frontier economics

HOW PRODUCT STANDARDS CAN GROW THE MARKET FOR LOW CARBON INDUSTRIAL PRODUCTS

A REPORT FOR THE ALDERSGATE GROUP

DECEMBER 2022

WWW.FRONTIER-ECONOMICS.COM

CONTENTS

frontier economics

frontier economics

Acknowledgements

This report benefited from input from a range of experts and stakeholders across the UK's industrial sectors. We would like to thank everyone who contributed their time and expertise, including the three experts who provided their input through hour-long, one-on-one interviews, the 22 experts who participated in the group workshop to discuss the role of product standards in supporting industrial decarbonisation, the 19 experts who commented on and reviewed this paper, and all other experts and stakeholders who provided written responses that helped inform this report. Their involvement was invaluable and the organisations of some of these experts are listed below. However, the findings and recommendations in this report cannot be attributed to any one individual or organisation, and the authors are responsible for the views expressed.

Autocraft	**E3G**	**Sky**
BASF	**Energy Intensive Users Group (EIUG)**	**Tata Steel**
Bellona	**Energy Savings Trust**	**Tesco**
Bioregional	**Energy Systems Catapult**	**Thames Water**
British Steel	**Green Alliance**	**TJM**
CBRE	**Interface**	**Willmott Dixon**
Celsa Steel	**Johnson Matthey**	**World Wildlife Fund (WWF)**
CEMEX	**Liberty Steel**	**WSP**
Cambridge Institute for Sustainability Leadership (CISL)	**Mineral Products Association (MPA)**	
Climate Group	**Siemens**	

Summary for policymakers

Meeting the UK's decarbonisation goals will require both supply-side changes to how products in the UK are manufactured and demand-side changes to generate a clearly visible and growing market for low carbon products. Supporting demand for low carbon products can provide an important incentive for manufacturers of critical materials and finished products to decarbonise and can create the confidence required for private investment in decarbonisation, some of which involves large upfront capital expenditure. Well-designed, mandatory low carbon product standards would help to spur investment and innovation by creating confidence about future demand.

Product standards can play an important role in supporting demand for low carbon products by nudging consumers towards more-sustainable products and disincentivising the sale of higher carbon products. As a result, there is growing interest from industry and policymakers in the potential role of product standards, and how they should be designed and implemented.[1]

Some stakeholders report that, in places, voluntary steps are already being taken to reduce the emissions intensity of products due to pressure from customers. However, these are limited partly by fear of unfair competition from higher carbon products. By implementing mandatory product standards, government can ensure that industry is competing on a level playing field, and that companies pushing further on reducing emissions are not put at a competitive disadvantage.

How should standards be applied?

Our engagement with industry focused very significantly on whether product standards should be mandatory or voluntary. Although there are challenges and benefits involved in both, stakeholders overwhelmingly reported that voluntary standards are unlikely to produce the significant change needed to establish markets for low carbon industrial products, and that standards need to be set at a mandatory level to have an effective impact on reducing emissions. **The real challenge is how to ensure mandatory standards are well designed**, rather than determining whether standards should be mandatory.

As standards are being developed, one of the most important areas of debate about their implementation is whether they should be applied to intermediate products, such as steel, cement and glass, or to finished products, such as buildings, packaging and automobiles. By pursuing a combination of both, government can create both direct incentives for specific low carbon materials while creating a demand signal more broadly across a product's supply chain.

This report outlines the important role of product standards in decarbonising heavy industry and manufacturing in the UK and sets out recommendations for policymakers to support the development of effective low carbon standards. It is based on a review of evidence about the effectiveness of

[1] See the Department of Business, Energy and Industrial Strategy's (BEIS) recent Call for Evidence on creating markets for low-emissions industrial products, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1092716/market-low-emissions-industrial-products-cfe-summary-responses.pdf

product standards, a review of international product standard policies, and input from industry stakeholders and experts from a wide range of economic sectors through interviews, a stakeholder roundtable, written submissions, and a cross-economy expert review of this paper.

Recommendations for policymakers

To stimulate the creation of markets for low carbon industrial products, the government should outline a clear direction of travel for the development of product standards policies. Policymakers should deliver ***a package of measures that results in well-designed mandatory standards****. They should:*

1. **Implement mandatory product standards aimed at creating demand for low carbon industrial goods and materials, outlining clear timelines for their introduction.** In order to make the right investments in low carbon production today, manufacturers and businesses need clarity on the policy measures that will be implemented in future, particularly those that will support the creation of markets for low carbon products. Industry stakeholders reported that, as voluntary standards alone are unlikely to drive the required improvements in the emissions intensity of production in the near term, government should pursue the implementation of mandatory standards to create significant change.

In the near term, there are several key actions that policymakers can take to support the implementation of effective product standards. Policymakers should:

2. **Assign responsibility for developing and implementing mandatory product standards to an existing or new institution.** Due to the complexity of creating a product standard, this institution should work with industry and coordinate with existing international efforts to define low carbon products in order to develop an efficient set of product standards that drive decarbonisation in the most impactful areas. This could allow government to focus on the highest-emitting sectors, or areas that will be the most challenging to decarbonise, and minimise any unintended consequences (e.g. minimise the cost of new production processes). This institution should also work to ensure that the necessary inputs for the design and implementation of these standards, such as data collection, reporting requirements and mechanisms for enforcement, are in place.

3. **Enact policies that require data transparency and reporting as soon as possible.** A key message from industry stakeholders was that a lack of data on the embodied and life-cycle emissions of different materials and products and a lack of transparency on how it is collected and verified are key barriers to the development of reliable product standards. Consistent and robust data on the emissions intensity of production is a critical part of both the design and implementation of low carbon product standards, as it is needed to determine the relevant low carbon product standard and to enable manufacturers to comply with this standard.

   As a result, data collection needs to be standardised and start immediately across supply chains. The institution assigned responsibility for developing and implementing mandatory product standards should also be responsible for ensuring that data and reporting

requirements are put in place and for supporting the collection of this data. Where possible, government should try to minimise the complexity and cost of collecting this data to avoid creating barriers to small and medium-sized enterprises (SMEs) and manufacturers in lower-income countries, which may have more difficulty in collecting and reporting this data. It may also be necessary to provide specific support to SMEs and manufacturers in lower-income countries to ensure they can comply with these collection and reporting requirements.

4. **Develop product standards that apply throughout the supply chain to both intermediate and finished products.** Product standards can be applied directly to specific materials, such as steel and glass, or to finished products, such as cars and buildings. The former could create demand for specific low carbon materials but may be more complex to implement and may create the potential for material substitution. The latter could stimulate demand across multiple parts of the supply chain at once but may not provide as strong a demand signal. Given the relative merits and challenges of both, government should work with industry to understand where best to apply standards in the supply chain. Where standards are applied to both a finished product and intermediate product in the same supply chain, these standards should aim to be complementary and policymakers should avoid creating multiple standards for the same material.

5. **Develop consistent and unified standards, and ensure methodologies account for products' whole life-cycle climate impact.** Creating a unified standard for each product and industry will reduce compliance costs for manufacturers and create stronger incentives for decarbonisation by providing a clear definition of a low carbon product.

6. **Increase the ambition of mandatory standards over time to ensure that standards continue to encourage innovation and decarbonisation.** Standards that are static and do not change over time create the risk of anchoring manufacturers to the initial standard set and reducing the incentive for investment and innovation in further production improvements. Continuing to increase and tighten low carbon standards over time, while giving manufacturers time to adjust, will support further reductions in the carbon intensity of production, while promoting uptake of new technologies as they become available in the longer term.

7. **Work with policymakers abroad to ensure that standards and methodologies adopted in the UK are interoperable with those developed internationally.** Export manufacturers will face additional costs if the data and production methods required to comply with standards differ internationally. Moreover, as other countries adopt similar measures, greater interoperability of different standards will allow for more efficient global cooperation on industrial decarbonisation.

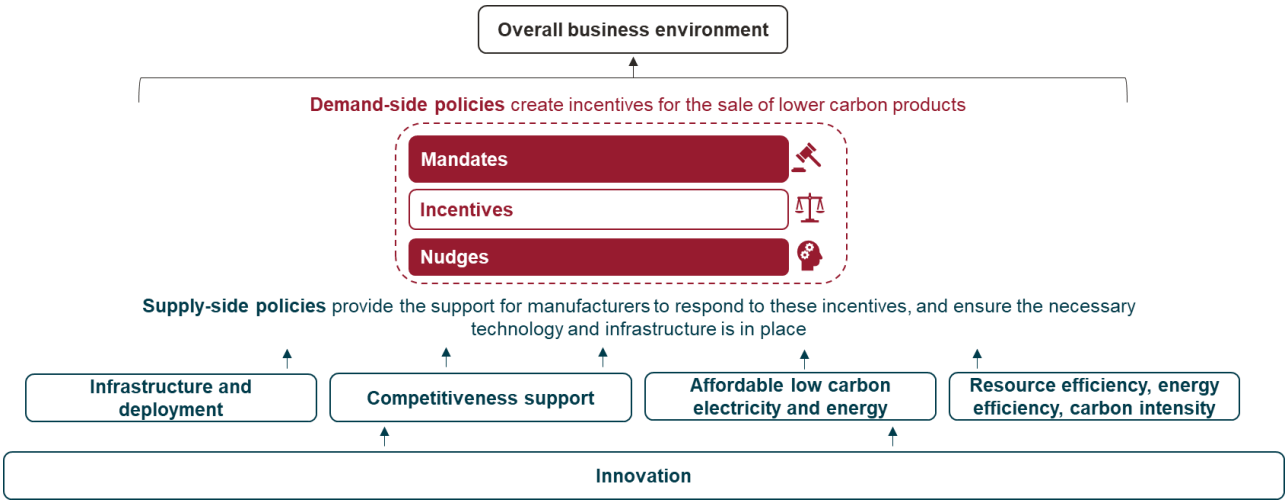
In the longer term, when designing and implementing specific product standards, policymakers should:

8. **Account for drivers of consumer behaviour when designing standards in order to maximise their impact on consumers.** While mandatory standards can have significant impacts on decarbonisation, standards which further differentiate between compliant products can be even more effective in creating demand for low carbon goods. The overall impact of these standards depends on how effectively they are able to drive consumer behaviour.

9. **Build on the Industrial Decarbonisation and Net Zero Strategies to deliver a clear policy framework for industrial decarbonisation.** As illustrated in **Figure 1**, demand-side policies are part of a wider policy framework. While they can create incentives for decarbonisation, manufacturers and businesses need support to respond to these incentives. This includes the provision of low carbon infrastructure, cost-competitive clean electricity,[2] support for deploying low carbon technologies that are not currently cost effective, and competitiveness support where there are differences in input costs between the UK and other countries linked to faster climate progress in the UK.

   Many stakeholders highlighted that the absence of wider policy support, or clarity about their pathway to emissions reductions (such as fuel switching versus carbon capture, utilisation and storage (CCUS)) increases the risk of inefficient investment that would negatively affect UK manufacturers' ability to compete with manufacturers abroad. The Department for Business, Energy and Industrial Strategy (BEIS) should prioritise the completion of business model support for hydrogen and CCUS, address challenges to grid investment and renewable energy deployment, and complete the review of the UK Emissions Trading Scheme (ETS) with clarity on the future cap on (free) emissions allowances going forward.

Figure 1 Interactions between demand- and supply-side policies



[2] For more information, see UCL, commissioned by the Aldersgate Group (2022), *Separating electricity from gas prices through Green Power Pools: Design options and evolution* and UCL, commissioned by the Aldersgate Group (2021), *Delivering Competitive Industrial Electricity Prices in an Era of Transition*

Executive Summary

The UK government has committed to significant carbon emissions reductions, with a legal requirement to achieve net zero by 2050. As a part of this transition to net zero, the government has set out a *Ten Point Plan for a Green Industrial Revolution*, which is intended to create the conditions necessary for significant private sector investment in decarbonisation and lead to long-term economic opportunities and growth.[3] Decarbonising UK industry and businesses is a significant part of these overall net zero goals. Industrial emissions represent approximately 16% of the UK's total emissions,[4] and emissions from the wider business sector increased slightly in 2021 to a total of 65 Mt of CO_2e, equal to 19% of all UK emissions.[5]

In addition to supporting net zero goals, industrial decarbonisation can also be a driver of economic growth and longer-term economic opportunities. Investment in low carbon production methods can improve overall industrial efficiency and productivity by improving resource efficiency and reducing the marginal costs of production.[6] The UK's heavy industries and manufacturing sectors employed 2.7 million people in 2022,[7] primarily outside of London and the South East. Establishing low carbon industry can help to secure the future of these jobs, while also supporting greater productivity in the sector by switching to more resource-efficient processes. These benefits can also support the competitiveness and resilience of other sectors. For example, supporting the development of low carbon production in the steel and glass industries can lead to spill-over benefits in the automotive industry, which makes use of these products.

To achieve industrial decarbonisation and create the conditions for private sector investment in low carbon technologies, immediate action is needed from policymakers. Support and incentives need to be in place to allow for investment today and accelerate growth in markets for low carbon products. Demand-side policies are an important policy tool for facilitating this. These policies include interventions such as product standards, procurement policies and demand-side taxes and subsidies. Such interventions are designed to create incentives for the production and sale of low carbon products by generating increased demand in the market.

This report explores the role of product standards, a key demand-side policy, and sets out design and implementation principles and next steps for policymakers. It focuses on growing demand and creating markets for critical low carbon products like steel and cement, which are then used in key infrastructure and finished consumer products, through the introduction of clear product standards at different levels of the supply chain. The report is informed by engagement with stakeholders and

[3] See HM Government (2021), *The Ten Point Plan for a Green Industrial Revolution*.

[4] See HM Government (2021, *Industrial Decarbonisation Strategy*.

[5] See BEIS (2022), *2021 UK Greenhouse Gas Emissions, Provisional Figures.* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1064923/2021-provisional-emissions-statistics-report.pdf

[6] See *Accelerating the Decarbonisation of Industrial Clusters and Dispersed Sites* (2021), prepared by Frontier Economics on behalf of the Aldersgate Group.

