Demand-side policies for industrial decarbonisation

A review of the function and effects of labelling schemes, product standards and procurement policies

September 2021

Bringing Ingenuity to Life
paconsulting.com

Contents

Overview

01

Executive Summary

Demand-side measures are essential to support the development of a market for low-carbon products. By stimulating demand through the introduction of product standards, labelling schemes or procurement policies, government can help consumers and producers work together to achieve net zero.

The purpose of this report is to summarise the available evidence and draw out key lessons learned, particularly common themes around success factors or barriers. It has sought to understand how demand-side measures have been adopted in the public and private sectors, the impact of such measures and the characteristics or conditions that improve success.

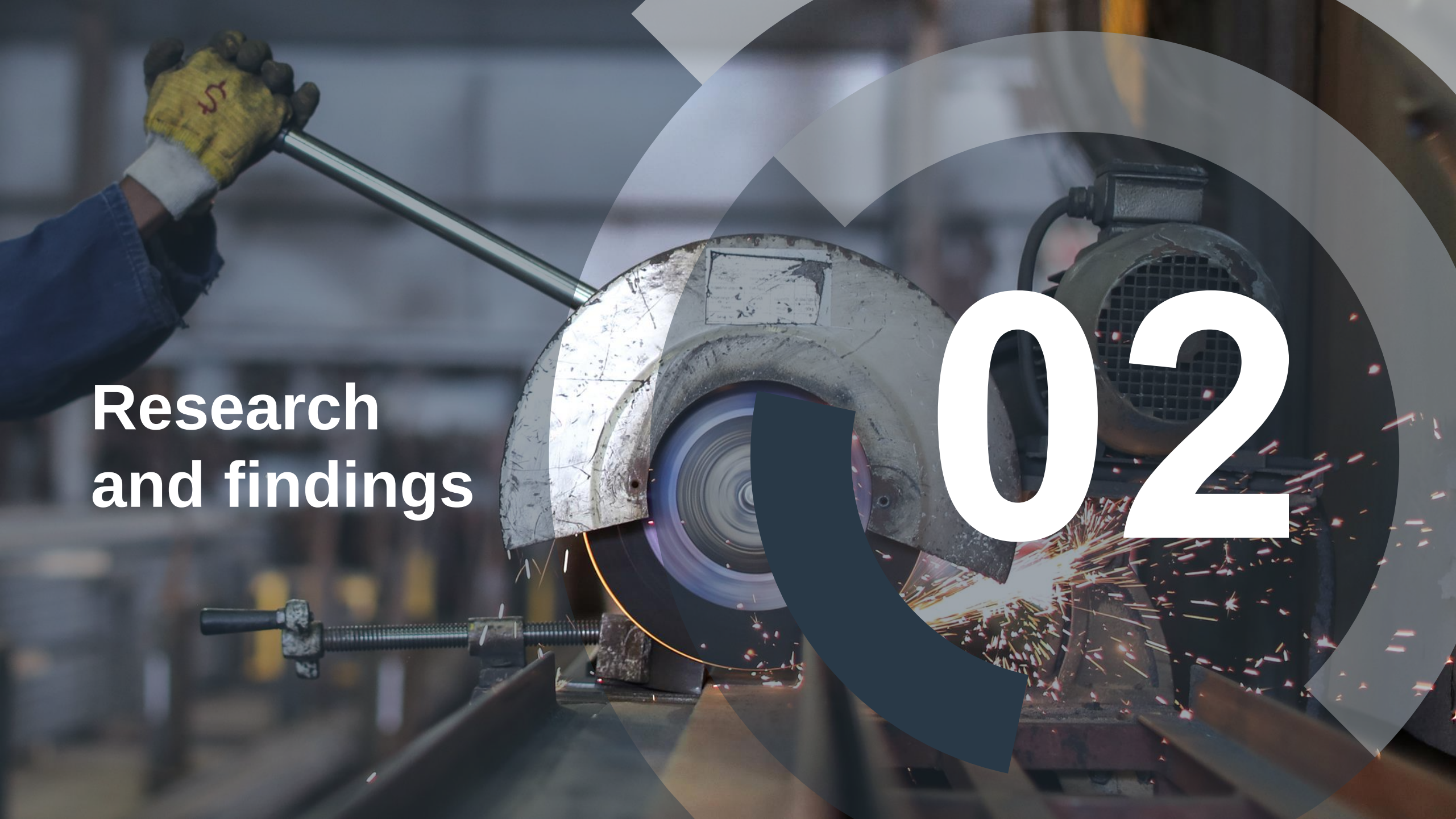
A mixed research approach of stakeholder interviews and a literature review has been undertaken to analyse a wide range of demand-side policies across sectors and geographies. Interviews, along with publicly available evaluations, lessons learnt reports and academic analyses of existing and past domestic and international demand-side measures revealed key areas of improvement. Insights on function, implication and impact were collated and reviewed to draw out strategic considerations for evaluating policy approaches.

There are more things we need to consider, including technology readiness, alignment between policies and specific considerations for SMEs. Policy makers need to consider how to raise sufficient awareness around any new measure and its objectives, ensure internal government resources are available for staff to gain the knowledge or skills needed to implement the policy, and be prepared to adapt to a rapidly evolving technological landscape.

There are significant opportunities to support industrial decarbonisation through demand-side measures.

To capture these, our recommendation is for the UK government to:

1. Develop a policy mix and map interactions and inter-dependencies to avoid ‘siloed’ policy design
2. Seek to harmonise demands on industry by aligning new policies with international standards
3. Beyond developing the right policies, identify the optimal intervention point in the system
4. Acknowledge industry’s long time horizons, and the associated risks of carbon lock-in, by giving early notice and being transparent about planning
5. Focus on rigorous criteria and verification methodologies
6. Consider mandatory options in favour of voluntary
7. Build on domestic skills to help industry harness the knowledge and innovation opportunities of net zero
8. Support the development and adoption of measurable and comparable impact indicators



02

Research and findings

Our understanding of the challenges faced by industry and policy owners

The insights in this section are drawn from desk-based research and stakeholder interviews to inform considerations of how future demand-side measures can be structured and delivered

Policy developments outpaced by technological advancements

Policy owners

- Establishing the optimal approach to technology in demand-side policy design mechanisms is difficult. Stakeholders have emphasised that policies almost never are entirely technology neutral nor that they should necessarily seek to be[1]. On the contrary, supporting certain technologies can be critical for industrial decarbonisation and also serve to create new green markets.
- The development of criteria for labels and standards is often time consuming and involves many rounds of stakeholder consultations. It also puts internal pressure on the policy owner to equip personnel with the right knowledge and capacities.

Small and medium sized enterprises

Industry

Small and medium sized enterprises typically have limited capacity and resources. Lessons learned from several demand-side measures[3] include the risk for smaller businesses to be disproportionately impacted by new reporting and data collection requirements.

Policy owners

Reconfiguring processes and operations to comply with new demands puts additional strain on businesses. Experts[4] have emphasised that policy design mechanisms need to take this into account and ensure that direct investments and innovation support are made available in tandem with or in advance of upcoming regulation or requirements.

Fragmented demands on industry

Industry

Businesses that sell multiple products or operate in more than one market may find they must comply with very disparate requirements[5]. This may also include navigating the varying scopes and objectives of different voluntary measures.

Similarly, the many different options can cause confusion amongst customers. Insufficient awareness of the cause or policy will fail to create market opportunities for participating businesses.

Policy owners

Requirements must balance what the industry is capable of and the overarching objective or end point. One way to do this is to develop the measure in close cooperation with stakeholders, an approach successfully implemented by the BSI[6]. This was one of the lessons learned of the EU Ecolabel – the requirements on some product groups were so strict that they repelled businesses from participating[7].

1. The Buy Clean California Act was also raised as a policy with technology neutral intent, but that, as it sets different GWP caps on different products that to certain extents compete with each other, or excluded certain materials from legislation, inevitably will end up favouring certain technologies. Interviewees included UCL and University of Manchester. Se also Gabbatiss 2021. 2. Interviews with EPD International and BSI 3. Buy Clean California Act, and interviews with the BSI and the University of Hull 4. BRE and BlueGreen Alliance 5. Interviews with University of Manchester and EPD International 6. The BSI have developed programmes of work that places particular emphasis on stakeholder involvement (these include Energy Smart Appliances and the Faraday battery challenge). 7. With the Swan Ecolabel, and former employees of the EU Ecolabel

Key barriers to the overall effectiveness of demand-side measures

We categorised the challenges faced by industry in the landscape they operate in, into challenges the policies need to address that reflect the ability of labels, standards and procurement policies to deliver on their objectives

- Identifying barriers and grouping them into six common themes allows for identification of policy options that will provide holistic support to industrial decarbonisation.
- Nuance exists around these common barriers for different policy types and individual policies. These specific challenges are captured in the policy type spotlights and policy assessments.

1	2	3	4	5	6
Buy-in: Awareness and engagement	**Operating under different regimes**	**Keeping up with technology**	**Know-how**	**Uncertainty, expectations and risk**	**Cost of compliance, particularly for SMEs**
BARRIERS					
• Any profusion of initiatives risks confusing, rather than stimulating demand. • Lack of public awareness of a standard or label will fail to create market share for participating businesses and the scheme may therefore struggle to be effective.	• International data availability, compatibility and verification for businesses operating in multiple markets. Manufacturing and supply chains are global and measures to manage and support these must be too.	• Rapid technological advancements could make it difficult to set effective targets.	• Capacity and resourcing limitations of policy owners, including government agencies or independent assessors, to supply adequate resources and training for personnel to implement requirements effectively.	• Initiatives vulnerable to reputational risk and loss of trust if there is lack of transparency in process. • Industry time horizons necessitate long-term notice of new regulation. • Could be difficult to quantify and measure impact.	• Varying degrees of technology readiness across sectors and business size may mean significant. upfront investments that require external support. • Complying with new requirements adds to administrative burden.

