases (e.g. biomethane)	Under the current scheme design, natural gas boilers are categorised as a non-compliant heating appliance. This means that low carbon gases like biomethane that can be burnt using a traditional natural gas boiler, without the need to adjust any system components (e.g. valves, burners, sensors) are implicitly treated as a non-compliant fuel.	This risk is unfortunate but also unavoidable. Currently, there is no way of knowing whether an end-user with a natural gas boiler is burning natural gas or a low carbon gas, such as biomethane, or indeed a blend of the two. We have considered options various options for making this distinction (including requesting further information from the consumer on their energy tariff), however this is not feasible without significantly increasing scheme complexity.

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Key challenges and risks (3/4)

Risk	Description	Solution
Limited scheme flexibility	Extraordinary circumstances such as a regional / global economic downturn or a supply chain shock that severely restricts the availability of essential components could lead to low/negative growth in the market. The risk is that these events could lead to poor CHSR despite the fact that these circumstances are out of the control of the manufacturers.	We believe the impact of this risk materialising is low. The financial penalty is applied to all non-compliant heating appliances sold onto the market. As such, it is likely that an extraordinary circumstance will depress the sales of both clean heating appliances and non-compliant appliances, therefore total sales volumes (and the total penalty) will be lower. If this is perceived as a significant issue, the European Commission could alter the fines in consultation with the heating industry.
Uncertain carbon savings	All standalone boilers are treated equally within the design. As such, the sale of a large standalone boiler, which may serve a number of households has the same impact on the CHSR as a small standalone boiler which serves on small households. As such, there is a risk that manufacturers that sell large boilers and emit more carbon, may have a vastly better CHSR than manufacturers that sell small boilers.	The risk of this situation materialising is low. In practice, it is unlikely that manufacturers will be selling both low carbon heating appliances and large standalone boilers as these two appliances would require different manufacturing facilities. This situation may exist, but we expect it to be niche.
Manufacturers flooding the market with product	There is a risk that manufacturers could seek to flood the market, or withhold product in order to manipulate their ratios. This may lead to a situation whereby a greater number of heating appliances have been sold than installed.	Manufacturers typically sell product to an intermediary (such as an installer, wholesaler, or distributor) who will then sell the product on to the end consumer. The intermediary will only purchase the amount of product from the manufacturer that it requires to fulfil demand. It would not buy more than it needs and in this sense, the scheme is self-regulating and therefore there is a low probability of this risk materialising.

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Key challenges and risks (4/4)

Risk	Description	Solution
Product quality	The scheme does not put any specific conditions on the quality of low carbon heating appliances sold into the market. Furthermore, there are no conditions on where the appliance is manufactured or where components are sourced from. Without these conditions, there is a risk that some manufacturers sell white-labelled low carbon appliances that have been manufactured outside the EU.	This is a complex issue and should be considered as part of wider industrial policy. We have considered adding incentives to encourage or reward the manufacturing of European made products. However, it would be very challenging to integrate this into the scheme design without adding significant additional burden on manufacturers. If this were to be incorporated into the scheme, a potential option would be to issue manufacturers with a label which states where the appliances, or certain components have been manufactured. Other options would be to further explore what conditions have been applied on US funding for heating appliances (via the IRA), or explore the approach France is taking with its heat pump subsidy scheme which is being revised to specifically reward EU-made products in future.
Inclusion of non-fully renewable heating appliances	A wide range of 'low carbon heating' appliances are compliant within this scheme which are more efficient than traditional fossil fuel heating. Despite this, there are several compliant appliances that still burn fossil fuels (e.g. thermally driven heat pumps). There is a risk that, if the uptake of these appliances is significant, or if they are used in a certain way, the reduction in carbon emissions may be slower.	The probability of this risk materialising is low. The low carbon heating appliances mentioned are typically applied in niche situations and are unlikely to be purchased by the majority of consumers – or produced by a majority of manufacturers. In any case, a review point has been incorporated into the design to ensure that the scheme parameters (including technology scope) can change if this risk materialises or the policy objectives change.

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Section 4: Additional policy designs and political framing

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Incorporating market mechanisms into the design

Development of further policy options (2 and 3)

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Design stage 5

Credit trading or cap and trade

Further policy options

Two further policy designs have been considered to provide policy makers with additional options to introduce more market-based elements.

In both additional options, the core design elements of the policy (discussed on pages 20 – 24) such as the objectives and the role of the Clean Heat Standard remain the same. As such, in both options the obligation remains on the manufacturer and the policy aligns with EUs indicative phase out target.

In these options we have considered at a high level how market trading elements could also be integrated.

In this slide we have set out how either a credit trading or cap and trade mechanism could work in the context of the core design choices made in the previous sections. In subsequent slides we discuss what information would be required to develop these options further and some of the associated challenges.