[7] See Office for National Statistics (ONS) data on employment by industry, based on the Labour Force Survey.

experts in a range of UK industries, including producers of both intermediate and final consumer products, and is supported by a review of international policies and wider evidence.

The important role of product standards in growing demand for low carbon products

In general, there are two types of product standards:

- **Mandatory standards,** which directly specify the emissions and/or production standards a product must meet in order to be eligible for sale in the market; and
- **Voluntary standards,** which attempt to nudge consumers and businesses towards purchasing low carbon products by increasing transparency around products' emissions footprints and/or wider environmental impacts.

These policies have both potential benefits and risks. Mandatory product standards can have a significant, direct impact on the emissions intensity of in-scope products, reduce the risk of carbon leakage, reduce costs for consumers (for example, the EU's Ecodesign measures reduced energy costs faced by consumers by an estimated EUR 120 billion in 2021 alone[8]), and impact emissions in other jurisdictions.

However, they can also be complex for manufacturers to implement, leading to costs which may be passed on to consumers and, potentially, to demand distortions. For example, depending on the scope of mandatory standards, they can lead to substitution between products covered by the standards and those that are not, or substitution of domestic products for imported products and carbon leakage.

Mandatory standards need to be carefully designed to mitigate these risks. Voluntary standards are likely to impose fewer costs on manufacturers and consumers due to their higher degree of flexibility, while still providing benefits to consumers through the increased availability of information. However, the adoption of voluntary standards may be limited, and there is mixed evidence on their impact in practice, suggesting they are less effective than mandatory standards.

Stakeholders from industry also reflected that voluntary standards can lead to confusion for consumers, especially when there are several standards covering the same issue. Moreover, if voluntary standards are not adopted by a critical mass of the market, they do not enable the creation of a level playing field for producers, which can itself deter investment and/or adoption.

The benefits and challenges of product standards policies and the importance of a comprehensive policy framework

There are a growing number of mandatory and voluntary environmental product standards in place internationally. These policies include mandatory standards like the EU Ecodesign Directive, the Buy Clean California Act and the Netherlands Cap on Embodied Building Emissions, as well as voluntary

[8] European Commission (2022), *Communication from the Comission: Ecodesign and Energy Labelling Working Plan 2022-2024*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022XC0504(01)&from=EN

standards and labels like the Carbon Trust Carbon Footprint Label, Eco-Score and the Foundation Earth eco-impact label.

These standards provide good examples of attempts to use product standards policies to shift demand to low carbon products. A key strength of the product standards reviewed for this report is that they **reduce the risk of carbon leakage,** where they apply equally to domestic and imported products, by ensuring that low carbon domestic producers are competing on an equal footing with less-regulated manufacturers abroad. Product standards also **provide direct benefits to consumers**, both in terms of cost savings from **increased energy and resource efficiency** and improved information for consumers. These policies can also be used to **improve data availability and comparability across products**, with the information that needs to be collected to evidence these standards used to improve transparency in the market. More generally, these standards illustrate how **mandatory and voluntary standards can complement one another**, with the opportunity for voluntary standards to be used to differentiate between products that meet mandatory standards and provide further incentives for low carbon manufacturers (for example, by further distinguishing between the emissions intensity of products that meet the minimum mandatory standard with a product label).

These policies also highlight some key challenges in the design and implementation of mandatory product standards which need to be addressed when developing new interventions. Depending on their implementation, they **risk increasing upfront costs for consumers,** creating a significant barrier for lower-income consumers even where these costs are recovered in the longer run due to increased energy efficiency for some products. **Enforcement can also be challenging**, with reports of significant rates of non-compliance for standards like the EU Ecodesign Directive, meaning that investment in compliance and monitoring is needed to ensure the effectiveness and fairness of standards.[9] **Voluntary standards may also be ineffective or create confusion for consumers**, with a significant gap between consumers' stated value of standards and their willingness to pay for low carbon products in practice. Depending on their implementation, **product standards can also lead to substitution between products covered by the standard and those that are not.** For example, a product standard that only applied to cement could lead to substitution to other products such as steel and wood in construction.[10] This means that the scope of standards needs to be carefully considered and policy frameworks on standards should be developed in a carefully co-ordinated way. However, stakeholders consulted for this report agreed that the potential benefits of mandatory product standards outweighed these challenges and that these challenges can be overcome by a comprehensive policy framework. **These challenges suggest that a package of reforms is needed.**

[9] See the Implementation Appraisal prepared for European Parliament in April 2022, available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/699502/EPRS_BRI(2022)699502_EN.pdf. Stakeholders consulted for this evaluation suggested that 10-20% of the products on the market did not comply with the Ecodesign regulations.

[10] For more information, see Frontier Economics and DNV (2021), *Improving the Market Benefits for Lower-carbon Industrial Production in Scotland.* Prepared for ClimateXChange.

Industry views on the design and implementation of product standards

To further understand good design principles and the considerations needed to avoid unintended consequences from product standards policies, we explored the potential for product standards to influence demand for industrial goods with industry stakeholders. This evidence was gathered through three separate in-depth, hour-long interviews with experts from the steel, food & drink retailing, and construction sectors; a workshop with 22 decarbonisation experts from industry, think tanks and academia; and further written responses and review of this paper from industry stakeholders.

These experts reported that **demand for low carbon products is growing, but carbon is still a lower priority concern than cost and quality for consumers and businesses**. As a result, in many industries, **voluntary standards alone are unlikely to drive the required improvements** in the emissions intensity of production in the near term. As voluntary standards also face many of the same challenges as mandatory standards, but are unlikely to deliver the same scale of positive change, mandatory standards should be implemented to produce significant change.

Experts in the construction sector reported that, in places, voluntary steps were already being taken to reduce the emissions intensity of new buildings due to pressure from customers, and that availability of an agreed methodology for assessing low carbon products would support them in continuing to do so. By implementing mandatory product standards, government can ensure that industry is competing on a level playing field, and that the most challenging initial steps towards low carbon production are not taken by a small number of organisations which will shoulder the highest levels of risk as first movers.

In the longer term, the ability to meet low carbon standards will continue to become more important. Experts indicated that **ensuring UK manufacturers have the capability to meet low carbon standards will support longer-term economic opportunities.** As demand for low carbon products continues to grow and sustainable product standards are introduced in key export markets, there will be significant benefits for manufacturers who are able to evidence and meet these standards.

Industry experts recommended a few key actions that are needed to support the development of effective product standards and ensure that UK manufacturers are able to take advantage of these longer-term economic opportunities. Experts highlighted the importance of unified and consistent product standards that take account of the whole life-cycle of emissions, as well as broader environmental factors, where possible, to avoid unintended distortions. They consistently emphasised the importance of increased data transparency and reporting requirements to support these standards, as well as the need to align standards internationally to ensure that UK manufacturers are able to access key export markets.

A number of stakeholders stressed the importance of ensuring that these data and reporting requirements were proportionate and that support was available for meeting them, particularly for SMEs and manufacturers in lower-income countries, for which reporting requirements may represent a more significant barrier. Industry stakeholders also highlighted that voluntary standards are unlikely to create the significant change needed to create a market for low carbon products and that mandatory standards were therefore more suitable, although a minor proportion of stakeholders consulted

reported interest in using voluntary standards as a transition phase to mandatory standards. To stimulate demand across supply chains, several stakeholders spoke of the need to apply standards to both intermediate and finished products, as this would create demand for specific materials while also allowing businesses to distribute emissions reductions to where they are most cost effective. Finally, industry experts reiterated the importance of providing a clear policy timeline and ensuring that wider policy support is in place to enable manufacturers to meet these standards.

Introducing effective mandatory product standards: recommendations for policymakers

Overall, based on this stakeholder input, a review of evidence about the effectiveness of product standards and a review of international product standard policies, we set out recommendations for policymakers below. *To stimulate the creation of markets for low carbon industrial products, the government should outline a clear direction of travel for the development of product standards policies. Policymakers should deliver* ***a package of measures that results in well-designed mandatory standards****. They should:*

1. **Implement mandatory product standards aimed at creating demand for low carbon industrial goods and materials, outlining clear timelines for their introduction.** In order to make the right investments in low carbon production today, manufacturers and businesses need clarity on the policy measures that will be implemented in future, particularly those that will support the creation of markets for low carbon products. As product standards can create direct demand for low carbon products, they are one of the most effective tools that government has to stimulate decarbonisation. They also support the competitiveness of UK manufacturers, by levelling the playing field with low-cost, high carbon imports. As, in many industries, voluntary standards alone are unlikely to drive the required improvements in the emissions intensity of production in the near term, government should pursue the implementation of mandatory standards to create significant change.

A number of key actions can be taken by policymakers to support the implementation of these mandatory product standards. Policymakers should:

2. **Assign responsibility for developing and implementing mandatory product standards to an existing or new institution.** Due to the complexity of creating a product standard, this institution should work closely with industry in order to develop an efficient set of product standards that drive decarbonisation in the most impactful areas. It should also coordinate with international efforts to define low carbon products (for example, initiatives such as ResponsibleSteel) in order to leverage existing expertise and accelerate the development of low carbon standards for key products. Working with industry and existing product standards initiatives could allow government to focus on the highest-emitting sectors, or areas that will be the most challenging to decarbonise, and minimise any unintended consequences (e.g. minimise the cost of new production processes). In addition to working with industry to design the standards, this institution should work to ensure that the necessary measures for the implementation of these standards, such as data collection, reporting requirements and mechanisms for enforcement, are in place.

3. **Enact policies that require data transparency and reporting as soon as possible.** A key message from industry stakeholders consulted for this report was that a lack of data on the embodied and life-cycle emissions of different materials and products, and a lack of transparency on how this data is collected and verified, is a key barrier to the development of reliable low carbon product standards. Consistent and robust data on the emissions intensity of production is a critical part of both the design and implementation of low carbon product standards, as it is needed to determine the relevant low carbon product standard and to ensure that manufacturers are complying with this standard. Ensuring robust data collection is in place is made even more important by the need for UK exporters to meet the requirements of the EU Carbon Border Adjustment Mechanism (CBAM), which is being phased in over the 2023-2025 period before entering full force in 2026.[11]

   As a result, this data collection needs to be standardised and start immediately across supply chains. The institution assigned responsibility for developing and implementing mandatory product standards should also be responsible for ensuring that data and reporting requirements are put in place and for supporting the collection of this data. Putting in strong data collection and reporting requirements today will enable suitable mandatory carbon standards to be set in future, and will directly affect company behaviour and the development of voluntary standards today.

   In some cases, the required data is already collected by manufacturers and needs to be made more transparent. However, in some industries there is not currently the capacity or expertise within the supply chain to capture and analyse this data. As a result, policies mandating data transparency and reporting should be accompanied by support from policymakers to develop this capability within the supply chain. They should also be designed to ensure that relevant information is captured, while limiting the administrative burden put on manufacturers in general. This is particularly important for small and medium-sized enterprises (SMEs) and manufacturers in lower-income countries, which may have more difficulty in collecting the required data due to resource and capacity constraints or knowledge and training gaps. Government should also provide specific support to SMEs which may have difficulty in collecting and reporting this data where necessary.

4. **Develop product standards that apply throughout the supply chain to both intermediate and finished products.** One of the primary considerations of our engagement with industry related to whether product standards should be applied directly to specific materials, such as steel and glass, or to finished products, such as cars and buildings. The former could create demand for specific low carbon materials but may be more complex to implement and create the potential for material substitution, while the latter could stimulate demand across multiple parts of the supply chain at once but may not provide such a strong demand signal. Given the relative merits and challenges of both, and the need to create demand for specific low carbon materials and to drive change across the economy, government should work with industry to understand where best to apply standards in the supply chain. Government should also work with industry to implement complementary standards on both intermediate and finished products, in order to have the maximum impact on both demand and decarbonisation. Where standards are applied to both a

[11] https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-carbon-border-adjustment-mechanism

finished product and intermediate product in the same supply chain, policymakers should avoid establishing multiple standards for the same material as this risks creating confusion for manufacturers and consumers.

5. **Develop consistent and unified standards, and ensure methodologies account for products' whole life-cycle climate impact.** The growing number of standards and methodologies creates confusion in the market for consumers and businesses and represents a significant administrative cost for manufacturers. Creating a unified standard for each product and industry will reduce the costs of complying with standards for manufacturers and create stronger incentives for decarbonisation by providing a clear target for what defines a low carbon product. In some cases, there may be scope for existing standards to be consolidated or replaced by an agreed low carbon standard. Government should review the full range of standards that apply to each of the sectors and, in cases where a carbon standard might overlap with other standards, seek to consolidate them when introducing the carbon one.

   Where possible, these standards should account for the whole life-cycle of product emissions as well as wider measures of climate impact to avoid unintended consequences and market distortions. Overall, there is a need for clarity about the objectives for the standard. This report focuses on standards aimed at mitigating carbon emissions. Not everything can be addressed through a single standard and trying to address a more complex measure of climate and environmental impacts through a single standard can lead to increased complexity and longer implementation timelines. However, standards for carbon intensity should still be designed to minimise the risk of unintended negative consequences on other environmental outcomes where possible. These standards should also apply equally to both domestic and imported products in order to avoid putting UK manufacturers at a disadvantage relative to less-regulated competitors abroad, distorting demand in favour of imports to the UK.

6. **Increase the ambition of mandatory standards over time to ensure that standards continue to encourage innovation and decarbonisation.** Standards should continue to evolve to create an ongoing incentive to reduce the carbon intensity of production and support long-term decarbonisation. While it is important to set an initial standard that is achievable for manufacturers at present, if this standard remains static over time, it risks anchoring manufacturers to this initial standard and the technologies available today. To encourage continued investment and innovation to support decarbonisation, mandatory standards should be progressive and change over time to incentivise an ongoing shift towards lower carbon production techniques and new solutions. In addition to being progressive and increasing in ambition over time, these standards should also be designed in such a way that they are not overly prescriptive, as overly prescriptive standards can risk limiting innovation. The changes to these standards should be clearly signposted by policymakers in order to give manufacturers time to adjust and to ensure that the right investments are put in place.