These are critical design considerations, specific to each policy type

Our analysis shows that these features and functions need to be reflected in new demand-side policy developments

Labelling schemes

Effectiveness hinges on consumer awareness

There is a potential contradictive relationship between the accuracy and accessibility of a label. Policies need to balance the complexity of the assessment with the need for clear messaging. While accuracy may increase trust for participating businesses, it also poses a risk of confusion at the point of consumption. Labels that communicate the underlying information via colour codes or scales, such as Energy Performance Certificates or LEED[1] will make the choice easier. However, simplifying the messaging comes at the cost of reducing scientific precision.

The policy assessments carried out in this study have shown that personnel procuring industrial products may not always have the expertise required to identify lower environmental impact products. Such B2B transactions may also require support to close knowledge gaps between purchasers and suppliers. Examples include Japan's Act on Promoting Green Purchasing and the Buy Clean California Act.

Product standards

Making processes more dynamic

To evolve with industry as it seeks to decarbonise, standards need to become more flexible and accessible[2]. This could be achieved by increasing digitisation efforts that, by extension, would bring down implementation costs. Stakeholders[2] have shared concerns that the process of developing standards might not be able to keep up with the current pace of low-carbon technological developments. This might be addressed by incorporating industry engagement to gauge the appropriate validity periods of assessments and certifications.

Pilot studies have found that more reiterative and accessible digital formats can increase compliance and efficiency. Digital systems can help record and manage data and track progress against standards. Solutions such as SMART (standards that are machine applicable, readable and transferable) have been developed by the ISO and IEC and are under review by the BSI. This automation process has applicability across a wide variety of sectors, including energy, academia and government[3].

Procurement policies

Staff knowledge and skills of the procuring institution are essential

Lessons learned[4] from Japan, South Korea and Sweden make clear that for a procurement measure to have effect, staff must be adequately equipped to integrate and implement it. This may include raising general awareness and the dissemination of information as well as offering upskilling and training opportunities.

Requirements to go hand in hand with direct investment and R&D

Lack of data availability and technology can make it difficult for industry to adapt to new requirements. The Buy Clean initiatives under development by several U.S. states and on a federal level have sought to address this by a gradual introduction of policies, including encouraging initial voluntary reporting so that benchmarks are set at appropriate levels, along with targeted direct investments and R&D[5]. Given similar challenges for other policy types, making supply-side support available might also increase the effectiveness of labelling schemes and product standards.

1.Interviews with University of Exeter and Hull 2. Interviews with BSI and EPD International 3. Interview with BSI, see also ISO 2018a, IEC 2019, Data Foundation 2020 4. Green Purchasing Network Malaysia 2017, Lundberg et al. 2015, Konkurrensverket 2017, UNEP 2017 5. According to BlueGreen Alliance, the estimated voluntary reporting period for Buy Clean is approximately 3 years to allow for: Initial guidance to manufacturers on the development and submission EPDs as they currently exist, Submission of a sufficient amount of EPDs by manufacturers to be reviewed and evaluated by the interagency process, Re-evaluation of EPDs as a sufficient reporting mechanism, and if necessary, development of a new reporting mechanism, Updated guidance to manufacturers on EPDs/potentially new mechanism, At the end of ~3 years, reporting via EPDs or new mechanism would become mandatory for entities looking to participate in the procurement process. See also OECD 2015

Demand-side policies can accelerate industry transition to net zero

Incorporating the design features on the previous slide can unlock significant opportunities

Labelling schemes

Increasing scope from product specific to company wide can ensure lasting effects

An innate limitation of labels is that they apply only to specific products or product groups[1]. If a company's practices outside of its eco-labelled product are able to continue on a business as usual trajectory, no real change will have been achieved. To ensure meaningful actions are being taken, policy makers should consider a whole systems or enterprise-wide view of labelling.

Product standards

Can provide cross regulatory certainty

In an increasingly complex context, where climate targets require coordinated policy design and implementation across sectors and levels, standards can be an effective cross-cutting delivery mechanism. In encouraging the development and adoption of low carbon products, standards could help in a number of ways. For instance, they could help both suppliers and consumers by establishing a definition of 'low carbon', to help manage supply chains and guide what technology to use[2].

Examples of standards that apply across sectors include BS 18477 – inclusive service provision[3]. The standard provides a framework for inclusive service and helps companies understand the underlying factors involved in consumer vulnerability, and work to develop processes to help with the problem. This standard is applied across sectors, including financial services, energy and telecoms. Other environmental standards that work across sectors include the ISO 50001: energy management systems, ISO 14001: environmental management and PAS 2060: Carbon Neutrality[3].

Procurement policies

Can wield significant influence over supply chain

Procurement policies are likely to most effective when carried out by influential actors in the supply chain[3].

Notably, these are not necessarily the consumers of finished goods, but could include actors higher up the value chain. Japan's Green Purchasing Act has demonstrated the potential for public procurement to stimulate the development and growth of new green products[5]. Recognising the pushback from industry in the face of new market regulation, such as the California Low Carbon Fuel Standard or Buy Clean acts, due to limited ability to adopt or scale up new technologies, public procurement can work as a precursor to prepare the market of upcoming regulations[6].

1. Interviews with University of Manchester, see also reviews of EU and Swan Ecolabels 2. Interviews with BSI and EPD International 3. BSI 2010, ISO 2018b, ISO 2015, BSI 2014 4. Interviews with University of Hull and experts at PA Consulting. See also resources from Healthcare Without Harm, available at: https://noharm-global.org/issues/global/why-sustainable-procurement 5. An analysis by Green Purchasing Network Malaysia 2017 showed that the market shares of all green products covered by the policy had increased since 2001 6. See slides 25-26, interviews with BlueGreen Alliance and UCL

Labelling schemes

Stakeholder reception

Despite the ambiguity of real and measurable effects of ecolabels on market shares and opportunities, businesses often cite this as their primary driver for joining the (voluntary) schemes[1]. Another success factor behind widely adopted labels is the establishment of a governance structure that closely engages with stakeholders[2]. In the case of the Nordic Swan Ecolabel, the initiative is run on market terms (only 5-10 % of revenue is state funding) - had businesses been unwilling for pay for its service and benefits, it would not have been able to continue operating[3].

Barriers to adoption

The number of trigger points – opportunities for actors to seek or be required to adopt the label – are a critical feature of increasing compliance. This holds particularly true for industries with long-term planning requirements, such as building and construction. Another type of trigger point is the use of Energy Performance Certificates as standards in the domestic and commercial rental markets, where since 2018, all rented property must have an EPC rating of at least 'E' [4].

In order to evolve dynamically with changing industry demand and technological advancements, labels need to take a holistic policy design approach. Adapting to new developments by creating sister labels for new indicators, such as net zero or biodiversity, risks causing further fragmentation to the demand-side policy landscape[5]. One example is the EU's forthcoming Product Environmental Declarations (PEF) that will have similar objectives to EPDs but place new demands on producers and are likely to be subject to long rounds of political negotiations[6].

Overall effectiveness – challenges and opportunities

In order to be attractive to businesses, labelling schemes must seek to stimulate consumer engagement around their cause. However, raising awareness alone might not suffice – consumers are primarily driven by cost and quality when making decisions, which may mean that the environmentally superior good must be competitive on price and quality, too[7].

A lesson learned from interviews is that initiatives that are anchored in or managed by industry rather than government tend to not only be better received by stakeholders but also more effective. This might be because they are better positioned to adapt to industry needs[2,3].

Several experts from labelling schemes have emphasised the importance of establishing trust. This might include the use of third party verification, which has recently been added as a feature to the California Low Carbon Fuel Standard[8]. Some labels, including the EU Ecolabel[9], have received criticism for not being sufficiently transparent around how assessments are made. At the same time, data sharing and access is sensitive and company participation will rely on labels agreeing to some kind of non disclosure agreement on how to protect their data.

1. Iraldo et al 2020, European Commission 2005 2. Interviews with the BRE Group, BBP and former staffers at the EU Ecolabel 3. Interview with Swan Ecolabel 4. Interview with the University of Exeter. 5. Interviews with University of Manchester and BRE Group 6. Interview with EPD International 7. Interviews with the University of Exeter and Hull, and PA Consulting. 8. Slide 26 9. WWF 2011

Product standards

Stakeholder reception

Setting a strong green standard is a balancing act between what is desirable and what is achievable. As has been the case for some of the schemes reviewed, including the EU Ecolabel[1] or early versions of Low Carbon Fuel Standard[2], standards that are too ambitious will repel rather than motivate businesses to participate. Policy design mechanisms that systematically engage with or consist of industry representatives appear to have been able to more dynamically address stakeholder feedback than those managed by a government body[3].

Barriers to adoption

Methodological challenges can be a barrier to compliance with some product standards. These can include data and capacity limitations of businesses in conducting life cycle analyses[2].

Another challenge is the relevance and longevity of a standard in a rapidly evolving technological landscape. Product standard negotiations and stakeholder consultations may take several years. Stakeholders have shared concerns that when the final product is delivered, its criteria will already have been outpaced by technological developments[5].

Industrial supply chains are international and interlinked, and many products are sold to several markets. Any given product may be exposed to and have to comply with a plethora of standards. Ensuring product standards work in harmony may help businesses keep costs down and reduce the administrative burden. This could include drawing on international methodologies such as through the ISO or CEN or avoiding the patchwork of regional initiatives through national efforts[6].