Option 2 – Credit trading*	Option 3 – Cap and trade
• An obligation would be placed on *certain* HVAC manufacturers to meet targets for the proportion of low carbon heating appliances they sell each year relative to standalone boilers powered by fossil fuels. • Manufacturers would need to hold credits equivalent to the number of low carbon heating appliances they sell. The number of credits they hold must correspond to their annual target. • Credits will be awarded for the sale of qualifying low carbon heating appliances – and credits will be generated by both the obligated brands and the non-obligated brands (e.g. the clean heating specialists). The size of the credit could vary by appliance or installation type e.g. to more strongly encourage stronger market development of a particular product category (weightings). • Credits could be tradable and manufacturers could have the option to carry forward excess credits or carry forward a limited proportion of their target from one year to make up in a subsequent year. If the manufacturer has insufficient credits, relative to its target, it would face financial penalties.	• The total number of standalone boilers powered by fossil fuels able to be sold each year into the European market would be capped. • Manufacturers would be able to purchase certificates which give them the right to sell standalone boilers powered by fossil fuels through an auction process. In addition to this, manufacturers could buy and sell additional certificates in a secondary market. • HVAC manufacturers would need to surrender certificates / allowances equivalent to the number of standalone boilers powered by fossil fuels they sell each year. If the manufacturer sells more than the number of certificates it surrenders, it would face financial penalties (in the same manner as the European ETS scheme currently works for obligated industrial players).

*A local content requirement could also be incorporated into the system of credits or fines.

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Design stage 5

Option 2 – Credit trading

What information would be required to develop this option and what decisions would need to be made?

The introduction of a credit trading element (akin to the UK CHMM) would require a number of parameters to be set leading to several fundamental design alterations. This would increase the complexity of the proposed performance-based incentive schene.

- **Which technologies are encouraged / disincentivised**: firstly, the mechanism would need to specify which appliances are included within the scope and which ones are not. Credit trading may lead to a lower number of eligible technologies.

- **The level of obligation / credit target per manufacturer**: policymakers would need to decide whether to introduce individual targets for each company, or a flat industry wide target which is applied to all manufacturers. In any case, company-level data would likely be required to ensure that the target is set at an appropriate level such that the scheme achieves it's desired outcomes, but is realistic for most organisations.
- **The size of the credit and of the fine for missing credits**: both the size of the credit given to compliant heating appliances and the level of penalty incurred for missed credits would need to be determined. In addition to this, policy makers would need to consider whether the size of credits vary across heating appliances (i.e. weightings) and whether this changes over time.
- **Development of a trading mechanism**: the mechanism would need to specify whether trading is conducted bilaterally, on an exchange, or both. And at what points in the year trading takes place, and the establishment of any independent broker(s).
- **Determine revenue use**: the scheme would need to consider how the revenue generated from the fines is used – ideally remaining within the clean heating sector for redistribution to encourage even more progress.
- **Clarify any flexibilities**: e.g. if any 'banking' of credits will be possible and the potential to carry over any targets to another year. Also grandfathering – and whether smaller, local brands are treated slightly differently to major multinational players.

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Design stage 5

Option 2 – Credit trading

What are the challenges associated with this option?

- **Determining which companies are obligated and which ones are not.** Beyond consideration of the portfolio of heating appliances each company has, other factors will need to be more closely considered e.g. the overall size and reach of the company (i.e. how many, and possibly which markets it sells in to).

- **Setting the credit target for each obligated manufacturer.** Will be a significant task given how this cannot be done in isolation company to company but needs to be considered across all obligated parties together. It will also require a clear end goal – since the nature of the credit trading mechanism is to lead to a specific number of appliance sales per brand per year. At the time of writing, there is no such European target for the deployment of clean heating devices which could be used to guide these decisions.

- **Introducing a credit trading dynamic into the European heating sector.** The industry is already highly competitive. With the added situation where one group of companies is having to generate / buy credits or face the prospect of fines, and another group which only stands to benefit from being able to sell its credits without having targets to meet or fines to face, it is possible that a range of unintended consequences will follow. In the development of the UK CHMM this was among the most contentious scheme elements, with many companies saying that fundamentally they will never engage with credit trading with their competitors.

- **Price dumping to meet credit targets.** Another strong critique of this approach is that it creates ‘a race to the bottom on price’. Obligated brands will most likely do whatever is cheapest and easiest for them in order to generate enough credits – e.g. selling eligible products at a loss (if the credit value is not set appropriately / set too high) this would likely result in non-obligated parties doing the same in order to maintain / continue to grow their own market shares. However, this activity would be unsustainable, could lower product quality and also not guaranteed to significantly reduce the end prices for consumers (depending on how much value from the price reductions the heating installers are able to capture for themselves).

- **Price increases for customers purchasing non-compliant devices.** Another potential response is that manufacturers could increase the price of non-compliant appliances in order to recover any costs from price dumping. Compared to option 1 (the performance-based incentive scheme) this risk is amplified due to an explicit target being placed on them.

- **Makes the performance banding and CHSR elements less relevant.** The performance banding would no longer be relevant if credit trading is introduced as penalty level for non-compliance would be flat across the industry. Furthermore, the scheme would need to ensure that pure low carbon heating manufacturers submit their sales figures if a complete data set on the total sales of heating appliances across the EU is achieved.

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Design stage 5

Option 3 – Cap and trade

What information would be required to develop this option and what decisions would need to be made?

There are a number of components that would need to be developed to establish a cap and trade system (akin to the EU ETS). Defining the trajectory of the fossil fuel boiler cap would be particularly challenging.

- **The level of the cap:** firstly, the mechanism would need to specify which heating appliances would be included within the cap. Policymakers would then be required to forecast the appropriate trajectory for the cap over time. In doing so, making assumptions on the desired growth of the low carbon heating market but also on the amount of different heating appliances required for installation in each Member State on a yearly basis.