7. **Work with policymakers abroad to ensure that standards and methodologies adopted in the UK are interoperable with those developed internationally.** The growing number of carbon-intensity standards and methodologies for the same group of products imposes additional costs on manufacturers, businesses and consumers. While standards adopted domestically should be consistent with one another, standards used in the UK also need to be consistent with those adopted internationally. For UK-based manufacturers to comply with standards adopted in export markets, they need to be able to collect the emissions data required by those standards. These manufacturers will face additional costs if the data and production methods needed to comply with standards internationally differ from those standards in the UK.

   More generally, differences in standards domestically and abroad create trade frictions and inefficiencies in global supply chains. To support global decarbonisation, policymakers in the UK should work with policymakers internationally to develop standards and limit the negative impacts on importers and exporters that result from additional administrative burden and inconsistency in standards. Where standards set in the UK are more ambitious from an environmental standpoint, as part of trade policy, policymakers in the UK should encourage policymakers internationally to adopt UK standards. This could help to ensure interoperability without compromising the level of ambition of UK standards.

   Moreover, as other countries adopt similar measures, improving the interoperability of different standards will allow for greater and more efficient global cooperation on industrial decarbonisation.

8. **Account for drivers of consumer behaviour when designing standards in order to maximise their impact on consumers.** When designing product standards, policymakers should take account of behavioural insights and consumer values in order to maximise the impact of these standards on demand. While mandatory standards can have significant impacts on decarbonisation, standards which differentiate between compliant products (such as through voluntary standards and product labels) can be even more effective in creating demand for low carbon goods. Research into the effectiveness of product labels consistently demonstrates the importance of the design of these labels, with their clarity closely tied to their impact on demand. Labels that leverage social influence, for example by indicating the choices that other consumers have made, can also significantly shift demand towards low carbon products.

   While data transparency and reporting requirements need to be put in place before these standards and labels can be adopted by the wider market, when implementing specific standards, policymakers should account for how they will be received by consumers and not just how (and whether) manufacturers and businesses can meet them.

9. **Build on the Industrial Decarbonisation and Net Zero Strategies to deliver a clear policy framework for industrial decarbonisation.** As illustrated in **Figure 1**, demand-side policies are part of a wider policy framework. While product standards can be used to create incentives for decarbonisation, manufacturers and businesses need support in order to respond to these incentives. This includes supporting the provision of cost-competitive low carbon electricity

supply[12] and ensuring that the necessary low carbon infrastructure is in place, that manufacturers have support for deploying low carbon technologies that are not currently cost effective, and that competitiveness support is in place where there are differences in input costs between the UK and other countries, linked to faster climate progress in the UK (particularly for SMEs, which may find it more difficult to decarbonise their operations than larger companies, or those based in industrial clusters with greater access to decarbonisation options).

Many stakeholders highlighted that the absence of wider policy support, or clarity regarding their pathway to emissions reductions (such as fuel switching versus carbon capture, utilisation and storage (CCUS)) increases the risk of inefficient investment, which could lead to stranded assets that would negatively affect UK manufacturers' ability to compete with manufacturers abroad. The Department for Business, Energy and Industrial Strategy (BEIS) should prioritise the completion of business model support for hydrogen and CCUS, address challenges to grid investment and renewable energy deployment, and complete the review of the UK Emissions Trading Scheme (ETS) with clarity on the future cap on (free) emissions allowances going forward.

[12] For more information, see UCL, commissioned by the Aldersgate Group (2022), *Separating electricity from gas prices through Green Power Pools: Design options and evolution* and UCL, commissioned by the Aldersgate Group (2021), *Delivering Competitive Industrial Electricity Prices in an Era of Transition*

Introduction

Decarbonising heavy industry is a key part of meeting the UK's net zero goals, with industrial emissions representing approximately 16% of the UK's total emissions.[13] Meeting this goal is likely to require a combination of supply-side and demand-side policy interventions. Supply-side interventions that support the deployment and adoption of low carbon fuels and technologies can be enhanced by demand-side policies that shift the demand of public sector organisations, private businesses and consumers towards lower emission products. These demand-side policies have the potential to influence purchasing decisions and grow the market for low carbon products and to increase the competitiveness of UK businesses.

This report focuses on the potential for product standards to shift demand towards low carbon industrial products and support industrial decarbonisation. The UK government highlighted the potential for product standards to provide an incentive for industrial decarbonisation in the *2021 Industrial Decarbonisation Strategy*. As part of this strategy, the UK government committed to considering the benefits of product standards policies, with a view to potentially introducing voluntary standards by 2025 and mandatory standards by the mid-to-late 2020s.

Product standards can be used to give consumers more information about carbon intensity and environmental sustainability, shifting demand towards low carbon products. They can also be used to remove the sale of higher carbon products that do not meet the standards from the market, thereby directly shifting demand towards low carbon alternatives. As a result, they have significant potential to support decarbonisation efforts but may also lead to an increased burden on businesses and consumers and other potential unintended consequences. Industry input into developing and designing these standards is therefore critical to ensure that they are able to drive emissions reductions while limiting potential impacts on the competitiveness of UK industry.

This report explores the potential role of product standards in supporting the development of markets for low carbon products and the key considerations for maximising their effectiveness. It focuses on growing demand and creating markets for critical low carbon products like steel and cement, which are then used in key infrastructure and finished consumer products, through the introduction of clear product standards at different levels of the supply chain. The report is structured as follows:

- The section on the **policy context and economic rationale** briefly sets out where product standards sit within wider decarbonisation policy, as well as the high-level potential benefits and risks of mandatory and voluntary standards.
- The **international examples of product standards policies** section explores product standards that have been implemented abroad. It also summarises the strengths and challenges of these policies in order to understand best practice and implementation risks for product standards policies in future.
- Through workshop and in-depth interview engagement with an expert stakeholder group, the section on **industry needs and implementation considerations** assesses the potential for

[13] See HM Government (March 2021). *Industrial Decarbonisation Strategy*.

product standards to influence demand and generate wider economic benefits. This section also outlines the design and implementation requirements needed to create effective standards.

- The **overall recommendations for policymakers** section summarises the key takeaways in terms of immediate and longer-term actions for policymakers.

Policy context and economic rationale

Product standards are a form of demand-side intervention and sit within a wider policy context. Understanding this wider context and the role of product standards within it can help inform where different types of product standards can be implemented and the additional support needed to ensure they are effective.

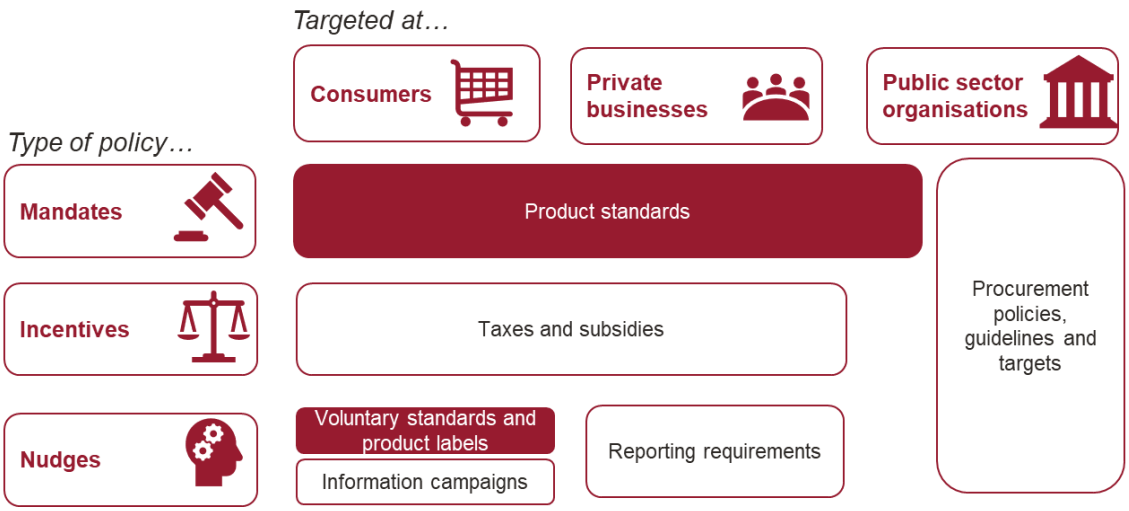
The role of demand-side policy

Demand-side policy increases the incentive to decarbonise by resolving market failures and creating new markets for goods. These interventions influence the purchasing decisions of consumers, businesses and public procurers to increase the demand for low carbon products, thereby creating a "pull" towards decarbonisation. They include product standards, taxes and subsidies targeted at buyers, information campaigns, reporting requirements and public procurement policies. In general, across these policies there is a trade-off between the certainty and scale of the impact on emissions and the potential complexity and costs associated with implementing the policy. Demand-side policy can be broadly split into three categories.

- **Mandates,** which ban the purchase of products that fail to meet a particular standard. Mandatory product standards are a form of mandate;
- **Incentives**, which provide specific benefits (such as financial subsidies) to encourage the purchase of certain products and discourage the purchase of others. Incentives can also include procurement rules which give low carbon products higher weighting in procurement exercises; and
- **Nudges,** behavioural interventions designed to encourage buyers to prefer certain products through the provision of information. Voluntary standards and product labels are forms of policy nudges.

Figure 2 below summarises the types of demand-side policies available to policymakers.

Figure 2 Demand-side decarbonisation policies



This report focuses on product standards, a subset of the overall suite of demand-side interventions available to policymakers.

The role, benefits and risks of product standards

Product standards can play a key role in supporting decarbonisation of industry in the UK. There are two overall types of product standards:

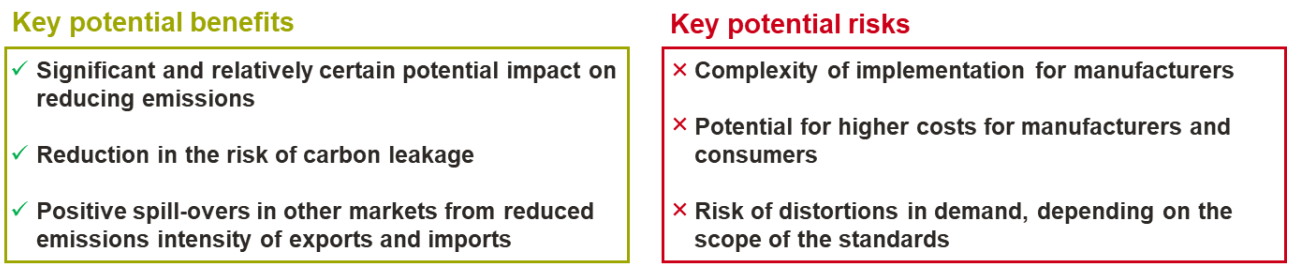
- **Mandatory standards**, which directly specify the emissions and/or production standards a product must meet to be eligible for sale in the market; and
- **Voluntary standards**, which attempt to nudge consumers and businesses towards purchasing low carbon products by increasing transparency around products' emissions footprints and/or wider environmental impacts. They can also be used as a transition mechanism to a mandatory standard. The voluntary standard met is often communicated in the form of a product label.

These policies can be used to overcome key market failures. Product standards can reduce information asymmetry between manufacturers and consumers and can better inform consumers about the environmental impacts of their purchasing decisions. They can also ensure that manufacturers with lower emissions-intensity production can compete with higher emission, lower price competitors. Overall, product standards can shift demand towards lower-emissions products and create a greater incentive for manufacturers to invest in decarbonisation. However, they can also impose additional costs for manufacturers and consumers. The potential benefits and risks of product standards are set out below at a high level and are explored in more detail in the subsequent sections of this report.

Mandatory standards

Mandatory product standards can have a significant, direct impact on the emissions intensity of in-scope products, reducing the risk of carbon leakage and impact emissions in other jurisdictions. However, they can also be complex for manufacturers to implement, leading to costs for consumers and potentially distorting demand. This is summarised in **Figure 3** below.

Figure 3 Summary of potential risks and benefits of mandatory standards



Potential benefits

Depending on the standard set, mandatory standards can have a **significant impact on the emissions intensity of in-scope products** by imposing a defined cap on the maximum allowed carbon content. For example, the EU Ecodesign Directive, which imposes mandatory energy efficiency standards on energy-related products sold in the EU, is estimated to have led to a 41% reduction in the electricity consumption of washing machines in 2020 relative to the scenario where no standards were in place.[14] **The impact of mandatory standards is also relatively certain** when compared to other demand-side measures, as policymakers can enforce a strict ceiling in terms of emissions or other sustainability measures which manufacturers must meet. This is much more direct than other demand-side policies such as taxes and voluntary standards, which rely on potentially uncertain consumer reactions to create incentives for manufacturers to decarbonise.

Mandatory standards which apply to all products sold in the UK can also **limit the risk of carbon leakage.** Mandatory product standards can be used alongside other policies such as free emissions allowances and carbon border adjustment mechanisms (CBAMs) to mitigate the risk of carbon leakage.[15] Where decarbonisation policies lead to increased costs for UK-based manufacturers, there is a risk of offshoring of production to other, less-regulated jurisdictions with lower production costs and higher emissions intensities. Product standards that apply to all products in a given market can significantly reduce this risk, as they can be used to ensure that foreign manufacturers meet the same standards as domestic industry in the UK. However, ensuring that product standards apply equally to all products may require increased transparency of the import supply chain and coordination with policymakers abroad.

[14] European Commission (2021), *Ecodesign Impact Accounting Annual Report 2020.*

[15] Climate Change Committee (2022), *Progress in Reducing Emissions: 2022 Report to Parliament.*

Beyond reducing the risk of carbon leakage, **mandatory standards can also lead to positive spill-overs to other markets**. UK-based manufacturers that need to comply with product standards to sell their products domestically may also reduce the emissions intensity of their exports due to the need to adapt production methods for their whole supply chain rather than just for those products sold in the UK. Product standards also create an incentive to decarbonise for non-UK manufacturers for which the UK is a significant export market. Overall, these standards can therefore lead to reductions in emissions intensity both domestically and internationally, even where they only apply to products sold within the UK.