Overall effectiveness – challenges and opportunities

As climate-related policy design is increasingly exercised across a wide range of sectors, standards can encourage the development and adoption of low carbon products in a number of ways. This includes establishing a consistent approach to what 'low' carbon really is, managing supply chains and guiding technological developments[4]. However, this assessment has shown that a successful standard is a balancing act - standards risk repelling business if the bar is set too high, but yet that they must be stringent enough to drive change. A solution that has been proposed is to develop standards at various degrees of ambition, rather than holding off implementation[5]. In this way, a standard could both set the floor and drive the leaders.

Eco-design and minimum standards have been recognised as successful policy tools in achieving energy efficiency improvements without having impact on upfront costs and often bringing down energy bills. Indeed, government will need ensure that costs are not over estimated as the initial increase is often recovered over time[7].

1. Interviews with former staffers at European Commission 2. As in the case of the California Low Carbon Fuel Standard, see for instance Sperling 2018. Available at: https://www.forbes.com/sites/danielsperling/2018/10/17/how-almost-everyone-came-to-love-low-carbon-fuels-in-california/?sh=63672cac5e84 3. The BSI have developed programmes of work that places particular emphasis on stakeholder involvement (these include Energy Smart Appliances and the Faraday battery challenge). 4. Interviews with the BSI, Swan Ecolabel, former staffers at the EU Ecolabel 5. Interviews with UCL and BSI. According to an ECA 2020 audit on eco-design and energy labelling, delays in the regulatory process significantly reduce the effectiveness of a policy 6. Interviews with EPD International, UCL, University of Manchester. Examples of initiatives that have successfully built on mature and recognised methodologies include the Buy Clean California ACT, that incorporated the use of EPDs based on ISO standards, a life cycle analysis tool introduced to the US market decades earlier through the LEED scheme. 7. Interviews with University of Hull and IEA 2015

Public procurement

Stakeholder reception

Initial industry opposition to standards tied to procurement policies is common. In the case of the Buy Clean California Act[1], industry representatives opposed the inclusion of cement and concrete on the basis of the green technology not being sufficiently mature or available at scale, leading to a significant increase in costs. This assessment has found that such opposition may be mitigated by a gradual introduction of the policy.

The efforts to develop a federal Buy Clean act in the U.S are seeking to address data and technology availability issues that have caused industry pushback to regional forerunners by encouraging initial voluntary reporting. This, alongside committing to direct investments and R&D support, aims to lower the threshold for compliance once mandatory requirements are introduced.

Barriers to adoption

Procurement requirements may adversely impact small and medium sized enterprises that have limited capacity and resources[2]. This could include carrying out environmental product declaration assessments or life cycle analyses – completing such processes are also often further complicated by limited data availability.

An attempt to address this is the Dutch tool DuboCalc[3], which has been developed for bidders to improve their design and submit in a standardised format. The tool is offered as a free resource, thus removing the financial burden and easing the administrative burden. Automating or in other ways reducing the burden of compliance may be of particular value to SMEs.

The effectiveness of a green procurement policy depends on the competency and knowledge of staff within the buying institution. Other market barriers include immaturity of goods – for instance, a lack of green products of the required quantity or at a competitive price point [7].

Lessons learned from Japan and Korea, and studies of green procurement within the European Union, support the conclusion that investing in upskilling of personnel to implement new procurement policies is critical[4].

Overall effectiveness – challenges and opportunities

The effect lag of green procurement varies with industry and scope - allowing the process to take time has even been recommended[5]. Industry requires space to adapt and develop, and technologies may require scaling up.

Public or private procurement policies can be powerful triggers for change if done by actors with buying power in the supply chain[6]. A key solution to internal knowledge gaps has been to connect the procurement requirements with labelling schemes or standards[7]. In this way, existing data and information can be accessed by both suppliers and procurers.

Long-term, green public procurement can incentivise and accelerate innovation as well as help make green products and solutions more mature[4], [7]. There will always be a risk of policies creating perverse incentives or distorting the market. This may include disproportionate credits given to environmental benefits at the cost of high quality products and delivery, or advantages to materials or regions not covered by the new policy[8].

1. See the Buy Clean California Act (slide 25) , reports from ClimateWorks 2019, OECD 2015 and the Sierra Club 2017 2. Interviews with University of Hull and BlueGreen Alliance 3. See slide 27, 4. OECD 2011 & 2015, USEPA 2011, UNEP 2017 5. Interviews with BlueGreen Alliance 6. Healthcare Without Harm, resources available at: https://noharm-global.org/issues/global/why-sustainable-procurement 7. As in the case of Japan's Green Purchasing Act (slide 23) or DuboCalc (slide 27) 8. Interviews with PA Consulting and BlueGreen Alliance, and as in the case of the Buy Clean California Act (slide 25)

03

Recommendations for policy makers

Successful interventions should align with these seven criteria

Criteria to consider for the development of new demand-side measures

- Insights gathered and lessons learned from stakeholder engagement and literature review.
- Common themes emerged across conclusions on what has made policies successful, enabling us to group the key criteria into 5 areas; policy mix, anticipatory design, policy design, build on domestic skills and measure impact.

Policy mix

a

Avoid policy silos by developing a policy mix and linking policy types

Anticipatory design

b

Beyond developing the right policy, identify the optimal intervention point

c

Acknowledge industry's time horizons by giving early notice and being transparent about planning

Policy design

d

Consider mandatory options in favour of voluntary

e

Focus on rigorous criteria and verification methodologies

Build on domestic skills

f

Utilise domestic skills and advantages to help industry capture the knowledge and innovation opportunity of net zero

Measure impact

g

Incorporate measurable and comparable impact indicators

These criteria are defined as follows

Policy mix

a Avoid policy silos by developing a policy mix and linking policy types

- It is unlikely that any one intervention will be able to deliver the change required. Developing or revising product standards, labelling schemes and procurement policies should be approached holistically. Research and stakeholder feedback suggests that a combination of policies, such as the use of ecolabels in procurement in Japan, is highly effective. A study of fuel efficiency standards in the EU[1] and an OECD report[2] recommended combining demand with supply-side measures, such as R&D support, subsidies for consumers and industries, and mechanisms for enhanced coordination[3]. Another supply-side measure of relevance might include carbon pricing and the UK Emissions Trading Scheme.
- Policies need to be sensitive to conflicting targets, such as reducing packaging but at the same time using the packaging surfaces to provide information to consumers about the environmental impact of products they buy.

Anticipatory design

b Beyond developing the right policy, identify the optimal intervention point

- Measures need to integrate a multitude of 'trigger points' or prompts for adoption and improvements. This might include annual reviews or reporting requirements or reducing license validity periods. Insights from interviews also include applying this approach to the UK government's Social Value Model[4]. Additional trigger points could include extending the Model to apply to directly awarded contracts or grants.
- It is important to note that consumption transactions are not necessarily where the most influence over the supply chain is wielded. Redirecting efforts further upstream may serve to catalyse industry faster. Stakeholders have highlighted the potential impact of procurement of steel – such as the green steel commitments of Volvo[5] and BMW[6]. Other interesting examples can be found amongst commodities with high deforestation risk, such as cattle, palm oil and soy, where companies such as Unilever and Mars Inc are using their market positions to exert influence over suppliers[7].

c Acknowledge industry's time horizons by giving early notice and being transparent about planning

- Industry processes, in particularly in the construction and building sectors, are long and will require adequate warning on upcoming changes or additions to requirements in order to incorporate in design stages. These risks are also associated with carbon lock-in challenges, where carbon intensive processes perpetuate and reinforce a system's or industry's dependence on fossil fuels.
- Approaches like the BSI's new flexible standards that enable broader participation and provide the tools for improvement can provide such certainty. The BSI Flex mechanism maintains the core principles of expert consensus, stakeholder engagement and public consultation but can be updated rapidly and iteratively to reflect new learning and new developments[8].

1. Bowyer et al. 2020 2. OECD 2011 3. An intervention that targets information and education rather than transactions is the Real Estate Environmental Benchmark (RREB), which is a comprehensive database of operational performance that offers members the opportunity to see the performance of their own properties against similar properties within the platform. Members also have through the BBP working groups and roundtables, opportunities to share knowledge and experience as well as collectively develop tools that better enable them to overcome the challenges associated with gathering data. Some examples include the Green Lease Toolkit, the Better Metering Toolkit, the Responsible Property management Toolkit and the Building Operations and Technology Working Group. See the 2020 report at: https://www.betterbuildingspartnership.co.uk/real-estate-environmental-benchmark-2020 4. Expert interviews with PA Consulting. Model available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940826/Social-Value-Model-Edn-1.1-3-Dec-20.pdf 5. Volvo (2021) 6. BMW (2021) 7. Forest 500 rankings at: https://forest500.org/rankings/companies 8. Interview with BSI, see also BSI n.d.-a and b.

These criteria are defined as follows

Policy design

d Consider mandatory options in favour of voluntary

Interviews with stakeholders have seen broad support in favour of mandatory over voluntary action. This will minimise the effect lag and is more likely to deliver results at pace. Notably, while mandatory measures are bound to attract certain industry opposition, as with the California Low Carbon Fuel Standard, some interviewees suggested mandated compliance might be preferable to companies as it ensures a more level playing field[1].

While voluntary labels certainly can attract significant business participation[2] and achieve positive impact, the effect lag – the delay between the introduction of a measure and realisation of benefits – is longer for voluntary measures than the time horizon for climate action requires[1].

e Focus on rigorous criteria and verification methodologies

In light of the accelerating urgency of climate action, as emphasised by the recent IPCC report[3], stakeholders anticipate government response to become more acute and frequent[4]. Initiatives need to balance the need for engagement yet accelerate change and it is vital to be deemed accessible and trust worthy in the eyes of both businesses and consumers. This is of particular importance for initiatives proposed by government. Developing and ensuring measures apply a rigorous method for accountability and auditing is critical. Many certifications and labelling schemes do this via third-party verifying institutions and independent assessors.