- **Development of an auction system:** the mechanism would need to determine whether any certificates are allocated for free (grandfathering) and how frequently (and how far in advance) the auction should be held. The associated infrastructure would also need to be established. This would include an auction platform, certificate management system, payment/settlement systems and a legal framework.

- **Determining the appropriate fine level:** there should be a rationale for the appropriate fine level to encourage the desired response from market players and to limit unintended responses as much as possible.

- **Development of a trading mechanism (secondary market):** the mechanism would need to specify whether trading is conducted bilaterally, on an exchange, or both. The associated infrastructure would also need to be established. This would include credit trading platforms, trading rules, compliance and reconciliation system and payment and settlement.

- **Determine revenue use:** the scheme would need to consider how the revenue generated from the certificates is used – ideally remaining within the clean heating sector for redistribution to encourage even more progress.

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Design stage 5

Option 3 – Cap and trade

What are the challenges associated with this option?

- **Setting an explicit cap is incredibly challenging and miscalculating the appropriate level brings significant consequences:** By establishing a cap level, policymakers would be trying to predict market outcomes. This is incredibly complicated and there would be a significant risk of inefficiencies occurring. If the cap is set too low this could impose significant costs on manufacturers. If the cap is too high, there may be a lack of incentive for manufacturers to invest in low carbon heating appliances.

- **The mechanism does not encourage the sale of specific types of low carbon heating appliances:** Certificates give manufacturers the right to sell standalone boilers using fossil fuels. There is no requirement, or incentives given to the sale of alternative heating appliances. This gives the manufacturer free reign to sell any type of alternative heating appliance (except any appliance that is capped).

- **By setting a cap on the number of boilers sold this restricts supply in the market and could potentially remove options for consumers:** This dynamic could occur in policy option 1, however it is amplified in option 3 as an explicit cap is placed on the market.

- **Uncertainty for manufacturers:** the price of certificates could be incredibly volatile. Manufacturers may struggle with the unpredictability of compliance costs. They might need to hold more certificates than planned, making it harder to manage their operations efficiently.

- **Exclusion of hydrogen ready boilers:** As per policy option 1, there is no credible way of distinguishing between standard natural gas boilers and hydrogen ready boilers. For this reason, in option 1 we include ‘hydrogen conversion kits’ as a compliant technology, meaning that a manufacturer can count the sale of a natural gas boiler as a compliant sale, upon conversion of the boiler to hydrogen. As a market mechanism that involves trading this could be more difficult to include within this option.

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Political framing

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Four policy windows

We have considered how the European CHS could be introduced into the political discussion and align with wider EU energy and climate change priorities. In this section we discuss how the core policy design could be adjusted to align with these priorities.

Analysis conducted as part of WP1 identified four policy windows which reflect EU energy and climate change priorities. These windows represent potential entry points and below we explain how the policy could be adjusted to align to these priorities.

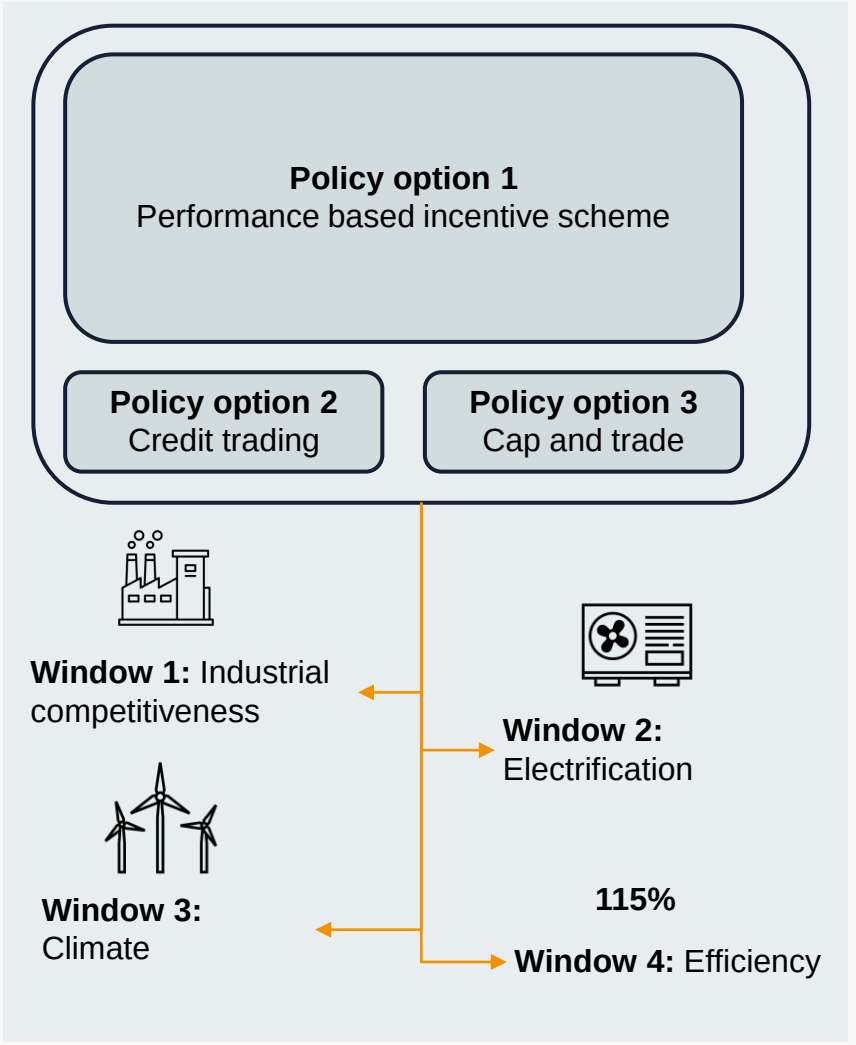
1. **Industrial competitiveness:** To align to this priority the CHS should be centred around supporting the transition of manufacturers.