Potential risks

However, mandatory product standards also present some risks, particularly in the form of increased costs for manufacturers and consumers. Mandatory product standards can be **complex for manufacturers to implement.** It is complex, especially for small or medium-sized enterprises (SMEs), which may have greater difficulty gathering the required data, to measure emissions for some products.[16] Depending on the standard set, manufacturers may also need to make significant changes to their production techniques or adopt new methods of production, which adds to this complexity. While, for policymakers, product standards may be relatively less complex to implement than other policies such as taxes and subsidies,[17] they still require careful design and implementation. In particular, emissions-related standards still need to be designed in such a way as to take account of wider policy objectives such as land use, water use, social welfare and product safety.[18] These standards also need to be designed carefully to avoid stifling innovation or locking manufacturers into technologies that are not efficient in the long run.

This increased complexity **may lead to higher costs for manufacturers and consumers.** The increased reporting and data collection required can lead to significant administrative costs for manufacturers, with these costs likely to have a disproportionate impact on smaller companies. Making changes to production and deploying new technologies can also lead to increased costs, for example if the changes to production require significant electrification.[19] At least a part of any increase in costs is likely to be passed on to consumers. This risk is higher for less-flexible standards which stipulate that a particular production technique or technology must be used. Given the current cost-of-living crisis, this risk of inflationary pressure from product standards needs to be mitigated through careful design of the product standard as well as through supporting policies such as supply-side subsidies that facilitate large-scale capital investment into plants and processes from industry.[20] Standards that deviate from those set in key export markets such as the European Union can also

[16] See BEIS (2022), *Towards a Market for Low Emissions Industrial Products: Call for Evidence Summary of Responses*.

[17] For an assessment of the relative complexity of implementation of different demand-side decarbonisation policies, see Frontier Economics and DNV (2021), *Improving the Market Benefits for Lower-carbon Industrial Production in Scotland.* Prepared for ClimateXChange.

[18] See BEIS (2022), *Towards a Market for Low Emissions Industrial Products: Call for Evidence Summary of Responses*.

[19] For more information on barriers to adoption of low carbon technologies, see *Accelerating the Decarbonisation of Industrial Clusters and Dispersed Sites* (2021), prepared by Frontier Economics on behalf of the Aldersgate Group.

[20] Climate Change Committee (2020), *Briefing Paper: The Potential of Product Standards to Address Industrial Emissions*.

increase the burden on manufacturers and exporters, and standards therefore need to be designed to minimise potential trade frictions from tension between domestic and international standards.

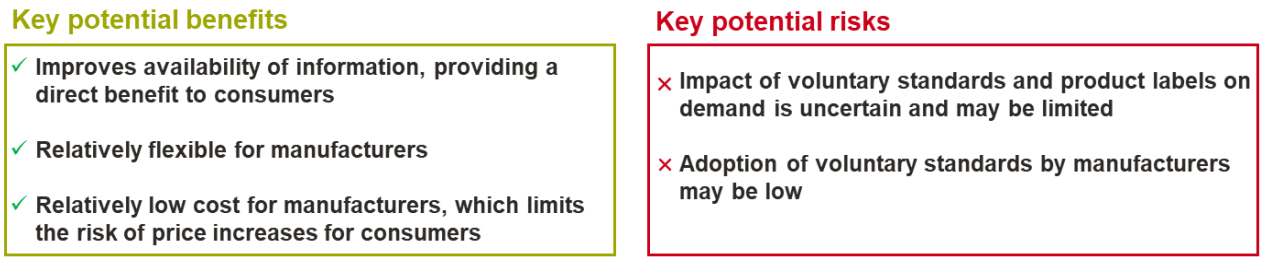
Product standards may also lead to distortions in demand, depending on the scope of the standards. They can lead to substitution between products covered by the standards and those not covered by the standards; for example, a product standard that only applied to cement could lead to substitution to other products such as steel and wood in construction.[21] Product standards that only apply to domestic production or to certain parts of the supply chain can also lead to substitution for imported products and carbon leakage.[22]

Overall, mandatory standards have significant potential to drive emissions reductions. However, they can be complex to implement and create the risk of higher costs for manufacturers and consumers, and they may distort demand. They therefore need to be designed carefully in collaboration with industry.

Voluntary standards

Voluntary standards are likely to impose fewer costs on manufacturers and consumers due to their higher degree of flexibility, and they can still provide a direct benefit to consumers by improving the information available to them when making their purchasing decisions. However, due to their voluntary nature, adoption of voluntary standards may be limited, and there is mixed evidence on the impact that increased availability of carbon and sustainability information has on purchasing decisions.[23] This means that the overall impact of voluntary standards is uncertain and potentially limited.

Figure 4 Summary of potential risks and benefits of voluntary standards



Potential benefits

Voluntary standards, which are often accompanied by product labels, provide a **direct benefit to customers by improving the availability of information in the market**. Consumers are increasingly reporting a desire for information on the carbon content of their products . A 2019 YouGov

[21] For more information, see Frontier Economics and DNV (2021), *Improving the Market Benefits for Lower-carbon Industrial Production in Scotland.* Prepared for Climatexchange.

[22] See BEIS (2022), *Towards a Market for Low Emissions Industrial Products: Call for Evidence Summary of Responses*.

[23] For a summary of the literature, see Potter, Bastounis, Hartmann-Boyce, Stewart, Frie, Tudor, Bianchi, Cartwright, Cook, Rayner, & Jebb (2021), *The Effects of Environmental Sustainability Labels on Selection, Purchase, and Consumption of Food and Drink Products: A Systematic Review*. Environment and Behavior, 53.

study of Western European and North American consumers found that two-thirds of consumers supported the idea of a recognisable carbon label on products,[24] while a recent survey of UK consumers found that 73% felt it was important for their food and drink products to have a low carbon footprint.[25] The lack of availability of this information leads to information asymmetry, a form of market failure, and means that consumers are unable to pay the optimal price for the product in question as they cannot assign full value to the carbon intensity of the product.

Voluntary standards are also relatively flexible for manufacturers when compared to other demand-side policies. They do not require manufacturers to adjust their production methods or the data they need to collect and report, but they provide them with an opportunity to do so in order to differentiate themselves from their competitors. They can also be implemented in such a way as to allow flexibility in terms of the information they report or the standards they meet. Voluntary standards can involve simply asserting that they are measuring the emissions intensity of their products, that the products are lower carbon than the average in the market or that products are manufactured using particular methods or technologies.

As a result, they are **relatively low cost for manufacturers and consumers.** Unlike mandatory standards, voluntary standards do not necessarily impose increased administration or production costs on manufacturers, or the associated cost pass-through to consumers. Instead, those manufacturers that provide lower carbon intensity products are able to communicate this to consumers, potentially enabling them to charge a premium and recover some of the costs of decarbonisation. This means they can also play a role as a transition mechanism to stricter, mandatory standards,[26] by allowing manufacturers to get reporting and measurement methodologies in place more gradually.

Potential risks

However, **the impact of voluntary standards on demand is uncertain and may be limited.** While consumers largely report that they want to purchase low carbon, more-sustainable products, this is not always translated into action. The overall evidence on the impact of environmental labels on consumer demand is mixed. While the academic literature studying the impact of carbon and sustainability on food purchases indicates that, in general, labels do affect consumer purchases, the impact is often relatively limited.[27] This impact is also highly dependent on the design of the labels and the clarity of the information conveyed.[28] To be effective, labels need to clearly and concisely convey information that consumers value and leverage wider behavioural insights to maximise consumer action. This includes making use of social leverage: research shows that informing a

[24] https://www.carbontrust.com/news-and-events/news/research-reveals-consumer-demand-for-climate-change-labelling

[25] https://www.compleatfood.com/carbon-labelling/#form

[26] See BEIS (2022), *Towards a Market for Low Emissions Industrial Products: Call for Evidence Summary of Responses*.

[27] For a summary of the literature, see Potter, Bastounis, Hartmann-Boyce, Stewart, Frie, Tudor, Bianchi, Cartwright, Cook, Rayner, & Jebb (2021), *The Effects of Environmental Sustainability Labels on Selection, Purchase, and Consumption of Food and Drink Products: A Systematic Review*. Environment and Behavior, 53.

[28] For more detail on the impact of voluntary standards and product labels on consumer demand, see Frontier Economics and DNV (2021), *Improving the Market Benefits for Lower-carbon Industrial Production in Scotland.* Prepared for ClimateXChange.

customer that others are purchasing environmentally friendly products significantly increases the likelihood of that customer making a sustainable purchase. Designing labels in a way that maximises their effectiveness requires an upfront investment in understanding consumers of the product in question.

Uptake of voluntary standards may also be low, particularly for less consumer-facing industries. While voluntary standards are low cost in the sense that manufacturers can choose whether or not to participate in them, cost still represents a barrier to their uptake. Complying with the information requirements of voluntary standards and implementing product labels can increase administrative costs, with these barriers likely to be more significant for SMEs.[29] In markets where consumer decisions are largely made on price and quality, there is therefore a relatively limited incentive for manufacturers to adopt these voluntary measures. Overall, this creates a risk of an effect lag, where the introduction of a voluntary standard takes much longer to have an impact on emissions compared to a mandatory standard.[30] The risk of low adoption and limited impact on consumers actual purchasing decisions means that voluntary standards may have a limited ability to drive reductions in the emissions intensity of production.

Experts from across the economy reported that, **due to the limited uptake of voluntary standards, they will be unlikely to drive the required improvements** in the emissions intensity of production. Moreover, as discussed above, voluntary standards also face many similar challenges to mandatory standards. The government should therefore implement well-designed mandatory standards to deliver the large-scale change needed to create a meaningful market signal for low carbon industrial products.

The overall policy framework

Demand-side policies do not exist in a vacuum. They interact with and need to be supported by supply-side policy to overcome other potential constraints.

As noted by the Climate Change Committee (CCC),[31] product standards specifically, and demand-side policy more generally, are important parts of providing cross-cutting incentives for industry to decarbonise. However, these policies cannot operate effectively alone. Decarbonising UK industry will be capital intensive, with tens of billions of pounds of investment required between the present and 2050.[32] There are also multiple types of market failures that need to be overcome, ranging from a lack of clear information available to consumers to significant upfront investment costs in shared infrastructure. No single policy can overcome all of these barriers, and multiple policy instruments will be needed to address this and support businesses and customers in transitioning to low carbon

[29] See, for example, Iraldo, Griesshammer, & Kahlenborn (2020), *The Future of Ecolabels*. The International Journal of Life Cycle Assessment, 25.

[30] PA Knowledge (2021), *Demand-side Policies for Industrial Decarbonisation*.

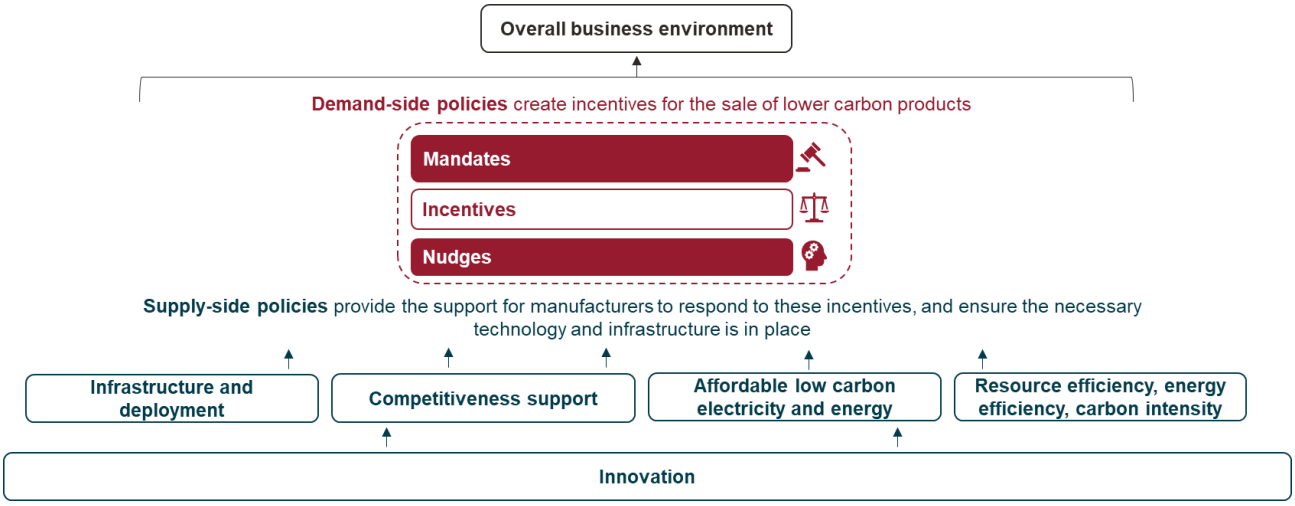
[31] Climate Change Committee (2022), *Progress in Reducing Emissions: 2022 Report to Parliament.*

[32] Climate Change Committee (2020), *Sixth Carbon Budget – Methodology Report*. See supporting data provided alongside the report that sets out the annual additional capital investment spend by sector.

products.[33] While demand-side policies and market mechanisms like emissions trading schemes can provide incentives for manufacturers to decarbonise, they still need adequate support to respond to these incentives.

As a result, demand-side measures must be deployed alongside supply-side measures to ensure their effectiveness and create an overall business environment that supports investment in decarbonisation. The interactions between demand-side and supply-side decarbonisation policy are illustrated in **Figure 5** below.