Build on domestic skills

f Utilise domestic skills and advantages to help industry capture the knowledge and innovation opportunity of net zero

UK skills and resources are in demand - global trends in climate policy design are in need of the UK's unique resources and skills. By seeking to lead in ambition and action, domestic capabilities can be utilised and grown. Examples from interviews include new requirements to disclose environmental along with financial risk, such as the Task Force on Climate-Related Financial Disclosures[5] or the Task Force on Nature-Related Financial Disclosures[6]. Within the UK, several of the world's leading accounting and finance institutions reside, and these are well placed to contribute with skills and knowledge as more and more countries move to make such climate reporting mandatory[7].

Measure impact

g Incorporate measurable and comparable impact indicators

A challenge that has also been recognised in literature is the complexities involved in quantifying and measuring the effectiveness of demand-side policies in achieving their objectives. To establish trust and ensure progress towards net zero it will therefore be critical to integrate indicators at an early stage[8].

1. Interviews with University of Exeter, Hull and Manchester. 2. See for example the Swan Ecolabel, LEED and BREEAM 3. IPCC 2021. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf 4. Interviews with BRE 5. https://www.fsb-tcfd.org/ 6. https://tnfd.info/ 7. Interviews with UCL and University of Manchester 8. This challenge is recognised in the fourth chapter of the HMT Net Zero Review, Market Failures and Policy Choices. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004025/210615_NZR_interim_report_Master_v4.pdf

The criteria enable a more holistic approach to policy for industrial decarbonisation

From conversations with stakeholders, policy assessments and a wider literature review, the seven criteria reflect both gaps and significant opportunities to achieve net zero. While implementation may require tailoring to fit each policy, the criteria can be understood as common denominators for demand-side interventions.

We have grouped the seven criteria into thematic areas of action for policymakers with the intent of facilitating a holistic approach to supporting industrial decarbonisation. Together, the themes capture and conclude the functions that need to be integrated across sectors and policy types.

Policy mix

Anticipatory design

Policy design

Build on domestic skills

Measure impact

The following slides suggest a policy direction that addresses the barriers, opportunities and key criteria for successful policy making that make up the findings of this report. We have identified potential next steps that could be taken when developing demand-side measures in support of industrial decarbonisation. In addition to these, broader considerations have emerged that should be incorporated into future work to ensure the needs of industry are adequately addressed and the decarbonisation of British industry realised.

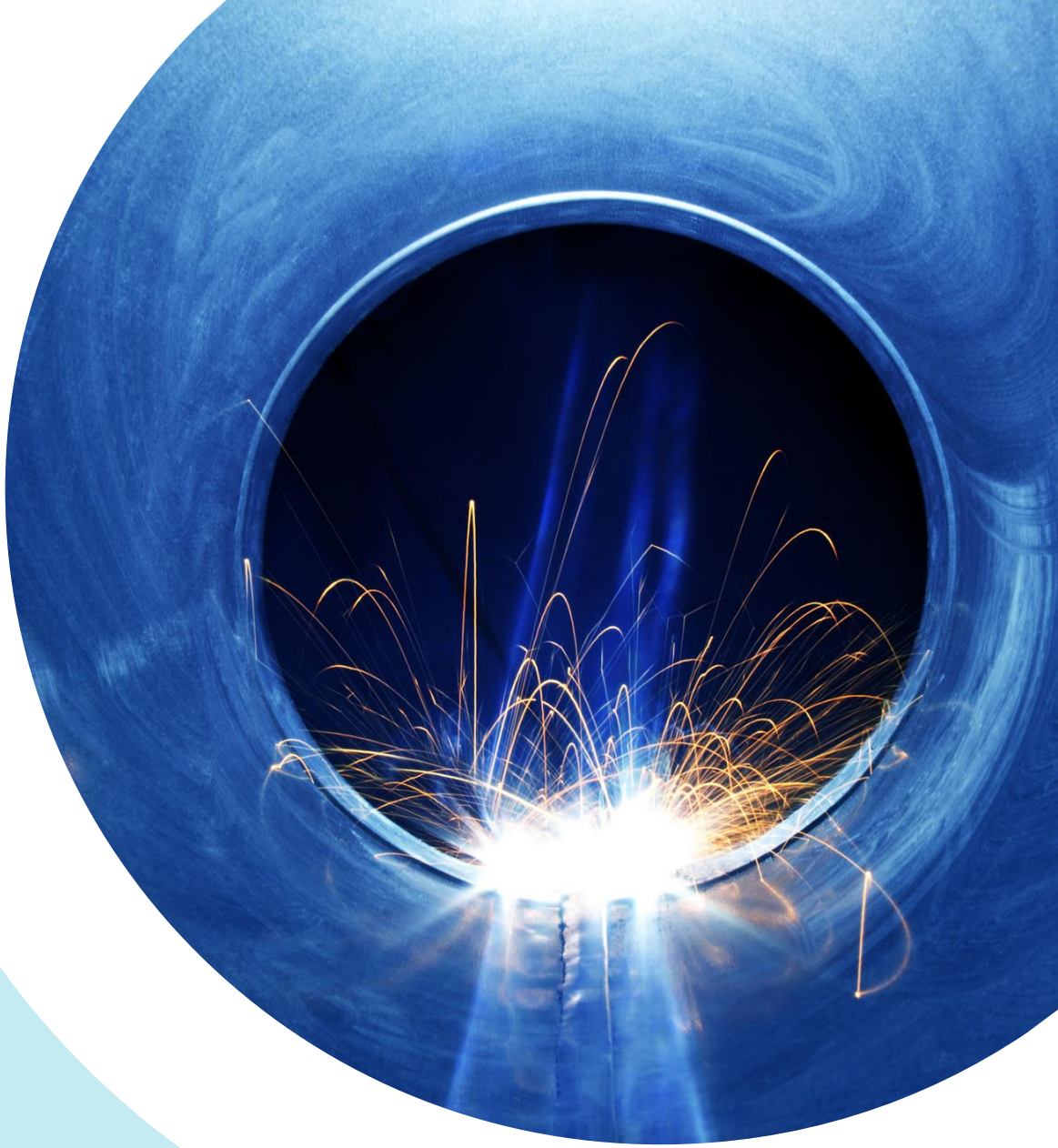
Our recommendations for next steps on demand-side measures

1. Consider a **design authority for demand-side policy design.** A design authority is a governance mechanism that can join up government departments to ensure decisions align across departments and are made collaboratively, and that synergies are captured effectively.
2. **Coordinate a forum for dialogue that brings policy owners and stakeholders across sectors and policy types together** to identify needs and develop solutions. This can include engaging business leads who purchase or sell industrial products to understand the level of expertise.
3. Work with stakeholders to **develop and scale up flexible standards at varying degrees of ambition,** that can be efficiently adapted alongside technological advancements.
4. Explore the potential of **linking well established or new product standards or labelling schemes to existing or new procurement requirements.**
5. Assess the need for and opportunities associated with **establishing a British ecolabel for the embodied emissions of industrial products.**
6. **Use causal mapping to understand policy interactions and inter-dependencies.** This also has potential to be a valuable broader net zero policy tool as it enables a system-level view of key levers and policy options.

Policy assessments

04

Contents



Reviewed measures

Name	Issuer	Type of issuer	Category	Type of measure	Target industry	Year launched
Act on Promoting Green Purchasing	Government of Japan	Government	Public procurement	Mandatory	Finished goods and services	2001
BREEAM	BRE Group	Profit-for-purpose, owned by the BRE Trust	Labelling scheme, Standard	Voluntary	Buildings	1990
Buy Clean California Act	California State Government	Local government	Public procurement	Mandatory	Procurement of carbon steel rebar, structural steel, flat glass and mineral wool board insulation	2017
EU Ecolabel	EU	Supranational government	Labelling scheme, Standard	Voluntary	Finished goods	1992
DuboCalc	Rijkswaterstaat, Dutch Government	National Government	Public procurement	Mandatory	Infrastructure projects	2010
LEED	US Green Building Council	Non-profit	Labelling scheme, Standard	Voluntary	Buildings	1998
Low Carbon Fuel Standard	California State Government	Local government	Product standard	Mandatory	Transportation fuel, oil refineries and distributors	2009
Swan Ecolabel	Nordic Governments	Multilateral	Labelling scheme, Standard, Procurement	Voluntary	Finished goods	1989

Act on Promoting Green Purchasing

Issuer	Government of Japan
Type of issuer	Government
Category	Public procurement
Type of measure	Mandatory
Target industry/ materials	Finished goods and services
Year launched	2001

Function

- Alignment and synergies with strategies and existing requirements
- Technology neutrality
- Governance

- The Act requires all national ministries and agencies to establish their own plan for green procurement. Compliance monitoring, guideline provision and annual review of the Basic Policy, covering over 270 items and associated standards, is facilitated by the Ministry of Environment (MoE) in cooperation with other departments. The Act relies of self-declaration, and no certification or labelling scheme is used to indicate whether products meet the evaluation criteria.
- There is not sufficient information on the technology neutrality of the Act.

Implication

- Stakeholder reception
- Barriers to adoption

Initial barriers have included higher cost of environmentally high-performing products as the price point conflicted with the procurement priorities. Additionally, the limited availability of green products on the market has in same cases made it difficult for bidders to meet the tender quantity specifications. However, studies have shown that the Act has stimulated demand for green goods, which over time is likely to translate into economies of scale and driving down of costs.

Impact

- Business impact
- Effect lag
- Achievement of objectives

- In 2013, 95 % of all procurement items across government implemented the Act and in 2014, the estimated GHG reduction as compared to 2000 baseline was 590,983 CO2te. The market share of green products had increased since 2001 for all product groups covered by the Act.
- By developing an online database of guidelines and information about green products in tandem with the Act, the internal barrier of lack of awareness and procurement skills amongst government staff and bidders could be overcome.