2. **Electrification:** To align to this priority the CHS should be centred around increasing the share of electricity used for heating.

3. **Climate:** To align to this priority the CHS should be centred around decarbonising the heating market.

4. **Efficiency**: To align to this priority the CHS should be centred around increasing the efficiency of heating appliances on the market.

In the next slide, we demonstrate how the categorisation of heating appliances (non-compliant, compliant and neutral) and the size of scheme penalties / credits / certificates could be adjusted (weighted) in to order to align the policy design with these windows. Further detail on the adjustments can be found in the annex.



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Design stage 5

Aligning CHS design to four policy windows

A summary of proposed design changes

Policy window	Objective	Technology scope	Weightings
1 - Industrial competitiveness	Supporting the transition of manufacturers.	All appliances that generate 'low carbon heat' (and/or on-site low carbon electricity) from the point of installation are considered compliant.	Manufacturers with a higher CHSR pay a higher fine / receive more credits / need to buy more certificates per compliant/non-compliant appliance sold.
2 - Electrification	Increasing the share of electricity in the heating market.	Only certain heating appliances that are powered solely by electricity are compliant.	For policy option 2, the number of credits awarded could increase with the size of the electric heating appliance as more low carbon heat is generated per appliance. For policy option 3, the number of certificates required could increase with the size of the standalone boiler sold.
3 - Climate	Decarbonising the heating market.	All heating appliances that run on fossil fuels would be considered as non-compliant.	For policy option 2, more credits could be awarded to appliances that remove a greater amount of carbon. For policy option 3, more certificates for selling more polluting appliances.
4 - Efficiency	Increasing the efficiency of heating appliances on the market.	Only heating appliances that can achieve a certain level of seasonal heating efficiency (e.g. greater than 115%) would be considered compliant.	For policy option 2, more credits could be awarded for placing more efficient appliances on the market. For policy option 3, more certificates are needed for placing a less efficient appliance on the market.

Our current policy design aligns most closely with policy window 1 (highlighted in yellow). The inclusion of a wide range of compliant low carbon heating appliances gives manufacturers flexibility. Furthermore, the penalty level incurred by a manufacturer is proportional to their performance band, meaning that there is a stronger incentive on manufacturers with a higher ratio to improve. This supports the competitiveness of the European heating industry as it gives them a pathway to transform.

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Section 5: Conclusion

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Key conclusions

There are many design choices that need to be considered when developing a Clean Heat Standard. We believe our core design is simple, pragmatic, and tailored to the European context, with the best chance of effectively placing more clean heating systems on the market.

Below are the key strengths of our version of a Clean Heat Standard, which have been central to our approach throughout the design process:

- **Simplicity:** A core element of our scheme design is simplicity. Designing a Clean Heat Standard that incorporates a large number of heating markets introduces a number of significant challenges. In order for this scheme to be practically feasible it is essential that the scheme remains simple. Ultimately, manufacturers are required to provide very few pieces of information in order to comply with our design.
- **Not overly prescriptive:** Unlike other market mechanisms, this scheme does not set an explicit uniform market wide sales target on all obligated parties. In part, this is due to the diversity of European heating markets. Each Member State is at a different stage in its adoption of low carbon heating and there is significant economic, political and social diversity. Given this context, explicit domestic targets would not be feasible.
- **Provides certainty to manufacturers and the wider industry:** Within our design, key scheme parameters such as the technology scope, reporting requirements and penalty levels are established on day one and do not change over time. This certainty enables manufacturers to strategize and plan their decarbonisation pathway out to 2040.
- **Penalties are proportionate to performance and not financially ruinous:** The penalty level set in our scheme design is linked to the typical profit margin of a natural gas boiler. By setting the penalty to this level, the scheme will alter the economics and make the sale of fossil fuel boilers less and less profitable for a manufacturer. However, at the same time, this penalty is designed not to be financially ruinous to the companies that incur fines, and therefore improve the probability of compliance and progression from one year to the next.

Preconditions for success

A Clean Heat Standard is an emerging policy solution that is currently being explored across several different markets around the world. However, it is too early to say whether this type of intervention will be successful in achieving a sustained acceleration the uptake of low carbon heating appliances.

As highlighted in the project, a CHS is not a silver bullet and there will be some low carbon heating deployment barriers that the market alone won't be able to sufficiently address. It is crucial that industry is supported and this measure is combined with a holistic policy framework which includes a suite of interventions that help industry reduce demand and supply side barriers.

Furthermore, there are potential risks that could materialise which the scheme would be unable to mitigate against. Again, support from wider policy would be required if these risks were perceived as significant enough.

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Annex A: General

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Where does a CHS fit within the existing policy mix?

At its core, a CHS provides a market transition pathway from present day to a desired end-point. To achieve this outcome, this mechanism exploits a market-based approach, which puts emphasis on the market (with support from Government) to decide which low carbon heat demand and supply side barriers to address and how to address them.