Figure 5 Interactions between demand and supply-side policies



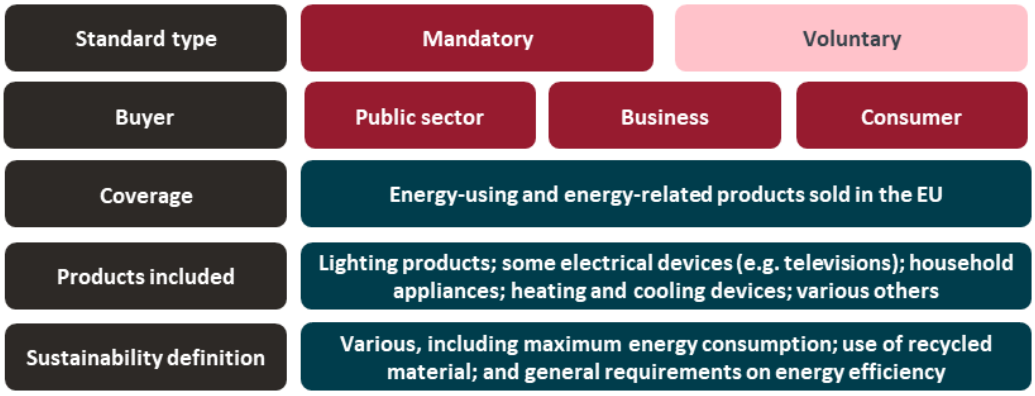
[33] This is further explored in HM Treasury (2021), *Net Zero Review: Analysis Exploring Key Issues*.

International examples of product standards policies

There are a growing number of voluntary and mandatory environmental product standards policies internationally. This section gives a brief summary of a subset of these policies. These examples help to illustrate good design features of mandatory and voluntary standards, along with key considerations and risks that need to be taken into account when implementing product standards policies.

The EU Ecodesign Directive

Figure 6 Summary of the EU Ecodesign Directive



The EU Ecodesign Directive (Directive 2009/125/EC)[34] establishes a set of mandatory energy efficiency standards for energy-using and energy-related products sold in the EU. This policy is part of the European Commission's wider initiative on the circular economy.[35]

The Ecodesign Directive applies to a wide range of energy-related products, including lighting products, household appliances, heating and cooling devices, and other electric devices such as computers and electric motors.[36] It provides a framework for product design and reporting requirements, with ecological and energy efficiency requirements set by product-specific implementation groups. Since its introduction in 2009, the Ecodesign Directive has been gradually expanded to include new products and more strict requirements. While it largely focuses on energy efficiency requirements, it has been expanded to include standards for other measures of sustainability such as water use, repairability and recyclability for some products.

This is a mandatory standard. In practice, when a minimum requirement is introduced, non-compliant products are banned from sale in EU member states. These requirements encourage manufacturers

[34] See Directive 2009/125/EC of the European Parliament, available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32009L0125

[35] See EU Action Plan on a Circular Economy COM (2015) 614/2.

[36] https://europa.eu/youreurope/business/product-requirements/compliance/ecodesign/index_en.htm#shortcut-0

of energy-related products to take energy consumption and wider environmental concerns into account when designing their products. The ecodesign requirements are often complemented by the EU energy labelling regulation, further strengthening this incentive.

Strengths of policy

The EU Ecodesign Directive highlights a number of key benefits and good design principles for product standards. In particular, the Ecodesign Directive:

- **Works alongside other demand-side policies.** It is used in combination with the EU energy labelling regulation so that consumers can distinguish between the energy efficiency of compliant products.[37] This provides a further incentive for manufacturers to exceed the mandatory standard set.
- **Has significantly reduced energy use and costs for consumers.** The Ecodesign measures reduced energy costs faced by consumers by an estimated EUR 120 billion in 2021 alone, with the cost savings expected to rise considerably in 2022.[38] The standards have also significantly reduced carbon emissions from electricity use, with the Ecodesign standards and accompanying energy labels estimated to have reduced EU primary energy demand by 7% per year.[39]
- **Allows for gradual increases in ambition.** While the scope of the Ecodesign Directive is still relatively limited and is focused on energy-related products, it has been gradually expanded to include additional products and measures of sustainability as well as more rigorous standards for products already covered. This allows manufacturers to gradually adapt to the standards. It has also laid the groundwork for a much more ambitious standard in the form of the Ecodesign for Sustainable Products Regulation, a proposed replacement to cover a significantly broader range of product groups as well as additional carbon circularity and sustainability requirements.[40]

Design and implementation challenges

This policy also raises a number of risks to be taken into account when designing and implementing product standards policies. The Ecodesign Directive highlights that:

- **Mandatory standards may lead to higher upfront costs for consumers.** A cost-benefit analysis of the Ecodesign Directive undertaken by BEIS in 2021 highlighted the risks of increased manufacturing costs being passed on to consumers. While these will likely eventually be offset by energy savings, it imposes a particular barrier to lower-income consumers.[41]

---

[37] https://single-market-economy.ec.europa.eu/industry/sustainability/sustainable-product-policy-ecodesign_en

[38] European Commission (2022), *Communication from the Comission: Ecodesign and Energy Labelling Working Plan 2022-2024*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022XC0504(01)&from=EN

[39] European Commission (2021), *Ecodesign Impact Accounting Annual Report 2020.*

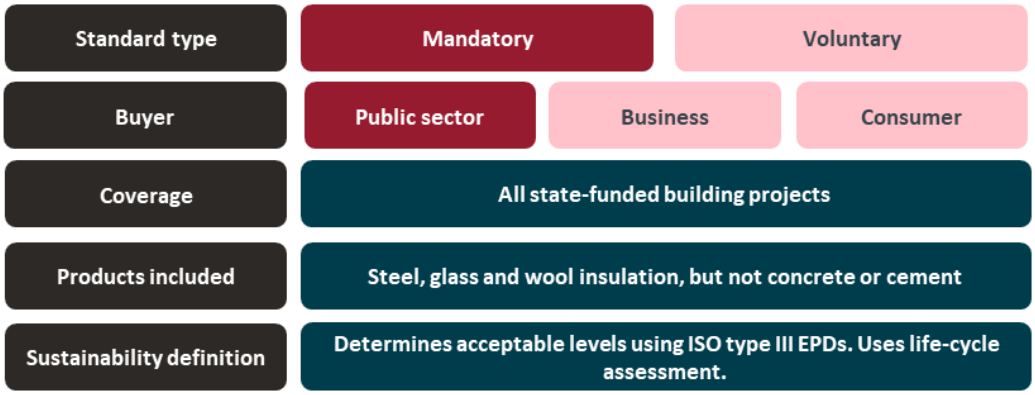
[40] European Commission (2022), *Proposal for a Regulation Establishing a Framework for Setting Ecodesign Requirements for Sustainable Products and Repealing Directive 2009/125/EC.* Available at: https://environment.ec.europa.eu/publications/proposal-ecodesign-sustainable-products-regulation_en

[41] BEIS (2021), *Impact Assessment of Proposed Ecodesign Requirements for Electric Motors and Variable Speed Drives, and Electrical Mains-operated Welding Equipment*.

- **Enforcement can be costly and challenging.** To ensure the policy is effective, policy authorities need to undertake conformity assessment and market surveillance. There is significant non-compliance (estimated at more than 10%) with the standards set by the Ecodesign Directive, and stakeholders also highlighted that enforcement is not uniform across the EU.[42] This becomes increasingly challenging and costly as additional, more-comprehensive standards are introduced.

The Buy Clean California Act

Figure 7 Summary of the Buy Clean California Act



The Buy Clean California Act (Assembly Bill No. 262) requires state-funded building projects in California to account for the effects of certain construction materials on global warming and establishes a threshold level of environmental performance for these products. It was passed in October 2017 but only came into effect in July 2022 after a long period of implementation.

Under this policy, the California Department for General Services must define a "maximum acceptable" level of global warming potential (GWP) for the construction materials that are covered by the Act, based on the industry average for those materials. GWP standards were published in January 2022 and will be reviewed every three years. GWP is measured using a full life-cycle cost-accounting method and represents the manufacturers' GWP of the eligible material's production life-cycle.

The materials included in the Act are structural steel, concrete-reinforcing steel, flat glass and mineral wool insulation. Carbon-intensive materials such as concrete, cement and aluminium are not included.

[42] See the Implementation Appraisal prepared for European Parliament in April 2022, available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/699502/EPRS_BRI(2022)699502_EN.pdf. Stakeholders consulted for this evaluation suggested that 10-20% of the products on the market did not comply with the Ecodesign regulations.

Strengths of policy

Key strengths of the Buy Clean California Act include that it:

- **Makes use of existing standards and methodologies.** Successful bidders for a public works project must submit environmental product declarations (EPDs) which demonstrate that they are compliant with these requirements to the public sector organisation responsible for awarding the contract.[43] These EPDs must be specific to the production methods used at the plant where the product was made, rather than being an average for the manufacturer.
- **Creates clear benefits for low carbon, domestic manufacturers and reduces risk of carbon leakage.** Manufacturers that already produce low carbon products directly benefit from the Act, as it helps them compete with less-regulated, higher emission manufacturers abroad. Proponents of the Act also point to its potential to have a positive impact on local industry, by helping "heavily regulated California steel mills that compete with unregulated or under-regulated mills in China, India and elsewhere".[44]
- **Leads to a gradual strengthening of standards.** GWP standards are based on industry averages for those materials, which are reviewed every three years.

Design and implementation challenges

However, the implementation of this policy also highlights the need for long implementation timelines and the risk of market distortions from policies that only apply to a part of the overall market.

- **Extensive stakeholder engagement was a key part of the policy development,** which led to a long implementation timeline. It took five years from the passing of the bill for the standards to come into effect, even when focusing the scope of the standards on a relatively narrow set of products. There was also significant opposition from some industries which did not want their products to be covered by the Act.[45]
- **Limits around scope may introduce distortions.** The Act excludes key construction materials like concrete, wood and aluminium, although there are currently proposals to expand the list of products included.[46] This raises concerns about anti-competitiveness and distortion of demand, with steel industry representatives arguing that it leads to steel being placed at a disadvantage relative to products such as wood and concrete that are not covered by the Act.[47]

[43] EPDs are International Standards Organisation (ISO) type III declarations which communicate the life-cycle impacts of products and can be used for all goods and services.

[44] https://www.rics.org/north-america/news-insight/future-of-surveying/sustainability/the-buy-clean-california-act---what-can-we-learn-from-it/

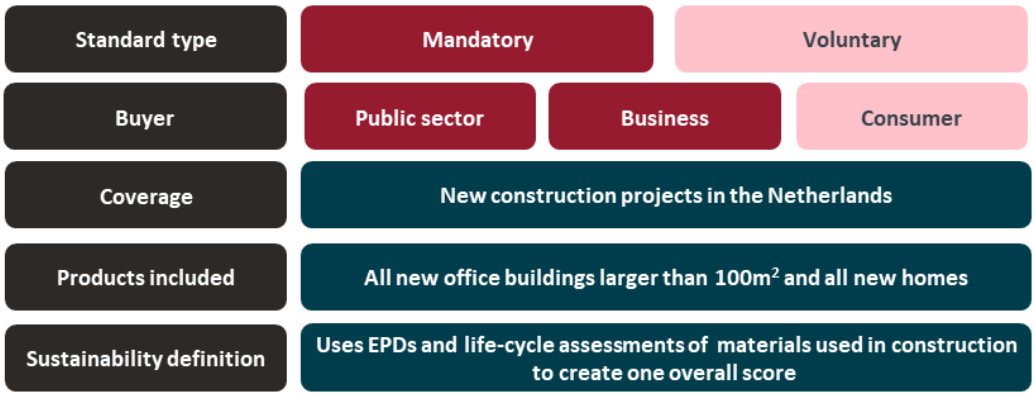
[45] https://www.atlastube.com/atlas-observer/the-new-buy-clean-california-act-good-intentions-with-unintended-consequences/

[46] Senate Bill 778, if passed, would add concrete to the Buy Clean programme.

[47] https://www.enr.com/articles/43445-aisc-raises-fairness-issues-over-buy-clean-california-act

The Netherlands Cap on Embodied Building Emissions

Figure 8 Summary of the Netherland Cap on Embodied Building Emissions



In 2018, the Netherlands introduced a carbon Cap on Embodied Emissions in new buildings. A Dutch Building Environmental Performance Declaration (DBED) is mandatory for every new office building larger than 100m^2 and new-built homes.

Each DBED returns one overall score, which must fall below the maximum limit set. This mandatory standard came into effect after a period of mandatory disclosure: since 2017 new buildings covered by the policy have had to account for and disclose their embodied emissions, based on a national framework.[48] Policies encouraging the collection and disclosure of emissions data are also being enacted elsewhere in the EU – the EU has created the voluntary level(s) framework, which measures carbon and other sustainability indicators throughout a building's life-cycle, [49] while France's RE2020 regulation mandates analysis of embodied emissions over the entire life-cycle of the building.

Strengths of policy

The Cap on Embodied Emissions has a number of important benefits. It:

- **Provides a clear and comparable score across buildings**. The overall environmental performance indicator is a single score, calculated as a weighted average of the life-cycle assessments (LCAs). This makes it easier to determine what "good" looks like from an embodied emissions perspective.

[48] BPIE (2021), *Whole-life Carbon: Challenges and Solutions for Highly Efficient and Climate-neutral Buildings.*

[49] https://environment.ec.europa.eu/topics/circular-economy/levels

- **Allows for a phased reduction in maximum emissions.** The maximum score allowed can be reduced gradually over time. The threshold single-score indicator limit has fallen from 1.0 to 0.8 since 2018, and in public and private procurement a stricter threshold can be used.[50]
- **Improves data availability and supports a database of LCAs for wider use.** An LCA must be performed for every material used, with these LCAs then collected in the National Environmental Database, improving transparency in the construction market.[51]

Design and implementation challenges

The Cap on Embodied Emissions also illustrates the importance of trade-offs that should be considered at the policy design stage.