References
Green Purchasing Network Malaysia (2017) A SAMPLING OF SUCCESSES IN GREEN PUBLIC PROCUREMENT. Available at: https://www.oneplanetnetwork.org/sites/default/files/case_studies_140317_web.pdf
Ministry of the Environment, Japan (n.d.) Act on Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities. Available at: http://www.env.go.jp/en/laws/policy/green/1.pdf
Ministry of the Environment, Japan (2016) Introduction to Green Purchasing Legislation in Japan. Available at: https://www.env.go.jp/policy/hozen/green/kokusai_platform/2015report/handbook_eng.pdf
United Nations Environment Program (2017) FACTSHEETS ON SUSTAINABLE PUBLIC PROCUREMENT IN NATIONAL GOVERNMENTS. Available at: https://www.oneplanetnetwork.org/sites/default/files/factsheets2017.pdf

Building Research Establishment Environmental Assessment Method (BREEAM)

Issuer	BRE Group
Type of issuer	Profit-for-purpose, owned by the BRE Trust
Category	Labelling scheme, Standard
Type of measure	Voluntary
Target industry/ materials	Buildings
Year launched	1990

Function

- Alignment and synergies with strategies and existing requirements
- Technology neutrality
- Governance

- BREEAM is a green building certification widely recognised internationally, and present in over 90 countries. The BREEAM methodology seeks to be holistic and science-based and studies suggest BREEAM is widely appreciated by industry. The certification draws on other well recognised methodologies – applicants with verified EPDs are rewarded points and can increase the rating.
- BREEAM does not rely on companies' own reporting but is third-party verified - assessments are undertaken by independent assessors who collect information on a wide range of environmental and sustainability indicators, with the ultimate certification decision made by BREEAM.
- BREEAM applies a mixed approach to technology neutrality. The scheme refers to well-established standards but also has scope for submitting businesses to state which methodology has been used and rewards more accurate methodologies.

Implication

- Stakeholder reception
- Barriers to adoption

Major investors and builders as well as ESG investors increasingly make use of the BREEAM scheme. Many local authorities across the UK mandate minimum BREEAM ratings in planning specifications and stakeholders have said they would recommend BREAAM and that they would use the scheme again.

A barrier to adoption by companies with limited resources can be the assessment fees and additional bureaucracy, but over time costs have been shown to be recovered for a majority of participants - upfront investments were paid pack over time due to improved energy efficiency.

Impact

- Business impact
- Effect lag
- Achievement of objectives

- BREEAM has issued 594,011 certificates covering 2,313,475 registered buildings in 89 countries. There is a statistically significant positive relationship between the higher BREEAM ratings 'very good', 'excellent' and 'outstanding' and rental levels in London. A 'very good' rating translated into a 3.6 % higher rent than a building with the same characteristic but no BREEAM rating. Additionally, most of the assessments submitted to the scheme are 'very good' or 'excellent', which could be seen to demonstrate the intent and commitment to sustainable outcomes of clients and developers involved. Its rigorous and transparent methodology is likely a reason for why BREEAM is so well adopted in the UK. As mentioned above, stakeholders have also emphasised its holistic approach that incorporates new indicators or themes (e.g. net zero or biodiversity) rather than creating new certifications, which helps minimise the administrative burden on businesses.

Interviews

Gray, A. (July 2021) BRE

Ghumra, S. (August 2021), BRE

References

BREEAM (2021a) How BREEAM Certification Works. Available at: https://www.breeam.com/discover/how-breeam-certification-works/

BREEAM (n.d) Delivering Sustainable Buildings: Savings and Payback – Breakfast Briefing. Available at: https://tools.breeam.com/filelibrary/Presentations/DeliveringSustainableBuildingsSlides.pdf

Frank Knight (2021) Season 3, Episode 4: How a building's BREEAM rating influences rental levels. Available at: https://www.knightfrank.com/research/article/2021-05-06-season-3-episode-4-how-a-buildings-breeam-rating-influences-rental-levels

Parker, J. (2012) The Value of BREEAM. Available at: https://tools.breeam.com/filelibrary/BREEAM%20and%20Value/The_Value_of_BREEAM.pdf

Soulti, E., and Leonard, D. (2016) The value of BREEAM A review of latest thinking in the commercial building sector. Available at: https://tools.breeam.com/filelibrary/Briefing_Papers/BREEAM-Briefing-Paper----The-Value-of-BREEAM--November-2016----123864.pdf

Buy Clean California Act

Issuer	California State Government
Type of issuer	Local government
Category	Public procurement
Type of measure	Mandatory
Target industry/ materials	Procurement of carbon steel rebar, structural steel, flat glass and mineral wool board insulation
Year launched	2017

Function

- Alignment and synergies with strategies and existing requirements
- Technology neutrality
- Governance

The Buy Clean California Act (BCCA) sets limits on product lifecycle emissions, by requiring each supplier to submit a lower global warming potential (GWP) than the GWP cap for each product. More state as well as a federal Buy Clean acts are under consideration. The BCCA is likely to have a high inter-operability and alignment with existing business practices and requirements through its use of environmental product declarations (EPDs), which are based on ISO standardised certification (14025).

There is not sufficient information on the technology neutrality of the BCCA.

Implication

- Stakeholder reception
- Barriers to adoption

The BCCA faced initial industry opposition toward the inclusion of cement and concrete in the legislation, on the basis of compliance with the Act significantly increasing costs, which were subsequently removed. The cost of adoption and development of EPDs is carried by suppliers and barriers to adoption include concerns about the requirement make these facility specific, incurring administrative burdens for SMEs. Further, the lack of data and benchmarks in the domestic market may lead to risk of inaccuracies or failure to report.

Impact

- Business impact
- Effect lag
- Achievement of objectives

Estimating the impact of the BCCA is made difficult by the limited availability of data on industry performance or purchasing quantities. In addition, concerns have been raised about not being able to access benchmarks and thus report accurately on emissions. That said, the Act is mandatory and compliance should ensure access to business opportunities in the participating departments.

The very recent adoption of the BCCA is another reason for limited evidence of impact. The Act was signed into law in 2017 with gradual components entering into force since. By July 2021, 2.5 years later than stated in the original bill, the GWP limit, which EPDs for submitted products in bids must not exceed, was published.

Interviews
Martin, C. & Stofferahn, J. (August 2021) Blue Green Alliance.
References
ClimateWorks (2019) THE ROLE OF GREEN PUBLIC PROCUREMENT. Available at: https://www.climateworks.org/wp-content/uploads/2019/09/Green-Public-Procurement-Final-28Aug2019.pdf
Sierra Club (2017) Letter from Sacramento: Concrete Facts About Cement and Climate Pollution Available at: https://www.sierraclub.org/california/letter-sacramento-concrete-facts-about-cement-and-climate-pollution
Sierra Club (n.d.) Frequently Asked Questions About Assembly Bill 262, the Buy Clean California Act. Available at: https://www.sierraclub.org/sites/www.sierraclub.org/files/sce/sierra-club-california/PDFs/FAQFINALMarch29.pdf
California Department of General Services (2021) Buy Clean California Act. Available at: https://www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder

California Low Carbon Fuel Standard

Issuer	California State Government
Type of issuer	Local government
Category	Product standard
Type of measure	Mandatory
Target industry/ materials	Transportation, oil refineries and distributors
Year launched	2009

Function

- Alignment and synergies with strategies and existing requirements
- Technology neutrality
- Governance

The LCFS is one of a group of programs in the California Global Warming Solutions Act from 2006 aiming to reduce the state's emissions. The California Air Resources Board (CARB) supervises the LCFS. As of 2020, the LCFS requires accredited third-party verification, which is an amendment to the previous regulation. The LCFS takes a mixed governance approach and utilises both market mechanisms (emissions trading) and control and regulation. A credit or a debit is generated based on the carbon intensity of the fuel and awarded according to the annual standard regulated by the LCFS. The pacific coast initiative between the states of California, Oregon, Washington and British Columbia aims to strategically align climate policies.

The LCFS is technology neutral. Its aim is to reduce the carbon intensity of transportation fuels, but it does not specify how this must be achieved. A company can earn an LCFS credit by reducing the carbon intensity of a fuel through process improvements or by opting renewable feedstocks or inputs.

Implication

- Stakeholder reception
- Barriers to adoption

Despite an extensive stakeholder consultation process and peer reviews, the LCFS experienced significant industry pushback, mainly from the fossil fuel industry, during its first decade. One lawsuit was filed for breach of the commercial clause, claiming the Act favoured Californian suppliers, but was overruled in 2013. Other industry opposition has included an open letter to CARB, signed by 25 biofuel executives opposing the inclusion of indirect land use change and predicted financial impact on their companies. Conversely, 170 scientists submitted a letter a year later asking for indirect land use change be considered for all fuels, not just biofuels. Other barriers to adoption has included the data limitations and capacity requirements on businesses in conducting life cycle analyses of fuels.

Impact

- Business impact
- Effect lag
- Achievement of objectives

Studies suggest companies are able to make significant profits from participation in the scheme, which is likely to increase adoption and by extension, impact of the policy. In 2020, a price cap of $200 (2016 dollars) per carbon credit was set in order to prevent fuel price spikes and bring certainty to the market. The effect lag exceeded expectations – the LCFS reached its targets to reduce emissions by 10 % in 2020 as compared to 2010 levels 4 years early. One study founds that jurisdictions with LCFS programs in place contain several of the metropolitan areas with the highest EV deployment in North America. The share of alternative fuels in transportation grew from 6.1 percent to 8.5 percent between 2011 and 2017. An new additional target to of a 40 % reduction below the 2020 limit has been set.