Most of the solutions to decarbonise heat are technologically mature, but the speed of their deployment is not in line with climate goals. Indeed, there are numerous barriers to the deployment of clean heating systems which will vary across EU states depending on their market characteristics.

There is a wide range of policy leavers that governments can introduce to overcome these barriers (e.g. subsidy and regulation). However, these may be financially unsustainable, one-dimensional, politically unattractive and ultimately insufficient to reduce the barriers sufficiently to stimulate demand or supply.

For the scheme to be successful, the obligated party must be able to address these barriers (either directly or indirectly through the influence it reasonably can have).

Upfront cost	Energy costs	Lack of consumer awareness	Manufacturing constraints	Lack of skilled installers
Grants	Energy price rebalancing	Public information campaign	Grants/loans (R&D funding)	Establish qualifications
Loans	Promotion of tariffs	Performance labelling	Installation targets	Funding for training
Tax rebates	Promotion of energy efficiency measures	Trials and demonstration projects	National phase-out plans	Developing digital tools to simplify installation process
Alternative business models (e.g. flexible finance options)	Installation quality standards			Training installers
Green mortgages	User training			

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The UK Clean Heat Market Mechanism

Key design considerations from two public consultations – Jan 22 and Mar 23

Model: 40% were in favour of a rising target for heat pumps, agreeing that this more simplistic has a more direct, explicit and predictable link to the scheme objectives. 15% were in favour of the average efficiency option, arguing that a sales target might lead to the prioritisation of cheaper or less efficient devices.

Trading mechanism: 61% were in favour of a credit trading scheme. Unlike a 'pooling' option credit trading is a well-established, transparent and competitive way of providing manufacturers of any size flexibility over how they meet their obligation. Only 1 respondent supported a 'pooling' option with concerns over how arrangements would be established and how smaller organisations may be disadvantaged.

Obligated parties: Less than 10% of respondents supported the 'supplier' obligation model. Those in favour generally argued that suppliers are best placed to advise consumers, with whom they have an existing direct relationship. Furthermore, they are well placed to offer flexible and targeting tariffs. For those against the supplier model, they argued that this would lead to a transfer in costs to consumers in the form of higher energy bills. Others argued that it would not accelerate innovation to the same extent as the manufacturer obligation and that trust could be undermined as electricity prices are higher than gas.

Targets: Opinions on the target level were relatively split. 37% disagreed with the levels that have been agreed with the vast majority believing that they are overly ambitious and unachievable under the current UK market conditions and policy framework. 40% believed that the target level was appropriate, whilst 23% did not believe they were ambitious enough.

Treatment of hybrid and high temperature heat pumps: 63% of stakeholders believed that hybrids should be included within the scheme in some form. However, most agreed that conditions should be applied to restrict their deployment or improve their performance. Government decided to include hybrid heat pumps, given their contribution to the scheme objectives. However, hybrids would be rewarded with a lower credit weighting compared to a standalone heat pump to reflect its lower carbon and energy demand reduction potential.

82% of stakeholders were in favour of including high-temperature heat pumps. Following the first consultation Government decided to include high-temperature heat pumps, acknowledging their improved performance over recent years and their suitability to some 'hard to treat' properties.

Weightings: The consultation explored many options for creating differentiated incentives depending on the technology that was installed or displaced. This included incentivising the replacement of more carbon intensive heating systems, incentivising low carbon technologies with the greatest carbon reduction potential and increasing obligations on the sale of the most carbon intensive heating systems.

Respondents suggested other factors that could be rewarded such as, heat pumps manufactured in the UK, the sale of complementary measures such as heat batteries or energy efficiency, the sale of heat pumps to low-income households and the promotion of other areas of the market (e.g. installer training).

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Annex B: Further detail on final policy design

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Treatment of appliance manufacturers vs. importers