- **There are trade-offs between reducing embodied emissions from construction and improving energy efficiency at the point of use**. Materials that increase energy efficiency from building use can increase embodied emissions from construction.[52] For the best result in terms of overall emissions impact, the environmental impact of building materials and the ultimate energy efficiency of the building should be considered together.
- **Weighting of different stages of emissions in the LCA analysis can materially impact decisions around materials used.** For example, weighting future emissions less heavily than current emissions can favour materials such as wood.[53] How to assess different stages and emissions as well as wider measures of sustainability need to be carefully considered to ensure the policy is aligned with broader policy objectives.

[50] See Attia, Santos, Al-Obaidy, & Baskar (2021), *Leadership of EU Member States in Building Carbon Footprint Regulations and their Role in Promoting Circular Building*. IOP Conference Series: Earth and Environmental Science; and https://milieudatabase.nl/en/about-us/an-introduction-to-the-nmd/

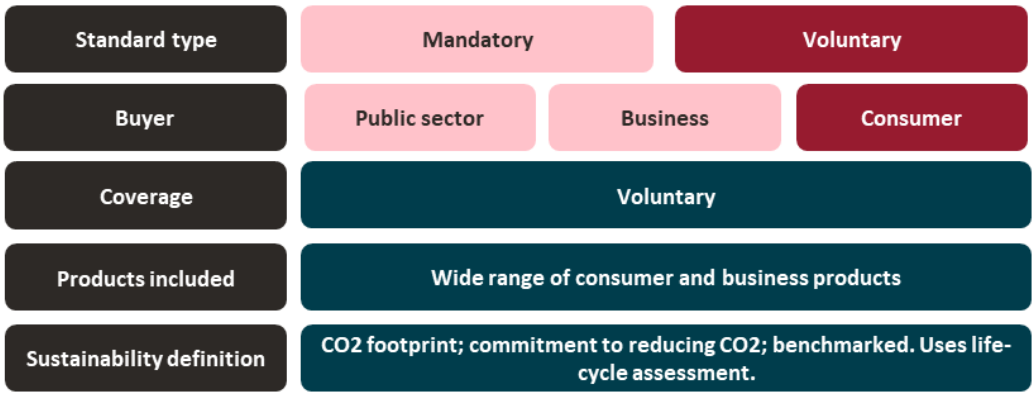
[51] https://milieudatabase.nl/en/about-us/an-introduction-to-the-nmd/

[52] See Attia, Santos, Al-Obaidy, & Baskar (2021), *Leadership of EU Member States in Building Carbon Footprint Regulations and their Role in Promoting Circular Building*. IOP Conference Series: Earth and Environmental Science.

[53] https://www.storaenso.com/en/newsroom/news/2022/1/good-for-wood-new-embodied-carbon-regulations

The Carbon Trust Carbon Footprint Label

Figure 9 Summary of the Carbon Trust Carbon Footprint Label



The Carbon Trust Carbon Footprint Label is a voluntary standard. It takes the form of a label on commercial products with the aim of enabling consumers to purchase products that have the lowest carbon emissions impact over their life-cycles.

The Carbon Trust verifies organisation and product carbon footprints, and then provides the Carbon Trust "badges" to demonstrate that certain standards have been met.[54] It uses a LCA of the product: cradle-to-gate or cradle-to-grave depending on the circumstances. The information and methodological requirements vary depending on the type of label the product is being evaluated for. These labels have been applied to a range of products and industries, including Cemex cement and Walkers crisps.

There are four main labels:

- CO2 measured: indicates that the carbon footprint of the product has been measured;
- Reducing CO2: indicates a commitment to reduction of CO2, not including offsets, over two years;
- Carbon neutral: indicates that the product is carbon neutral; and
- Lower CO2: indicates that the life-cycle carbon footprint of a product is significantly lower than the life-cycle carbon footprint of the market-dominant product in its category.

Strengths of policy

The Carbon Trust Carbon Footprint Label:

- **Is flexible and imposes a limited burden on manufacturers.** Manufacturers have flexibility in terms of which label they use, which gives them additional options for signalling their carbon intensity and planned future emissions reductions. However, there are still costs from the

[54] https://www.carbontrust.com/what-we-do/assurance-and-certification/product-carbon-footprint-label

collection of the data required for the label, which may be more significant for smaller manufacturers.

- **Provides a comparable label across a wide range of products.** The labels are consistent across different products and industries, reducing potential confusion for consumers due to a proliferation of different standards. Clarity of information is important, as research shows that consumers tend to ignore label information when there is too much of it or it is too complicated.[55]
- **Provides valuable information to consumers.** Consumer research commissioned by the Carbon Trust in 2020 found that two-thirds of consumers support carbon labelling, which is consistent with other research.[56] This level of interest in carbon information has also been rising in recent years. Businesses involved highlight that the label has helped them to build trust with consumers and stand out in the market.

Design and implementation challenges

As a voluntary label, the Carbon Trust Carbon Footprint Label also faces some key implementation challenges that are relevant for future policies.

- **The value-action gap limits the effectiveness of voluntary labels.** While consumers largely report valuing low carbon products, far fewer actual report taking this into account in their purchasing decisions.[57] This means that the impact of these voluntary standards is likely to be much lower than mandatory ones.
- **Inconsistent definitions of carbon neutrality or low emissions can undermine consumer confidence in labels and voluntary standards.** While the Carbon Trust Carbon Footprint Label benefits from its clarity and consistency across different products, the proliferation of different standards in the market and a lack of understanding from consumers can still lead to issues. For example, Evian bottled water, certified as “carbon neutral” under the labelling scheme in 2020, has been accused of misleading consumers about the carbon neutrality of the product due to a lack of understanding by consumers of what carbon neutral actually means.[58]

[55] See, for example, McCluskey & Swinnen (2004), *Political Economy of the Media and Consumer Perceptions of Biotechnology*. American Journal of Agricultural Economics, 86(5); and Lusk & Marette. (2012), *Can Labelling and Information Policies Harm Consumers?*. Journal of Agricultural & Food Industrial Organization, 10(1).

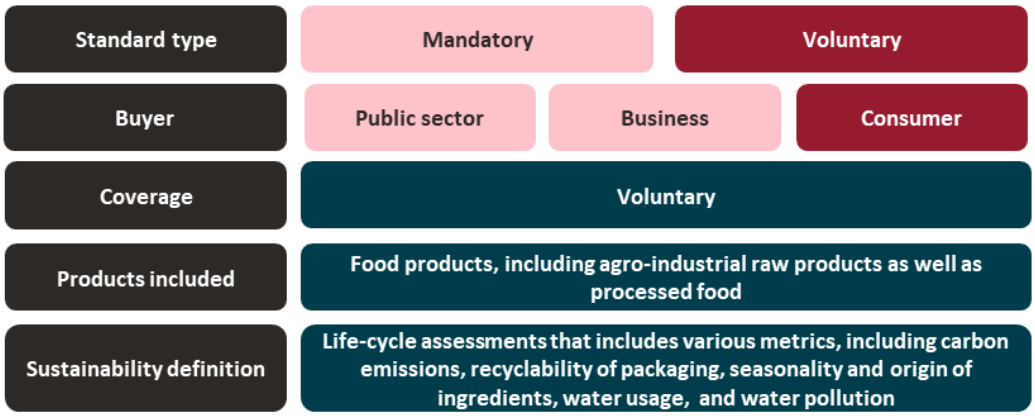
[56] https://www.carbontrust.com/resources/product-carbon-footprint-labelling-consumer-research-2020

[57] See https://www.carbontrust.com/zh/node/51 and https://hbr.org/2019/07/the-elusive-green-consumer

[58] https://www.foodbusinessnews.net/articles/22486-lawsuit-focuses-on-evians-carbon-neutral-claim

Competition in food eco-labelling: Eco-Score and Foundation Earth

Figure 10 Summary of voluntary eco-labelling food policies



There are a growing number of voluntary eco-labelling schemes for food products. These policies include Eco-Score, a French environmental impact label, and Foundation Earth's eco-impact score label. Both of these policies are currently being trialled in the UK.

Eco-Score is a French standard for labelling food products targeted at consumers, which has been piloted by several large European retailers including Lidl, Carrefour and Colruyt.[59] Based on publicly available LCA product data, it scores products from A (low) to E (high) according to their environmental impact. This score takes account of manufacturing, transport and packaging impacts, supplemented by data from producers on recyclability, geographic origin and seasonality of ingredients.[60]

Foundation Earth has developed its own food environmental impact scoring system,[61] currently being piloted by retailers including Aldi, Lidl, Morrisons, Tesco and Sainsbury's. This labelling policy is also based on a LCA method and takes account of a product's carbon emissions, water usage, water pollution and biodiversity impacts to assign a rating from A (best) to G (worst). The Foundation Earth eco-impact label pilot began in 2021 with the aim of rolling out a Europe-wide scheme by autumn of 2022. However, this has been delayed, with Foundation Earth citing competition between different front-of-pack food labels as a major factor in this delay.[62]

[59] https://solutions.shopmium.com/en/the-eco-score-labelling-is-gaining-ground/

[60] https://docs.score-environnemental.com/v/en/

[61] https://www.foundation-earth.org//how-it-works/

[62] https://www.foodnavigator.com/Article/2022/06/15/Foundation-Earth-calls-for-harmonised-approach-to-eco-labels-This-is-our-opportunity-to-put-commercial-pressure-and-national-politics-to-one-side

Strengths of policy

Food labelling policies such as Eco-Score and the Foundation Earth eco-impact score:

- **Provide valuable information to consumers.** These food labelling schemes are generally popular with consumers, with 88% of Europeans reporting that sustainability labels should be compulsory on food products, according to the 2019 Eurobarometer survey.[63] Individually, these schemes are also clear and concise, with each label providing a single easy-to-interpret score which is comparable across products.
- **Account for wider sustainability concerns.** These labels go beyond just assessing carbon emissions impacts to include wider measures of sustainability such as water usage, recyclability and geographic origin. This enables them to be adapted to align with different policy objectives and allows consumers to form a more-comprehensive overall view of the emissions and welfare impacts of a product.

Design and implementation challenges

These policies also highlight some of the general challenges faced by voluntary standards.

- **Proliferation of schemes increases confusion for customers and burden on manufacturers.** By competing for prominence, these different schemes reduce the chance of success by one label being adopted across Europe's grocery market. They also risk confusing consumers. While the Eco-Score and Foundation Earth labels both use LCA analysis, they use different data sources and include different weightings and measures of sustainability. This is a significant barrier to the overall effectiveness of these labels in the market.
- **Data availability and transparency is a challenge.** Foundation Earth has reported that access to high quality data is a major barrier to assessing the environmental impact of food products, with more incentives for transparency and accurate product-level LCAs needed in the supply chain.[64]
- **The overall effectiveness of voluntary food labels is limited when compared to the potential impact of mandatory standards.** The intent-action gap remains an issue for food labelling schemes. There is some evidence that eco-labels change food purchasing decisions, with one study in a Belgian supermarket finding that a "simple but comprehensive" eco-label increases the LCA scores per calorie (i.e. the eco-friendliness) of their subjects' food consumption by around 10%.[65] However, this is a relatively limited impact compared to the proportion of consumers who report that labelling should be compulsory.

[63] https://www.just-food.com/analysis/food-eco-labels-are-imperfect-but-consumers-want-them/

[64] https://www.foundation-earth.org/a-year-of-foundation-earth-ecolabelling-5-things-we-have-learned/

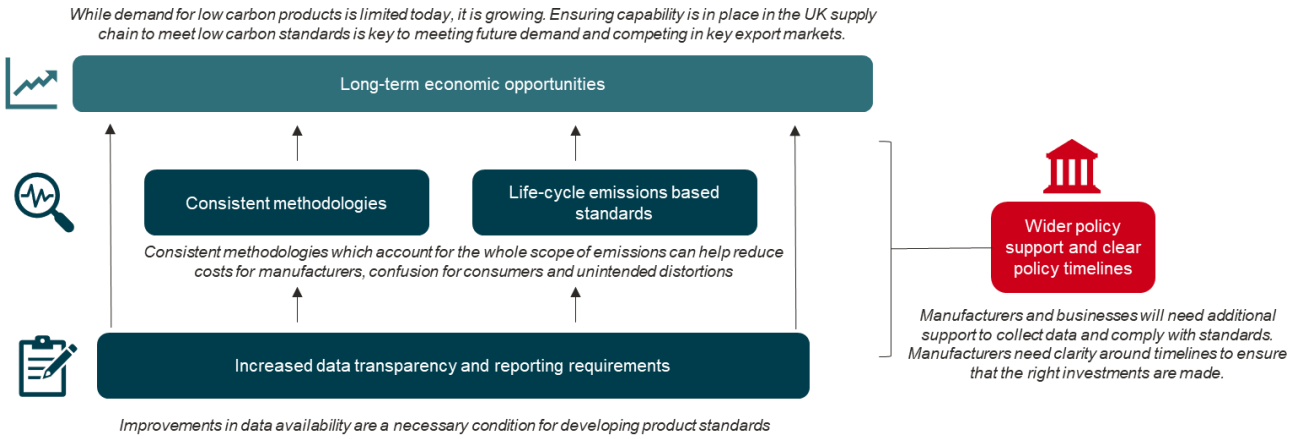
[65] Vlaeminck, Jiang, & Vranken. (2014), *Food Labeling and Eco-Friendly Consumption: Experimental Evidence From a Belgian Supermarket*. Ecological Economics, 108.

Industry needs and implementation considerations

To further understand good design principles and the considerations needed to avoid unintended consequences from product standard policies, we explored the potential for product standards to influence demand for industrial goods with industry stakeholders. This evidence was gathered through three separate in-depth, hour-long interviews with experts from the steel, food & drink retailing, and construction sectors; a workshop with 22 decarbonisation experts from industry, think tanks and academia; and further written responses and review of this paper from industry stakeholders.

The key input received by stakeholders is summarised in **Figure 11** below and explored in greater detail in the remainder of this section.