References

Berkeley Law (2019) CALIFORNIA CLIMATE POLICY FACT SHEET: LOW CARBON FUEL STANDARD. Available at: https://www.law.berkeley.edu/wp-content/uploads/2019/12/Fact-Sheet-LCFS.pdf
Bowyer, C., Skinner, I., Malins, C., Nanni, S., Baldock, D. (2015) Low Carbon Transport Fuel Policy for Europe Post 2020. Available at: https://www.transportenvironment.org/sites/te/files/publications/2015_07_Low_carbon_transport_fuel_policy_for_Europe_post-2020.pdf
California Air Resources Band (n.d.a) LCFS Verification. Available at: https://ww2.arb.ca.gov/lcfs-verification
California Air Resources Band (n.d.b) LCFS Meetings and Workshops. Available at: https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/lcfs-meetings-and-workshops
California Air Resources Board (2019a) Appendix B ECONOMIC ANALYSIS – SENSITIVITY RISK SCENARIOS. Available at: https://ww2.arb.ca.gov/sites/default/files/classic/regact/2019/lcfs2019/appb.pdf
California Air Resources Board (2019b) Cleaner fuels have now replaced more than 3 billion gallons of diesel fuel under the Low Carbon Fuel Standard. Available at: https://ww2.arb.ca.gov/news/cleaner-fuels-have-now-replaced-more-3-billion-gallons-diesel-fuel-under-low-carbon-fuel
California Air Resources Band (2020a) Low Carbon Fuel Standard. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-09/basics-notes.pdf
California Air Resources Band (2020b) Unofficial electronic version of the Low Carbon Fuel Standard Regulation. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf
California Air Resources Band (2021) Latest state Greenhouse Gas Inventory shows emissions continue to drop below 2020 target. Available at: https://ww2.arb.ca.gov/news/latest-state-greenhouse-gas-inventory-shows-emissions-continue-drop-below-2020-target
Green Car Congress (2008) Biofuel Companies Question ARB's Inclusion of Indirect Effects in Low Carbon Fuel Standard. Available at: https://www.greencarcongress.com/2008/10/biofuel-compani.html
Green Car Congress (2009) Group of Scientists and Economists Urge Inclusion of Indirect Land Use Change Effects for Biofuels and All Transportation Fuels in California LCFS. Available at: https://www.greencarcongress.com/2009/04/usc-lcfs-20090421.html
Kelly,C. and Pavlenko, N. (2020) Assessing the potential for low-carbon fuel standards as a mode of electric vehicle support. Available at: https://theicct.org/sites/default/files/publications/LCFS-and-EVs-dec2020.pdf
Lima, L., Bacchi, M. (2018) Global Ethanol Market: Commercialization Trends, Regulations, and Key Drivers. Available at: https://www.sciencedirect.com/science/article/pii/B9780128045343000136
Parson, T. and Hecht, S. (2018) Major Policy Attacks on California's Low Carbon Fuel Standard and Why They're Off-Target. Available at: https://legal-planet.org/2018/11/05/major-policy-attacks-on-californias-low-carbon-fuel-standard-and-why-theyre-off-target/
Science Direct (n.d.) Low Carbon Fuel Standard. Available at: https://www.sciencedirect.com/topics/engineering/low-carbon-fuel-standard
Skone, T. (2017) Governmental Regulations, Guidance, and Standards Employing Life Cycle Analysis. Available at: https://www.sciencedirect.com/science/article/pii/B9780124095489100752
Sperling, D. (2018) How (Almost) Everyone Came To Love Low Carbon Fuels In California. Available at: https://www.forbes.com/sites/danielsperling/2018/10/17/how-almost-everyone-came-to-love-low-carbon-fuels-in-california/?sh=63672cac5e84
TransportPolicy (n.d.) CALIFORNIA: FUELS: LOW CARBON FUEL STANDARD. Available at: https://www.transportpolicy.net/standard/california-fuels-low-carbon-fuel-standard/
Tyner, W. (2020) Biofuel economics and policy: The Renewable Fuel Standard in 2018. Available at: https://www.sciencedirect.com/science/article/pii/B9780128154977000336

DuboCalc

Issuer	Rijkswaterstaat (RWS), Dutch Government
Type of issuer	Government
Category	Public procurement
Type of measure	Mandatory
Target industry/ materials	Infrastructure projects
Year launched	2010

Function

- Alignment and synergies with strategies and existing requirements
- Technology neutrality
- Governance

DuboCalc calculates the embedded environmental impacts of construction materials, allowing bidders to compare and optimise building and design, energy use and maintenance. The RWS applies functional specifications in their tenders and tools such as DuboCalc to assess the climate commitment of bidders. The final score, the environmental cost indicator (MKI) of the calculation is submitted along with price and is in the assessment awarded credits which are used to weigh the price. The calculation method builds on ISO standard 14040 and Dutch NEN 8006 specification of life cycle assessments.

There is not sufficient information on the technology neutrality of DuboCalc.

Implication

- Stakeholder reception
- Barriers to adoption

Reactions from bidders have been positive and the RWS has received expressions of enthusiasm and eagerness in applying the method. Due to the complexity of the calculation, studies have shown DuboCalc to be most effective when applied to bigger projects and contracts. Similarly, using the tool requires expertise in both environment, materials and engineering and can be counter effective if applied without this.

Impact

- Business impact
- Effect lag
- Achievement of objectives

The DuboCalc software includes 11 environmental parameters and case studies have shown the effectiveness of the tool in allowing suppliers to test the impact of their design choices before submitting a bid.

According to stakeholder feedback, DuboCalc helped identify both environmental impact and cost reductions.

References

DuboCalc (n.d.) DuboCalc. Available at: https://www.dubocalc.nl/en/

European Commission (2013) GPP in practice. Available at: https://ec.europa.eu/environment/gpp/pdf/news_alert/Issue36_Case_Study78_Rijkswaterstaat.pdf

OECD (2019), Public Procurement in Germany: Strategic Dimensions for Well-being and Growth, OECD Public Governance Reviews, OECD Publishing, Paris, https://doi.org/10.1787/1db30826-en.

Rijkswaterstaat (2020) Sustainable procurement using DuboCalc and the CO2 performance ladder. Available at: https://gpp2020.eu/fileadmin/files/Training_materials/Training_reports_photos_etc/Sustainable-procurement-using-DuboCalc-and-the-CO2-performance-ladder_lr....pdf

Zwan, J. (n.d.) The use of Dubocalc and the CO 2. Available at: https://slidetodoc.com/the-use-of-dubocalc-and-the-co-2/

EU Ecolabel

Issuer	European Union
Type of issuer	Supranational
Category	Labelling scheme, Standard
Type of measure	Voluntary
Target industry/ materials	Finished goods
Year launched	1992

Function

- Alignment and synergies with strategies and existing requirements
- Technology neutrality
- Governance

The EU Ecolabel is recognised in all Member States, who are responsible for the application and control of the label in their respective countries. A 2005 evaluation found that the EU Ecolabel typically works in harmony with national or other regional green labels. An explicit goal in the 2020-2024 strategy is to further improve governance and international synergies. The EU Ecolabel is awarded to products by submission of life cycle analysis data through a third-party verification system. The Ecolabel covers a range of products groups, including textiles, electronic equipment and paper products. Product groups under development include financial products, food and office buildings. According to stakeholders, the paper product category has been one of the more widely adopted, with electronic displays and furniture lagging behind.

There is not sufficient information on the technology neutrality of the EU Ecolabel.

Implication

- Stakeholder reception
- Barriers to adoption

Criticism has been raised around the Ecolabel's methodology, including its lack of a formal complaint mechanism and that its auditing body does not publish information about the auditing process. Feedback on the scheme from participating businesses is positive – many cite increased market shares as the main incentive cited to adopt the EU Ecolabel. Studies have also shown that the standards in the scheme are used as a benchmark by non-participants. Costs of participation is the main barrier for potential applicants, while existing participants cite rigorous criteria for compliance and high cost of the licence as the most significant barrier to effective implementation.

Impact

- Business impact
- Effect lag
- Achievement of objectives

As of March 2021, 1 892 licenses had been awarded for 78 071 products (goods and services) in the EU market. While some businesses reported having been able to improve their environmental performance and increase market shares through the EU Ecolabel, it is very hard to quantity its effectiveness. The observed cost-revenue relationship is opaque – due inter alia to a lack of competitive awards and public purchasing benefits. Public awareness and consumer recognition is low and the ecolabel is often confused with the organic label. A study found lower levels of uptake of the EU ecolabel than other products by other green labels.
.

Interviews
Kalinowska, K. (July 2021) European Commission
Anonymous former EU Ecolabel staffer (July 2021)
References
European Commission (2021a) EU Ecolabel key figures. Available at: https://ec.europa.eu/environment/ecolabel/facts-and-figures.html
European Commission (2021b) The European Ecolabel. Available at: https://ec.europa.eu/environment/ecolabel/documents/general.pdf
European Commission (2020a) Strategic EU Ecolabel Work Plan 2020 – 2024. Available at: https://ec.europa.eu/environment/ecolabel/documents/EU%20Ecolabel%20Work%20plan%202020-2024%20Dec%202020.pdf
European Commission (2020b) Report on the Identification of elements for a future strategy for the EU Ecolabel/ Available at: https://ec.europa.eu/environment/ecolabel/documents/Report on the Identification of elements for a future strategy for the EU Ecolabel.pdf
European Commission (2005) EVER: Evaluation of EMAS and Eco-label for their Revision. Available at: https://ec.europa.eu/environment/ecolabel/documents/EU-Ecolabel-revision.pdf
European Commission (2007) Revision of the EU Ecolabel Regulation (EC) No 1980/2000. Available at: https://ec.europa.eu/environment/ecolabel/about_ecolabel/revisions/revision_report2007.pdf
WWF (2011) WWF view on the EU Eco-label and APP products. Available at: https://wwfeu.awsassets.panda.org/downloads/wwf_view_on_eu_ecolabel_and_app_for_companies_final_1.pdf

LEED

Issuer	US Green Building Council
Type of issuer	Non-profit
Category	Labelling scheme, Standard
Type of measure	Voluntary
Target industry/ materials	Buildings
Year launched	1998

Function

- Alignment and synergies with strategies and existing requirements
- Technology neutrality
- Governance

LEED (Leadership in Energy and Environmental Design) is the most widely used green building rating system in the world and with over 40,000 buildings certified in the US only by 2013. The certification is adopted by several US federal agencies, along with state and local governments, that require or reward LEED certification. LEED is third party verified and submitted projects are awarded points for sustainable building choices across several categories. The program relies on self-reported data which is sent to the USGBC for assessment.