EU-produced and imported devices are treated the same

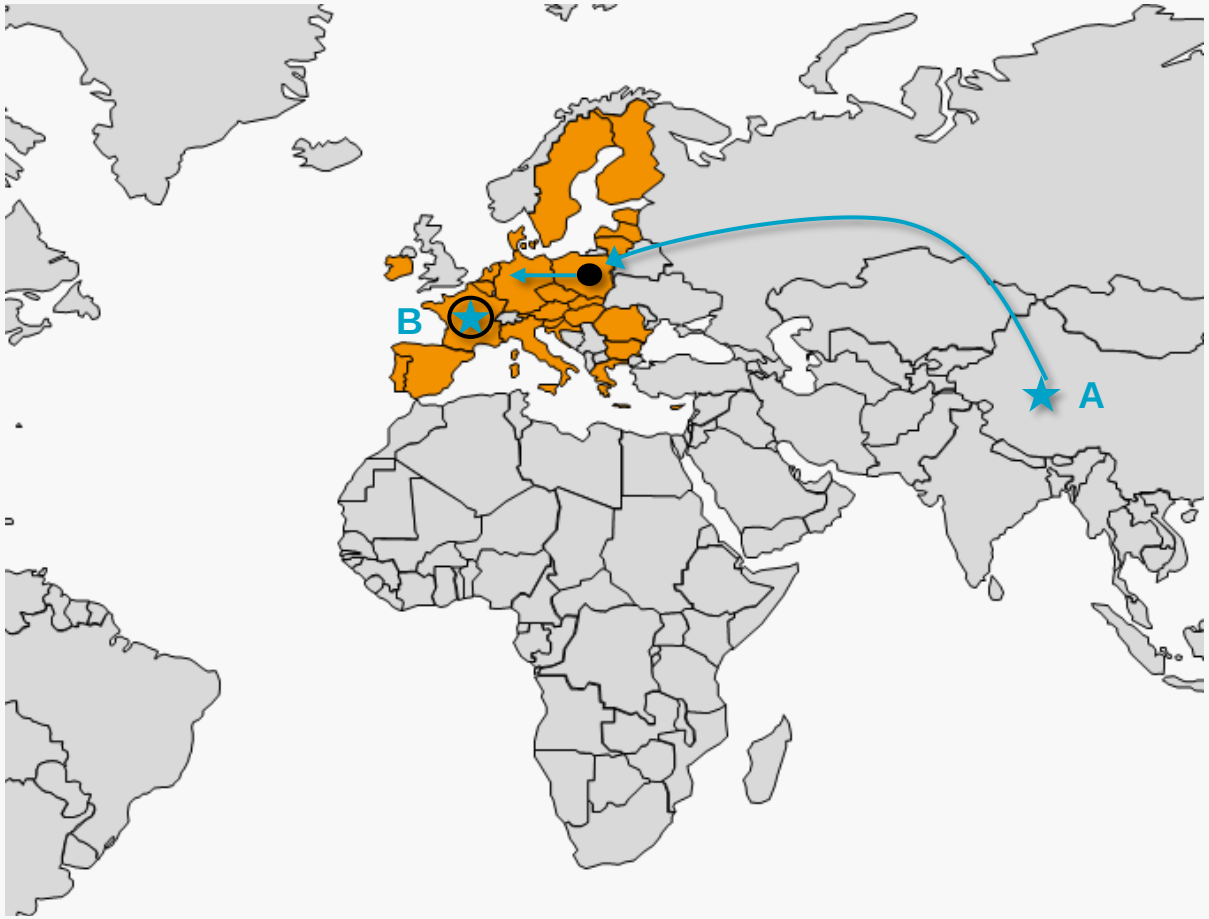
In Scenario A shown by the map, the heating appliance is originally produced / manufactured outside of Europe and brought in via an importer. At this point it is technically under no obligations from our CHS. The importer has bought it, but the device itself has not been sold within the EU.

However, as soon as that importer company sells the product on to its customer (whether direct to an installer or otherwise – and regardless of whether it choses to whitelabel the device or make any changes to the components / controls / casing) this constitutes the first sale on European soil and so here it will come under the scope of the CHS. Based on the appliance type it will be counted as either a compliant / non-compliant / neutral device and must be tracked accordingly.

In Scenario B, the product is manufactured in France and the first sale is also in France. The sale will be recorded from the factory to the next step in the supply chain (wholesaler / energy retailer / installer, etc.) and again logged according to the 3 categories we have determined.

Icon	Description
★	Original site of appliance manufacture (the factory it comes from).
●	Location first sale on European soil is recorded (sale, not purchase).
←	Movement of products between locations.
⊛	The site of production is also where first European sale is recorded.

Possible journeys for heating appliances to take to get to market



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Alternative metrics - Weighted carbon intensity

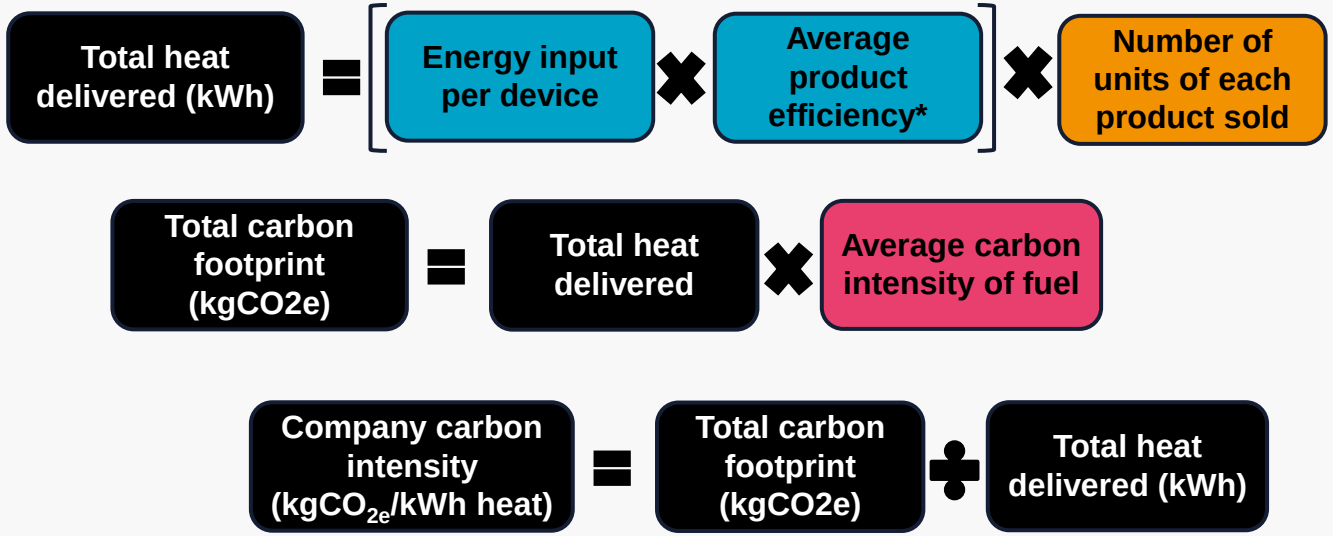
Further consideration

Manufacturers and importers of energy-related products sold in the EU must register their products on the EPREL database to comply with the EU Energy labelling and Eco-design requirements.