Figure 11 Summary of industry input on policy support needed to implement effective product standards



Demand for low carbon products is growing, but carbon is still a lower priority concern than cost and quality for consumers and businesses

Experts across multiple industries reported that **demand for low carbon products is increasing, but that this demand represents a relatively small portion of the market**. Customers and businesses still primarily make decisions based on price and quality, with carbon intensity and other environmental factors a secondary concern.

- In the food & drink sector, there is growing consumer interest in sustainability and sustainable products. However, this demand is largely being driven by younger generations and more affluent consumers. Demand for low carbon products has yet to reach the tipping point where it is a major driver for the whole market.
- Steel industry experts reported that demand for low carbon steel is growing, with companies entering into long-term agreements to purchase defined quantities of low carbon steel in the

future.[66] While demand for low carbon steel varies by end-market, there is increasing demand from areas such as the automotive and construction sectors where businesses want to certify to customers that their scope 3 emissions are low. However, cost and quality are still the major driver of steel purchases, and carbon intensity concerns need to be balanced against broader business objectives including community impacts, resource scarcity, supply chain risks and product safety.[67]

- Carbon intensity is also of growing importance to purchase decisions in the construction sector. Stakeholders reported that as more businesses adopt net zero targets, demand for low carbon products and information on the environmental performance of products is increasing. However, again, emissions-related concerns need to be balanced against other business objectives and are not the main driver of demand in the market.

This is consistent with evidence submitted in the recent Call for Evidence published by BEIS on policies that can support the market for low carbon emissions industrial products.[68] Respondents to the Call for Evidence also reported that, while there is growing demand for low carbon products, it is currently too small in most cases to support a business case for investing in low carbon production.

Overall, while demand for low carbon products may continue to grow over time, it does not appear to be significant enough to drive major reductions in the emissions intensity of production in the near term. Stakeholders consulted for this report suggested that voluntary standards alone would not be enough to drive the required improvements in the emissions intensity of production, with mandatory standards needed to see significant change, although a minor proportion of stakeholders suggested that voluntary standards may still be beneficial as a transition to mandatory standards. By implementing mandatory product standards, government can also ensure that industry is competing on a level playing field and that companies that push further on reducing emissions are not put at a competitive disadvantage.

Enact policies to require data transparency and reporting

The experts engaged for this report indicated that data transparency and reporting requirements are a necessary condition for effective product standards and can enable further industry action. They consistently reported that improvements in data collection and transparency

[66] See, for example, the agreement by BMW Group to purchase low carbon steel from Salzgitter AG. Available at: https://www.press.bmwgroup.com/usa/article/detail/T0366413EN_US/bmw-group-significantly-increases-use-of-low carbon-steel-at-european-plants?language=en_US

[67] See, for example, Frontier Economics and DNV (2021), *Improving the Market Benefits for Lower-carbon Industrial Production In Scotland*, where cement stakeholders reported the importance of considering building safety standards alongside the emissions intensity of products.

[68] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1092716/market-low-emissions-industrial-products-cfe-summary-responses.pdf

could have a significant impact on efforts to improve market benefits for low carbon products and that this should be an area of focus for policymakers.[69]

Lack of consistency in datasets and frameworks was cited as a major barrier across a variety of industries such as food & drink, steel, and construction. Putting in place data collection and reporting requirements is necessary both for creating the standard itself (as this standard needs to be based on robust industry data in order to be effective) and for ensuring that manufacturers are able to comply with any voluntary or mandatory standards that are enacted. While data transparency is not sufficient by itself to lead to significant decarbonisation, it can still support businesses to make informed decisions about their purchases even when not accompanied by mandatory standards.

- Experts in food & drink retailing reported that meeting a strict mandatory standard today would be difficult for most products and manufacturers. There is not currently the capability within the supply chain to be able to get the data and understand what to do with it, let alone then reformulate a product to be able to hit that target. These manufacturers need to be encouraged to collect this data. This increased transparency and traceability needs to be implemented at all levels of the supply chain.[70]
- Experts in the construction sector indicated that lack of information was a significant barrier to establishing baselines and standards in the industry with respect to how to define low carbon products and which products to purchase. While this information largely exists and manufacturers of products that are used in construction collect the relevant data, this data is not readily available or shared consistently. Experts reported that even without mandatory standards, increased information availability would help encourage the construction sector to build lower-emissions products.

"There is not currently the capacity and capability within the supply chain to be able to get the required emissions data and understand what to do with it." ~ food & drink sustainability expert

However, these reporting requirements lead to costs for manufacturers. These costs are more significant for smaller firms, which may need more support in order to comply with increased data collection and transparency. They can also be more difficult for manufacturers in developing countries to comply with, with stakeholders reporting concerns that product standards can be discriminatory against small enterprises in low-income countries due to the demands and resource costs of complying with certification processes. As a result, it is also important to ensure that data collection requirements are proportionate, in order to avoid placing too high a burden on SMEs and enterprises in low-income countries.

[69] In addition to being necessary for the design and implementation of product standards, reporting requirements can assist with the operation of other decarbonisation policy mechanisms. For more information on this, see Energy Systems Catapult (2022), *Carbon Accounting in Industry: Learning from the South Wales Industrial Cluster*.

[70] For an example of this issue of traceability in practice, see WWF (2021), *Packaging Unwrapped: Exploring the Environmental Impacts of Global Materials Flows Relating to the UK's Packaging Consumption*, which outlines issues related to the data transparency in the supply chain of packaging.

Experts indicated that it was important to move towards a position where all manufacturers in the market (including smaller firms) are able to disclose carbon-related data in order to form an accurate picture of the market as a whole. Limiting the proliferation of different reporting requirements, targeting these requirements carefully, and providing smaller firms with the subsidies and technical support to meet these requirements could help to limit negative impacts on smaller manufacturers.

Ensure methodologies account for products' whole life-cycle climate impact

Stakeholders also consistently reported that, where possible, the whole life-cycle of emissions should be included in the measure of emissions intensity. Taking a life-cycle approach can avoid distortions and unintended substitution between products. As an example, embodied carbon may appear to be the same between two products, but, at the end-of-life stage, one will go to landfill while the other will be recycled. Use-related emissions are also significant for some products, representing the majority of emissions for carbon-intensive products like buildings.[71] A life-cycle approach would allow consumers to distinguish between these products and select the one with the lower-emissions impact, while an embodied carbon standard would not. Stakeholders also indicated that it is particularly important to consider the potential for reuse, remanufacture and repurposing of some products, as the potential for reuse and remanufacturing can have a significant implication for the relative carbon intensity of products such as automotive parts over their lifetime. The importance of assessing the whole-life impact of a product also means that **standards should be applied throughout the supply chain to both intermediary and finished products.** While a few stakeholders consulted for this report suggested that standards should target more homogenous, upstream materials first, in general, stakeholders reported that standards should apply across supply chains.

This report focuses on the role of product standards in mitigating carbon emissions. While not every environmental objective can be addressed through a single standard, stakeholders suggested that measurements of emissions intensity should be considered alongside other measures of environmental sustainability and policy objectives where possible. Other measures of sustainability, such as water usage and biodiversity, affect the environmental impact of products. Reducing the emissions intensity of production could also be at odds with other wider objectives like improving animal welfare in farming,[72] and introducing new requirements for manufacturers could have implications for policy objectives such as the levelling-up agenda.[73] If these wider considerations are not considered, emissions-based standards risk undermining wider policy objectives or leading to negative environmental impacts overall despite reducing carbon emissions.

---

[71] Koezjakov et al. (2018), *The Relationship Between Operational Energy Demand and Embodied Energy in Dutch Residential Buildings.* Energy and Buildings (165).

[72] For example, land use is a key component of agricultural emission (for more information, see Intergovernmental Panel on Climate Change (2020), *Climate Change and Land*). As a result, agricultural methods which require more land, such as free-range farming, can increase animal welfare but put upwards pressure on emissions, all else being equal.

[73] For example, deployment of lower-carbon production methods may require access to inputs which are more difficult to access for manufacturers in more dispersed locations and less industrially concentrated areas. For more information on the challenges of decarbonising in industrial clusters and dispersed sites, see The Aldersgate Group commissioned report *Accelerating the Decarbonisation of Industrial Clusters and Dispersed Sites*.

Ensuring clarity about the objectives for particular standards, including their role (if any) in meeting wider environmental objectives, is therefore important. This may also be a reason to avoid overly prescriptive standards that lock manufacturers into particular technologies, which limits the potential for innovation and the development of new technologies. Some stakeholders suggested that standards that were output based, rather than prescriptive of certain technologies, are more likely to encourage innovation.

However, full life-cycle declarations are relatively complex, which can create difficulty for implementing life-cycle based standards for some products. The information requirements of complying with LCAs can be significant, particularly for smaller manufacturers with fewer financial resources and a lack of the required expertise. This is a barrier in the food & drink sector, where there is not currently the capacity and capability within the supply chain to get the data required and understand what to do with it. Due to the depth of analysis required, LCAs may not be scalable to markets with high numbers of differentiated products. Improving the availability and transparency of information over time could help to overcome this. However, in industries with a large number of products, undertaking full LCAs and EPDs for every product may not be practical or scalable. In these cases a different measure of environmental sustainability may be needed in order to implement these standards in the necessary timeline.

Act to support the development of consistent and unified standards

The emissions-related data collected also needs to be translated into consistent methodologies**. A unified approach should be taken to product standards in order to reduce the burden and cost on suppliers as well as the potential of confusion for customers.** There is potential for these unified standards and methodologies to be based on existing standards and to consolidate multiple existing standards in the market.

A growing number of standards are emerging in the market, and stakeholders reported that this was an issue across multiple industries for both consumer-facing and intermediary products. This lack of consistency creates confusion around what constitutes low carbon for both consumers and manufacturers and poses a barrier to decarbonisation.

- In the food & drink sector, multiple sustainable standards like Eco-Score, Foundation Earth and Planet-Score all use different methodologies, increasing confusion for consumers.
- In the construction sector, methodologies for assessing carbon emissions like those of the Royal Institute of Chartered Surveyors do not always align in terms of what is included within the carbon measurement, limiting the comparability of buildings and materials.
- In the steel sector, the same steel product will often have multiple measures of carbon intensity due to a lack of alignment across different standards, increasing the administrative burden on steel manufacturers and creating confusion for customers.

Consistent methodologies may also assist some sectors to decarbonise even without mandatory standards. For example, experts in the construction sector reported that voluntary steps were already being taken to reduce the emissions intensity of new buildings due to pressure from customers and that availability of an agreed methodology for assessing low carbon products would support them in

continuing to do so. Experts in food & drink decarbonisation also reported that, with a consistent methodology and improved data availability, businesses were likely to continue investing in decarbonisation in the near future. More generally, a clear standard that sets out what a good baseline for carbon intensity is can support businesses to procure lower-emissions intermediate products and reduce the emissions intensity of finished products, even if this standard is not mandatory. This can help develop more capability in the supply chain to meet low carbon standards and transition to a mandatory standard in the longer term.

Provide a clear timeline for policy implementation and continue to work with industry to design reporting requirements and product standards

Collecting the data required to design and comply with low carbon product standards takes time, and deploying new production methods will require significant investments. While stakeholders largely reported that supply will be able to adjust to low carbon standards, the time required for this adjustment depends on the rigidity of the standard set and the industry in question. Capital investments in heavy industry are long lived, with assets in sectors like steel lasting for 20 years or more. **As a result, manufacturers need notice to respond to major changes and avoid risks of inappropriate long-term investments and stranded assets.** The UK government has taken some important steps in this direction with the *Industrial Decarbonisation Strategy,* but it should continue to provide more details on the implementation timing and nature of voluntary and mandatory product standards where possible.

Policymakers should also continue to work with industry to design these timelines and future decarbonisation policies. Designing product standards can be complex, and policymakers should engage with industry to determine the relevant low carbon standards for different products and the appropriate parts of the supply chain at which to enforce these standards. Stakeholders highlighted the importance of working with industry to ensure that these standards are progressive and increase in ambition over time. Product standards that continue to evolve can avoid anchoring manufacturers to current technologies and create an ongoing incentive to innovate. Stakeholders also emphasised the importance of working with existing initiatives such as ResponsibleSteel to leverage existing efforts and accelerate the development of product standard policies where possible.

Ensure the necessary wider policy support is in place

Beyond clear policy timelines, wider support will be needed for manufacturers to adapt to low carbon standards. Decarbonising will require changes in production methods and technologies for many industries, with manufacturers needing to make use of tools such as electrification of heat, low carbon hydrogen, and carbon capture and storages technologies. This will require critical infrastructure like carbon storage, hydrogen networks and affordable green electricity to be available. Manufacturers may also need support to offset increased costs from decarbonisation in order to continue competing with manufacturers abroad who do not face the same costs and to avoid increasing costs for consumers. Smaller manufacturers without the current capability to collect detailed carbon emissions data may also need support to adapt to any data transparency requirements.

Overall, stakeholders emphasised that **product standards cannot be effective in driving decarbonisation alone and are but one part of the policy support needed.**

Building on its Industrial Decarbonisation, Hydrogen, and Net Zero Strategies, government should prioritise the creation of a clear policy framework for the decarbonisation of the UK's heavy industries and manufacturing sectors. In particular, this framework should aim to create certainty about the availability of low carbon fuels and technologies such as hydrogen and CCUS. Uncertainty about the technological route that a given company can take to reduce its emissions is stifling investment and increasing the risk of carbon leakage while undermining international competitiveness. In particular, government can complete the hydrogen and CCUS business models to provide a clear investment signal for these technologies.

Similarly, government should act swiftly to finalise reforms to UK electricity markets[74] and the UK ETS,[75] both of which have been subject to recent consultation. Effective electricity (and energy) markets and the resulting prices for industry are key to decarbonising industrial processes and meeting low carbon product standards, while visibility of future (free) emissions allowances will provide an important investment signal for low carbon technologies.