There is not sufficient information on the technology neutrality of LEED.

Implication

- Stakeholder reception
- Barriers to adoption

Since its conception, the LEED scheme has played a pivotal role in creating a new market for green building commerce.
However, it has also received criticism for skewing market incentives so that it no longer corresponds to technological advances but rewards inexpensive measures which receive high scores. For example, the installation of bike racks may reward points regardless of whether users do use bikes to commute to work

Impact

- Business impact
- Effect lag
- Achievement of objectives

According to the USGBC, estimates from LEED certified buildings between 2015-2018 saved $1.2 billion on energy, $149.5 million on water, $715.3 million on maintenance and $54.2 million on waste. The also helped achieve 34% lower CO2 emissions, 25%
less energy and 11% less water consumed and diverted 80 million tons of waste diverted from landfills.

A notable barrier to understanding the efficacy of LEED certification is the lack of measured energy performance of certified buildings. The schemes has been updated to require annual reporting of performance, but it lacks tools to revoke the label if actual energy use misses its targets. In spite of the USGBC having collected such performance data since 2009, the information has not been made public. Other studies have found no statistically meaningful difference in energy use or carbon emissions between LEED and non-LEED buildings.

References

Appelbaum, A. (2010) Don't LEED us astray. Available at: https://www.nytimes.com/2010/05/20/opinion/20Appelbaum.html?scp=1&sq=don%E2%80%99t%20LEED%20us%20astray&scse
Barth, B. (2018) Is LEED Tough Enough for the Climate-Change Era? Available at: https://www.bloomberg.com/news/articles/2018-06-05/reconsidering-leed-buildings-in-the-era-of-climate-change
Denzer, A., Hedges, K. (2011) The Limitations of LEED: A Case Study. Journal of Green Building. doi: https://doi.org/10.3992/jgb.6.1.25
Fowler, K., Rauch, E., Henderson, J. (2010) Re-Assessing Green Building Performance: A Post Occupancy Evaluation of 22 GSA Buildings. Available at: https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-19369.pdf Fuerst, Franz and McAllister, Patrick M., Green Noise or Green Value? Measuring the Effects of Environmental Certification on Office Property Values (July 15, 2008). Available at: https://ssrn.com/abstract=1140409 or http://dx.doi.org/10.2139/ssrn.1140409
Mark, L. (2013) LEED outstrips BREEAM across the globe – including Europe. Available at: http://www.architectsjournal.co.uk/news/leed-outstrips-breeam-across-the-globe-including-europe/8643464.fullarticle
Schindler, S. (2013) Following Industry 's LEED : Municipal Adoption of Private Green Building Standards. Available at: https://core.ac.uk/download/pdf/234108624.pdf
Scofield, J. (2013) Efficacy of LEED-certification in reducing energy consumption and greenhouse gas emission for large New York City office buildings. Available at: https://www.sciencedirect.com/science/article/pii/S037877881300529X
Swearingen, A. (2014) LEED-Certified Buildings Are Often Less Energy-Efficient Than Uncertified Ones. Available at: https://www.forbes.com/sites/realspin/2014/04/30/leed-certified-buildings-are-often-less-energy-efficient-than-uncertified-ones/?sh=72e28db82554
USA Today (2012) In U.S. building industry, is it too easy to be green? Available at: https://eu.usatoday.com/story/news/nation/2012/10/24/green-building-leed-certification/1650517/
USGBC (2021) Guide to LEED Certification: Commercial. Available at: https://www.usgbc.org/tools/leed-certification/commercial
USGBC (2021b) Why LEED. Available at: https://www.usgbc.org/leed/why-leed
USGBC (2020) REDUCING OUR CARBON FOOTPRINT: BIG BENEFITS FROM HIGHER LEED ACHIEVEMENT. Available at: https://www.usgbc.org/sites/default/files/2020-11/Reducing-Our-Carbon-Footprint-Big-Benefits-from-Higher-LEED-Achievement.pdf
USGBC (2018) LEED AND CLIMATE MITIGATION. Available at: https://www.usgbc.org/sites/default/files/LEED-and-Climate-Mitigation-Brief.pdf

Swan Ecolabel

Issuer	Nordic Governments
Type of issuer	Multilateral
Category	Labelling scheme, Standard, Procurement
Type of measure	Voluntary
Target industry/ materials	Finished goods
Year launched	1989

Function

- Alignment and synergies with strategies and existing requirements
- Technology neutrality
- Governance

The Swan Ecolabel operates in 5 Nordic countries. Thanks to its regional scope, the Swan Ecolabel enjoys high operability across the Nordic region. While the national Swan labels are responsible for implementing and executing the label domestically, the criteria are set together by the international umbrella organisation. The Swan Ecolabel is run on 'market terms', receiving only 5-10 % of revenue in state funding. The Swan Ecolabel uses a life cycle analysis (MECO) methodology and is third-party verified. It is governed as an independent entity of any of the Nordic governments.

The scheme does not publicly disclose its approach to technology neutrality, but some product specific documentation reflects that this principle may have been applied by criteria committees in design and specification.

Implication

- Stakeholder reception
- Barriers to adoption

Criteria for products are developed by product-specific criteria committees comprised of stakeholders from industry, trade, consumer associations as well as environmental organisations and government agencies.

Participating businesses are satisfied with the label – 8 out of 10 license holders would recommend the label to others. Consumers appear to agree – 86 % say the Swan Ecolabel helps them make better environmental choices.

Impact

- Business impact
- Effect lag
- Achievement of objectives

The label charges a fee for the application and should a licence be granted, an annual fee based on the turnover of the labelled product will be charged. By 2014, the Swan Ecolabel had issued 1869 licenses and labelled over 20 000 products. While difficult to measure or quantify, the success of the scheme implies that businesses that join the label do indeed enjoy increased product differentiation and market shares.

The Swan Ecolabel has been criticised for granting licences to products or businesses with environmentally harmful elements or practices, for example uncertified palm oil or diesel. Some of this criticism has been addressed by the label, particularly relating to statements that the label lacks scientific support to exclude genetically modified products

Interviews
Unge, R. (July 2021) Swan Ecolabel
References
ETC (2019) Miljömärkta tvålar innehåller palmolja. Available at: https://www.etc.se/klimat/miljomarkta-tvalar-innehaller-palmolja
ETC (2020) Satsning pa biobransle har dubblat utslappen. Available at: https://www.etc.se/sites/all/files/atoms/files/2020/10/biobransle_201001_14.pdf
Lange, P., Kjeldsen, U.,Tofteng, M.,Krag, A., and Kasper Lindgaard (2014) The coexistence of two Ecolabels. Available at: https://norden.diva-portal.org/smash/get/diva2:715474/FULLTEXT01.pdf
Nicolaisen, K., and Bugge, H. (2018) Ecolabelled Textiles in the Nordic Countries. Available at: http://norden.diva-portal.org/smash/get/diva2:1250020/FULLTEXT01.pdf
Ny Teknik (2018) Ingenjörernas kritik: Svanen ignorerar GMO-vetenskap. Available at: https://www.nyteknik.se/miljo/ingenjorernas-kritik-svanen-ignorerar-gmo-vetenskap-6900069
One Planet Network (2021) The Nordic Ecolabel – The Swan. Available at: https://www.oneplanetnetwork.org/initiative/nordic-ecolabel-swan
SVD (2018) "Hur länge ska Svanen få strunta i vetenskapen?". Available at: https://www.svd.se/hur-lange-ska-svanen-fa-strunta-i-vetenskapen
Swan Ecolabel (2021) Why the Nordic Swan Ecolabel? Available at: https://www.svanen.se/en/how-to-apply/why-nordic-swan-ecolabel/
Swan Ecolabel (2014a) Annual report 2014. Available at: https://www.oneplanetnetwork.org/sites/default/files/nordic_ecolabel_annual_report_2014.pdf
Swan Ecolabel (2011) Engangbatterier. Available at: http://www.svanemaerket.dk/-/criteriadoc/1053
Suikkanen, J., Nissinen, A., and Wesnæs, M. (2019) Nordic Swan Ecolabel and Product Environmental Footprint. Available at: http://norden.diva-portal.org/smash/get/diva2:1354808/FULLTEXT01.pdf
Tidningen Syre (2020) Replik: "Svanen måste tåla kritik". Available at: https://tidningensyre.se/2020/16-december-2020/replik-svanen-maste-tala-kritik/
TV4 (2019) Kritiken mot Svanenmärkningen: "Inte de absolut bästa miljöprodukterna" Available at: https://www.tv4.se/klipp/va/12511781/kritiken-mot-svanenmarkningen-inte-de-absolut-basta-miljoprodukterna

Appendices

05

Summary of research and methodology

The following activities were carried out over a period of 10 weeks to develop an understanding of the role and potential of demand-side measures in supporting industrial decarbonisation.