The EPREL database contains a wide range of data that could be combined with additional data from other sources to calculate the average carbon intensity of the products sold by a manufacturer on an annual basis.

Changes to the performance banding would be required if this metric is used to ensure they are set at the appropriate level. This has not been considered further.

In order to calculate the average carbon intensity of the products sold by a manufacturer, the following information is required.



	Calculation
	Data provided by EPREL
	Additional data provided by the manufacturer
	Additional data provided by external sources

*accounting for climatic conditions and any product-specific norms or factors to be applied.

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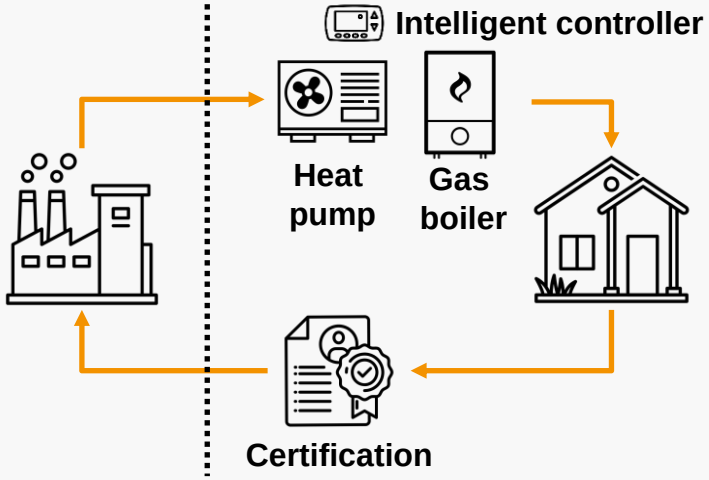
Additional reporting requirements

Hybrid heat pumps not sold as a ‘package’

The sale of integrated or compact hybrids that combine the boiler with the heat pump indoor unit in a single unit can be easily tracked as the device has one serial number. However, tracking the sale of un-integrated hybrid heat pumps systems is challenging because the two heating units are sold separately – each with their own serial number – and only combined into a system at the point of installation.

Under this scheme, such a hybrid will qualify if the manufacturer receives certification that the gas boiler has been installed alongside a heat pump + the intelligent controller to ensure that it can operate intelligently.

At this point, the manufacturer will be able to claim back the fine it originally paid for the boiler when it was sold.



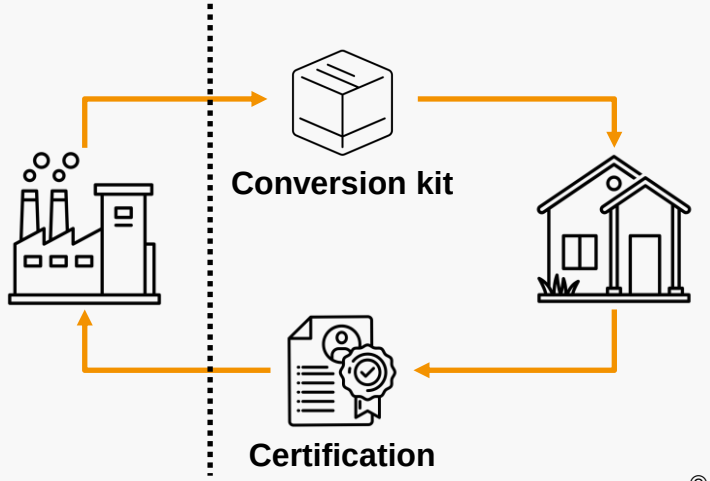
Hydrogen conversion kit

Hydrogen conversion kits contain the necessary key components to convert a natural gas ‘hydrogen-ready’ boiler to run fully on low carbon gas (i.e. hydrogen).

To qualify the sale of a hydrogen conversion kit, the manufacturer must get proof of installation and commissioning from the installer e.g. at the point when a local network switchover takes place.

Again, the manufacturer would originally pay a fine for the boiler, even if it is hydrogen-ready, but this can also be claimed back after receiving proof that the H2 conversion kit has been installed.

The same method also applies to any liquid fuel boiler which is converted to fully renewable liquid fuel (e.g. HVO, FAME).



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Annex C: Policy windows

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Policy window 1 - Industrial competitiveness

Supporting the transition of manufacturers

To align with this policy window, all appliances that generate 'low carbon heat' (and/or on-site low carbon electricity) from the point of installation are considered compliant. This is currently the categorisation of heating technologies that is proposed in our core design.

Categorisation of heating appliances

1 - Non-compliant	2 – Compliant	3 - Neutral
Natural gas boiler	Air-source heat pump	Electric boiler
Oil boiler	Hybrid heat pump	Biomass boiler (pellet, logs, chip)
Coal boiler	Thermally driven heat pump	
LPG boiler	Ground & water-source heat pump	
Low carbon 'ready' boiler	Exhaust-air heat pump	
	Micro-CHP (engine, turbine and fuel cell)	
	Pure hydrogen boiler	
	Renewable liquid fuel boiler	
	Low carbon gas or liquid conversion kit	

Weightings

Policy option 1 Performance-based incentive scheme No weightings	
Policy option 2 Credit based trading	Manufacturer with a lower CHSR is awarded more credits per compliant heating appliance.
Policy option 3 Cap and trade	Manufacturer with a lower CHSR requires less certificates per non-compliant heating appliance.