The broader support needed for UK industry to decarbonise is explored in more detail in The Aldersgate Group commissioned report *Accelerating the Decarbonisation of Industrial Clusters and Dispersed Sites.*

Work with policymakers abroad to ensure that standards and methodologies adopted in the UK are consistent with those adopted internationally

Experts consulted for this report emphasised that ensuring UK manufacturers have the capability to meet low carbon standards will support longer-term economic opportunities. Developing consistent standards and ensuring manufacturers have the capability to meet them will ensure that UK manufacturers are able to compete internationally as these standards become more stringent and may lead to positive spill-overs and carbon reductions abroad if these standards and tools are adopted internationally.

While demand for low carbon products is limited today, experts consistently reported that being able to evidence and meet low carbon standards is important for maintaining access to existing export markets and gaining a share of new markets. In particular, they cited the measures being undertaken in the EU to develop low carbon standards for food, drink and wider industrial products.[76] The EU is a significant export market for the UK, representing 48% of all UK goods exports in 2021. This is even

[74] For more information, see UCL, commissioned by the Aldersgate Group (2022), *Separating electricity from gas prices through Green Power Pools: Design options and evolution* and UCL, commissioned by the Aldersgate Group (2021), *Delivering Competitive Industrial Electricity Prices in an Era of Transition*

[75] For more information, see the Aldersgate Group response to the BEIS consultation (2022) *Developing the UK ETS*

[76] See for example https://www.eesc.europa.eu/en/our-work/opinions-information-reports/opinions/towards-sustainable-food-labelling-framework-empower-consumers-make-sustainable-food-choices and https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products_en

higher for sectors like food & drink, where the EU represented 56% of UK exports in 2021.[77] As the EU and other jurisdictions introduce more stringent sustainability and carbon standards, UK manufacturers will need to be able to meet or exceed these standards in order to remain competitive in these markets. To do so, UK-based manufacturers will need to have both the capability to collect and report the required emissions data and access to low carbon technologies and infrastructure. It is therefore important that these standards are aligned internationally and consistent across sectors.[78]

International alignment of standards has already begun to happen in some markets. Stakeholders consulted for this report indicated that efficiency standards in the automotive sector have become international due to the relatively low number of global manufacturers of cars, with these manufacturers needing to maintain databases to establish their compliance. This suggests that there may be scope to standardise methodologies in other industrial sectors dominated by a relatively small number of global manufacturers by encouraging these large manufacturers to consistently report the data they are each collecting about carbon in production and make it more transparent, yielding benefits for the market as a whole.

Export manufacturers, both in the UK and abroad, will face additional costs if they are subject to numerous product standards and methodologies for collecting, reporting and verifying their emissions data. With this in mind, the UK should also seek to develop product standards in such a way that ensures their future interoperability with other product standards developed elsewhere. This will also allow the UK to pursue ambitious product standards and targets, while allowing for future adoption from other countries as they implement measures of their own. There is an opportunity for the UK to take a leadership role here and to shape best practices internationally. Experts in construction indicated that the LCA undertaken for HS2 helped to shape thinking around LCAs in the wider market and with developing tools like One Click that are now used internationally for measuring carbon emissions from construction.[79] Given the UK's position as a global financial centre, reporting requirements and measurement tools implemented in the UK can incentivise greater reporting globally and support future development of carbon standards.

As co-chair of the United Nations' Industrial Deep Decarbonisation Initiative, which aims to put forward a product standard and green public procurement criteria for steel and cement during the 2023 Clean Energy Ministerial, the UK government is already taking a leading role on the global stage and should encourage more countries to become signatories to the initiative.

[77] Food & Drink Exporters Association (2021), *2021 Trade Snapshot*.

[78] The UK is already involved in initiatives to support this for some sectors. See, for example, the Industrial Deep Decarbonisation Initiative, led by the UK and India, which aims to standardise carbon assessments. Available at: https://www.unido.org/IDDI

[79] For information on the use of One Click, see https://www.oneclicklca.com/infrastructure-life-cycle-assessment-case-study/

Overall recommendations for policymakers

Product standards can play an important role in decarbonising UK industry and creating markets for low carbon products. Based on a review of evidence on the effectiveness of product standards, a review of product standards policies internationally and input from industry stakeholders and experts, we set out the following recommendations concerning the design and implementation of product standards.

To stimulate the creation of markets for low carbon industrial products, the government should outline a clear direction of travel for the development of product standards policies. Policymakers should deliver ***a package of measures that results in well-designed mandatory standards. They should:***

Recommendation 1: Implement mandatory product standards aimed at creating demand for low carbon industrial goods and materials, outlining clear timelines for their introduction.

In order to make the right investments in low carbon production today, manufacturers and businesses need clarity on the policy measures that will be implemented in future, particularly those that will support the creation of markets for low carbon products. As product standards can create direct demand for low carbon products, they are one of the most effective tools that government has to stimulate decarbonisation. They also support the competitiveness of UK manufacturers by levelling the playing field with low-cost, high carbon imports. Industry stakeholders reported that demand for low carbon products is growing, but carbon is still a lower priority concern than cost and quality for consumers and businesses. As a result, in many industries, voluntary standards alone are unlikely to drive the required improvements in the emissions intensity of production in the near term and government should pursue the implementation of mandatory standards to create significant change.

In the near term, there are several key actions that policymakers can take to support the implementation of effective product standards. Policymakers should:

Recommendation 2: Assign responsibility for developing and implementing mandatory product standards to an existing or new institution.

Due to the complexity of creating a product standard, government should assign an institution to work closely with industry in order to develop an efficient set of product standards that drive decarbonisation in the most impactful areas. This institution should also coordinate with international efforts to define low carbon products (for example, initiatives such as ResponsibleSteel) in order to leverage existing expertise and accelerate the development of low carbon standards for key products. Working with industry and existing product standards initiatives could allow government to focus on the highest-emitting sectors or areas that will be the most challenging to decarbonise, and minimise any unintended consequences (e.g. minimise the cost of new production processes).

In addition to working with industry to design the standards, this institution should work to ensure that the necessary measures for the implementation of these standards, such as data collection, reporting requirements and mechanisms for enforcement, are in place.

Recommendation 3: Enact policies to require data transparency and reporting as soon as possible.

A key message from industry stakeholders consulted for this report was that a lack of data on the embodied and life-cycle emissions of different materials and products, and a lack of transparency on how this data is collected and verified, is a key barrier to the development of reliable low carbon product standards. Consistent and robust data on the emissions intensity of production is a critical part of both the design and implementation of low carbon product standards, as it is needed to determine the relevant low carbon product standard and to enable manufacturers to comply with this standard. As a result, data collection needs to be standardised and start immediately, across supply chains. The institution assigned responsibility for developing and implementing mandatory product standards should also be responsible for ensuring that data and reporting requirements are put in place and for supporting the collection of this data. Putting in strong data collection and reporting requirements today will enable suitable mandatory carbon standards to be set in future and will directly affect company behaviour and the development of voluntary standards today.

In some cases, the required data is already collected by manufacturers and needs to be made more transparent. However, in some industries, there is not currently the capacity or expertise within the supply chain to capture and analyse this data. As a result, policies mandating data transparency and reporting should be accompanied by support from policymakers to develop this capability within the supply chain. They should also be designed to ensure that relevant information is captured, while limiting the administrative burden put on manufacturers in general. This is particularly important for SMEs and manufacturers in lower-income countries, which may have more difficulty collecting the required data due to resource and capacity constraints or knowledge and training gaps. Government should also provide specific support to SMEs which may have difficulty in collecting and reporting this data where necessary.

Recommendation 4: Develop product standards that apply throughout the supply chain to both intermediate and finished products.

One of the primary considerations of our engagement with industry related to whether product standards should be applied directly to specific materials, such as steel and glass, or to finished products, such as cars and buildings. The former could create demand for specific low carbon materials but may be more complex to implement and create the potential for material substitution, while the latter could stimulate demand across multiple parts of the supply chain at once but may not provide such a strong demand signal. Given the relative merits and challenges of both, and the need to create demand for specific low carbon materials and drive change across the economy, government should work with industry to understand where best to apply standards in the supply chain. Government should also work with industry to implement complementary standards on both intermediate and finished products in order to have the maximum impact on both demand and decarbonisation. Where standards are applied to both a finished product and intermediate product in

the same supply chain, policymakers should avoid establishing multiple standards for the same material as this risks creating confusion for manufacturers and consumers.

Recommendation 5: Develop consistent and unified standards, and ensure methodologies account for products' whole life-cycle climate impact.

The growing number of standards and methodologies creates confusion in the market for consumers and businesses and represents a significant administrative cost for manufacturers. Creating a unified standard for each product and industry will reduce the costs of complying with standards for manufacturers and create stronger incentives for decarbonisation by providing a clear target for what defines a low carbon product. In some cases, there may be scope for existing standards to be consolidated or replaced by an agreed low carbon standard. Government should review the full range of standards that apply to each of the sectors and, in cases where a carbon standard might overlap with other standards, seek to consolidate them when introducing the carbon one.

Where possible, these standards should account for the whole life-cycle of product emissions as well as wider measures of climate impact to avoid unintended consequences and market distortions. For some products, it may be necessary for standards to include criteria for reuse, remanufacture and repurposing of materials in order to minimise long-term emissions impacts. Overall, there is a need for clarity about the objectives for the standard. This report focuses on standards aimed at mitigating carbon emissions. Not everything can be addressed through a single standard and, trying to address a more complex measure of climate or wider environmental impacts through a single standard, can lead to increased complexity and longer implementation timelines. However, standards for carbon intensity should still be designed to minimise the risk of unintended negative consequences on other environmental outcomes where possible. These standards should also apply equally to both domestic and imported products in order to avoid putting UK manufacturers at a disadvantage relative to less-regulated competitors abroad, distorting demand in favour of imports to the UK.

Recommendation 6: Increase the ambition of mandatory standards over time to ensure that standards continue to encourage innovation and decarbonisation.

Standards should continue to evolve to create an ongoing incentive to reduce the carbon intensity of production and support long-term decarbonisation. While it is important to set an initial standard that is achievable for manufacturers at present, if this standard remains static over time it risks anchoring manufacturers to this initial standard and the technologies available today. To encourage continued investment and innovation to support decarbonisation, mandatory standards should be progressive and change over time to incentivise an ongoing shift towards lower carbon production techniques and new solutions. In addition to being progressive and increasing in ambition over time, these standards should also be designed in such a way that they are not overly prescriptive, as overly prescriptive standards can risk limiting innovation. The changes to these standards should be clearly signposted by policymakers in order to give manufacturers time to adjust and to ensure that the right investments are put in place.

Recommendation 7: Work with policymakers abroad to ensure that standards and methodologies adopted in the UK are interoperable with those developed internationally.

The growing number of carbon-intensity standards and methodologies for the same group of products imposes additional costs on manufacturers, businesses and consumers. While standards adopted domestically should be consistent with one another, standards used in the UK also need to be consistent with those adopted internationally. For UK-based manufacturers to comply with standards adopted in export markets, they need to be able to collect the emissions data required by those standards. These manufacturers will face additional costs if the data and production methods needed to comply with standards internationally differ from those standards in the UK. For example, the EU will start monitoring the carbon content of imports from April 2023 in preparation for potentially implementing a carbon border tariff adjustment.

More generally, differences in standards domestically and abroad create trade frictions and inefficiencies in global supply chains. To support global decarbonisation, policymakers in the UK should work with policymakers internationally to develop standards and limit the negative impacts on importers and exporters that result from additional administrative burden and inconsistency in standards. Where standards set in the UK are more ambitious from an environmental standpoint, as part of trade policy, policymakers in the UK should encourage policymakers internationally to adopt UK standards. This could help to ensure interoperability without compromising the level of ambition of UK standards.

Moreover, as other countries adopt similar measures, improving the interoperability of different standards will allow for greater and more efficient global cooperation on industrial decarbonisation.

In the longer term when designing and implementing specific product standards, policymakers should:

Recommendation 8: Account for drivers of consumer behaviour when designing standards in order to maximise their impact on consumers.

When designing product standards, policymakers should take account of behavioural insights and consumer values in order to maximise the impact of these standards on demand. While mandatory standards can have significant impacts on decarbonisation, standards which differentiate between compliant products (such as through product labels) can be even more effective in creating demand for low carbon goods. Research into the effectiveness of product labels consistently demonstrates the importance of the design of these labels, with their clarity closely tied to their impact on demand. Labels that leverage social influence, for example by indicating the choices that other consumers have made, can also significantly shift demand towards low carbon products.

While data transparency and reporting requirements need to be put in place before these standards and labels can be adopted by the wider market, when implementing specific standards, policymakers

should account for how they will be received by consumers, and not just how (and whether) manufacturers and businesses can meet them.

Recommendation 9: Build on the Industrial Decarbonisation and Net Zero Strategies to deliver a clear policy framework for industrial decarbonisation.

As illustrated in **Figure 1**, demand-side policies are part of a wider policy framework. While product standards can be used to create incentives for decarbonisation, manufacturers and businesses need support in order to respond to these incentives. This includes supporting the provision of cost-competitive low carbon electricity supply[80] and ensuring that the necessary low carbon infrastructure is in place, that manufacturers have support for deploying low carbon technologies that are not currently cost effective, and that competitiveness support is in place where there are differences in input costs between the UK and other countries, linked to faster climate progress in the UK (particularly for SMEs, which may find it more difficult to decarbonise their operations than larger companies, or those based in industrial clusters with greater access to decarbonisation options).

Many stakeholders highlighted that the absence of wider policy support or clarity regarding their pathway to emissions reductions (such as fuel switching versus CCUS) increases the risk of inefficient investment, which could lead to stranded assets that would negatively affect UK manufacturers' ability to compete with manufacturers abroad. BEIS should prioritise the completion of business model support for hydrogen and CCUS, address challenges to grid investment and renewable energy deployment, and complete the review of the UK ETS with clarity on the future cap on (free) emissions allowances going forward.

[80] For more information, see UCL, commissioned by the Aldersgate Group (2022), *Separating electricity from gas prices through Green Power Pools: Design options and evolution* and UCL, commissioned by the Aldersgate Group (2021), *Delivering Competitive Industrial Electricity Prices an Era of Transition*