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Policy window 2 – Electrification

Increasing the share of electricity in the heating market

To align with this policy window, heating appliances would be recategorized so that only heating appliances that are powered solely by electricity are compliant.

For policy options 2 and 3, additional weightings related to appliance size and the level of decarbonisation achieved could be applied to credits or certificates to further reward actions that further increase the share of electricity used in the heating market.

For example in option two, large heat pumps that run solely on electricity would receive a x2 multiplier. In option three, 2 certificates would be required large standalone boilers that are entirely fuelled by fossil fuels.

Categorisation of heating appliances

1 - Non-compliant	
Natural gas boiler	Micro-CHP (engine, turbine and fuel cell)
Oil boiler	Pure hydrogen boiler
Coal boiler	Renewable liquid fuel boiler
LPG boiler	Low carbon gas or liquid conversion kit
Low carbon 'ready' boiler	Biomass boiler
Thermally driven heat pump	

2 – Compliant
Air-source heat pump
Exhaust-air heat pump
Ground & water-source heat pump
Electric boiler

3 - Neutral
Hybrid heat pump

Weightings

Policy option 1
Performance-based incentive scheme

No weightings

Policy option 2
Credit based trading

Credit enhancements for certain applicant appliances

Appliance size

Level of electricity use	Small	Medium	Large
Full	1	1.5	2
Partial	0.5	0.75	1

Policy option 3
Cap and trade

Additional certificates required for certain non-compliant appliances

Appliance size

Level of combustion	Small	Medium	Large
Full	1	1.5	2
Partial	0.5	0.75	1

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Policy window 3 – Climate

Decarbonising the heating market

To align with this policy window, heating appliances would be recategorized such that all heating appliances that burn fossil fuels would be considered as non-compliant.

For policy options 2 and 3, additional weightings related to appliance size and the carbon intensity* of appliances could be applied to credits or certificates to improved climate outcomes

For example, in option three, large coal boilers would require 3.33 certificates. In option two, heating appliances that emit zero carbon emissions would receive the full credit (and potentially an enhancement).

*To be informed by emission factors (e.g. from the ETS)

Categorisation of heating appliances

1 - Non-compliant	2 – Compliant	3 - Neutral
Natural gas boiler	Air-source heat pump	Electric boiler
Oil boiler	Ground & water-source heat pump	Biomass boiler (pellet, logs, chip)
Coal boiler	Exhaust-air heat pump	
LPG boiler	Pure hydrogen boiler	
Low carbon 'ready' boiler	Renewable liquid fuel boiler	
Hybrid heat pump	Low carbon gas or liquid conversion kit	
Thermally driven heat pump		
Micro-CHP (engine, turbine and fuel cell)		

Weightings

Policy option 1
Performance-based incentive scheme

No weightings

Policy option 2
Credit based trading

Credit enhancements for less carbon intensive compliant appliances

Compliant appliances	Appliance size: Small	Medium	Large
Full	1	1.5	2
Partial	0.5	0.75	1

Policy option 3
Cap and trade

Additional certificates required for more polluting non-compliant appliances

Carbon intensity	Appliance size: Small	Medium	Large
Gas	1	1.5	2
LPG	1.18	1.78	2.69
Oil	1.33	1.99	2.65
Coal	1.67	2.50	3.33

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Policy window 4 – Efficiency

Increasing the efficiency of heating appliances on the market

To align with this policy window, heating appliances would be recategorized such that only heating appliances that have an efficiency greater than 115% would be considered compliant.

For policy options 2 and 3, additional weightings related to the efficiency of the appliance could be applied to credits or certificates to improved climate outcomes.

For example, in option 2, more credits could be awarded to more efficient compliant heating appliances (e.g. hydronic vs hybrid heat pumps).

In option 3, more certificates could be required for placing less efficiency heating appliances on the market.

Categorisation of heating appliances

1 - Non-compliant	2 – Compliant	3 - Neutral
Natural gas boiler	Air-source heat pump	None
Oil boiler	Hybrid heat pump	
Coal boiler	Thermally driven heat pump	
LPG boiler	Ground & water-source heat pump	
Low carbon ‘ready’ boiler	Exhaust-air heat pump	
Electric boiler	Micro-CHP (engine, turbine and fuel cell)	
Biomass boiler (pellet, logs, chip)		
Pure hydrogen boiler		
Renewable liquid fuel boiler		
Low carbon gas or liquid conversion kit		

Weightings

Policy option 1 Performance-based incentive scheme No weightings		
Policy option 2 Credit based trading	Credit enhancements for more efficient compliant heating appliances	0+(115% - efficiency): 1.85 for a heat pump with an efficiency of 90%
Policy option 3 Cap and trade	Additional certificates required for less efficient non-compliant heating appliances	1+(115% - efficiency): 1.25 for a boiler with an efficiency of 90%

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Contact us

Jonny Buzzing
Consultant
jonny.buzzing@lcp.com

Andrew Conway
Senior Consultant
andrew.conway@lcp.com

Steven Ashurst
Head of Heat Research
steven.ashurst@lcp.com

Jon Slowe
Partner
jon.slowe@lcp.com

Maxime Loh
Analyst
maxime.loh@lcp.com

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