Landscape review and assessment tools

- Together with BEIS, a longlist of measures for review was identified. These sought to cover the three policy types and to draw on a diverse set of geographies, sectors and methodologies. The choice of the final shortlisted policies was guided by the availability of evaluations and evidence on the performance of these.
- To map relevant lessons learned and enable a comparison between the policies and their respective approaches, an evaluation framework was developed as a tool with which to carry out the assessments and bring forward key results from the literature. The 7 design principles in the Industrial Decarbonisation Strategy formed the basis of the framework (see slide 36) and it sought to develop descriptors that corresponded to the questions around challenges, success factors and impact that formed the purpose of this report. The full framework can be found on slides 34-35.

Lessons gathered from wider literature and shortlisted measures

In parallel, an extensive literature review was carried out, targeting the shortlisted policies in particular and wider reading around demand-side policies in general. To map the landscape and gather relevant material, search terms were chosen in correspondence to the evaluation framework developed for the policy assessments. A full list of the bibliography can be found on slides 37-46.

Conversations with industry and experts

21 stakeholder interviews were carried out over the research period. We are very grateful for the stakeholders who took the time to share their reflections and insights for the purposes of this report. Particularly valuable insight has been offered by academic subject matter experts. Richard Cochrane - University of Exeter, Pauline Deutz – University of Hull, Jonatan Pinkse – University of Manchester, and Nino Jordan – UCL, have all kindly contributed with their extensive knowledge and expertise.

Limitations

The active choice to seek a policy shortlist of diverse policy types, sectors and geographies was made as an attempt to mitigate the impact of research limitations on the results and conclusions of this report. This also included broadening the scope beyond industrial products. However, this report recognises a number of limitations that may still have had an effect on its results and conclusions.

- There is a significant lack of evidence and data on the performance of demand-side measures. While there are many examples of measures that seek to stimulate demand for sustainable products, few of these have been assessed against the barriers, success factors and impact criteria of relevance to this report. The choice of shortlisted policies for review has thus partly been guided by the availability of material.
- A second limitation that is reflected throughout this report is the difficulty of measuring and comparing impact. This is in large part due to a recognised challenge around the lack of data, quantifiable metrics and common indicators for labels, standards and procurement policies.

Definitions

Technology neutrality has many different interpretations depending on context. In this report, the term refers to the development of regulations in such as way that they neither favour nor discriminate against any technological solution. This principles stresses that the goal of regulation is effect or function rather than technology itself.

Evaluation framework

What					
Issuer	Type of issuer	Category	Type of measure	Target industry	Year launched

Function

Design principles addressed	Descriptor
• Apply equally to domestically produced and imported products • Technology neutral • Does the measure work in harmony with other policies, such as carbon pricing, energy efficiency and business models for low carbon technologies? • Is the measure suited to a joint approach between the UK and other countries pursuing similar goals?	• How does the measure align and create synergy with other government or international strategies, existing requirements and best practice approaches? • How does the policy relate to technology neutrality? • How is the measure governed to ensure transparency and accountability? – Formal complaint mechanisms – Published information about auditing process – Does the label award rely solely on information provided by the company? – Coverage of entirety of companies' actions or just the product in isolation?

Implications

• Cost sharing with consumers • Create balanced incentives • Apply equally to domestically produced and imported products • Adaptable according to the needs of different sectors	• How was the measure received by businesses and industry stakeholders? – Compatibility with existing company processes and governance – Perceived certainty of commitment and continuity • Were there any barriers to adoption?

Impact

Overall effectiveness	• Business impact – Did investments that are required for compliance with or adoption of the measure correspond to maintained or increased market shares or avoided costs? • What was the effect lag? – Time between measure action and realisation of benefits • To what extent did the measure achieve what it set out to do? – Fulfilment of objectives – Observed impact

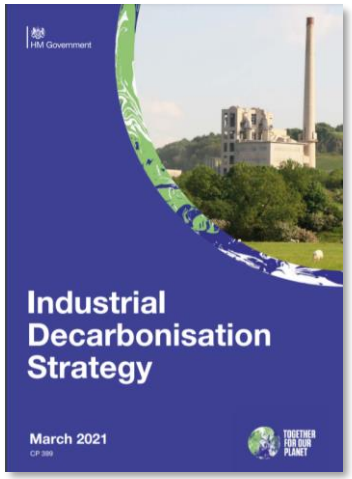
Hypothesis and key questions

The evaluation framework is our hypothesis and tool for assessment and not to be confused with the key criteria for success.

The Industrial Decarbonisation Strategy's[1] 7 Design principles for demand-side measures

We want to use demand-side measures to increase industry confidence in the profitability of decarbonisation and to support consumers to make low carbon choices. To be successful, the measurer we introduce should:

- Support industry to share the cost of decarbonisation with consumers
- Create incentives for emissions reductions which are balanced across industry
- Apply equally to domestically produced and imported products to ensure a level playing field
- Be adaptable according to the needs of different sectors
- Be technology-neutral to allow for the possibility of future innovation
- Work in harmony with other policies, such as carbon pricing, energy efficiency and business models for low carbon technologies
- Be suited to a joint approach between the UK and other countries pursuing similar goals



1. Available here:

Bibliography

General

- BEIS & MHCLG (2020a) ENERGY PERFORMANCE CERTIFICATES FOR BUILDINGS: Call for Evidence Summary of Responses. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/922653/EPC_Summary_of_Responses.pdf
- BEIS & MHCLG (2020b) ENERGY PERFORMANCE CERTIFICATES FOR BUILDINGS: Action Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/922660/EPC_Action_Plan.pdf
- BMW (2021) BMW Group invests in innovative method for CO2-free steel production Available at: https://www.press.bmwgroup.com/global/article/detail/T0327511EN/bmw-group-invests-in-innovative-method-for-co2-free-steel-production?language=en
- BSI (n.d.-a) Flex Standards. Available at: https://www.bsigroup.com/en-GB/our-services/standards-services/flex/
- BSI (n.d.-b) BSI Flex: Supporting innovation and resilience in fast-paced markets. Available at: https://www.bsigroup.com/en-GB/blog/corporate/bsi-flex-dynamic-good-practice/
- BSI (2010) Inclusive service provision. Requirements for identifying and responding to consumer vulnerability. Available at: https://shop.bsigroup.com/products/inclusive-service-provision-requirements-for-identifying-and-responding-to-consumer-vulnerability?pid=000000000030213909
- Dalhammar, C. (2015). The Setting of Progressive Energy Efficiency Performance Standards for Products through the Ecodesign Directive. Nordic Environmental Law Journal 2015(1), 21-41. Available at: https://nordiskmiljoratt.se/onewebmedia/NMT,%2012015,%20Dalhammar%206%20juli.pdf
- Data Foundation (2020) Understanding Machine-Readability in Modern Data Policy. Available at: https://www.datafoundation.org/understanding-machine-readability-in-modern-data-policy-2020#conclusion
- EU (2012) Monitoring the Uptake of GPP in the EU. Available at: Studies - GPP - Environment - European Commission (europa.eu)
- ECA: European Courth of Auditors (2020) Special report: EU action on Ecodesign and Energy Labelling: important contribution to greater energy efficiency reduced by significant delays and non-compliance. Available at: https://www.eca.europa.eu/Lists/ECADocuments/SR20_01/SR_Ecodesign_and_energy_labels_EN.pdf
- Gabbatiss, J. (2021) In-depth Q&A: How will the UK's hydrogen strategy help achieve net-zero?. Available at: https://www.carbonbrief.org/in-depth-qa-how-will-the-uks-hydrogen-strategy-help-achieve-net-zero
- Healthcare without harm (n.d.) Why Sustainable Procurement. Available at: https://noharm-global.org/issues/global/why-sustainable-procurement
- IEA (2015) Achievements of appliance energy efficiency standards and labelling programs. Available at: https://www.iea.org/reports/achievements-of-appliance-energy-efficiency-standards-and-labelling-programs

Bibliography

General

- IEC (2019) Making standards machine readable. Available at: https://www.iec.ch/blog/making-standards-machine-readable
- IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [MassonDelmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.
- Iraldo, F., Griesshammer, R. & Kahlenborn, W. (2020) The future of ecolabels. Int J Life Cycle Assess 25, 833–839 Available at: https://doi.org/10.1007/s11367-020-01741-9
- ISO (2015) ISO 14001:2015 Environmental management systems — Requirements with guidance for use. Available at: https://www.iso.org/standard/60857.html
- ISO (2018a) ISO/IEC 18745-1:2018 Available at: https://www.iso.org/standard/67800.html
- ISO (2018b) ISO 50001:2018 Energy management systems — Requirements with guidance for use. Available at: https://www.iso.org/standard/69426.html
- Konkurrenverket (2017) Långsiktiga effekter av miljöanpassad upphandling. Available at: https://www.konkurrensverket.se/informationsmaterial/rapportlista/langsiktiga-effekter-av-miljoanpassad-upphandling/
- Lundberg, S. et al. (2015). Is Environmental Policy by Public Procurement Effective? Public Finance Review. Vol 44(4), 478-499.
- Michelsen, O., & de Boer, L. (2009). Green procurement in Norway; a survey of practices at the municipal and county level. Journal of Environmental Management, 91(1), 160-167.
- House of Lords. (2011). Public procurement as a tool to stimulate innovation. Report.
- Noah M. Sachs, Can We Regulate Our Way to Energy Efficiency? Product Standards as Climate Policy, 65 Vanderbilt Law Review 1631 (2012) Available at: https://scholarship.law.vanderbilt.edu/vlr/vol65/iss6/6
- OECD (2011). Demand-side Innovation Policies. Available at: https://www.oecd.org/sti/demand-sideinnovationpolicies.htm
- OECD (2015) GOING GREEN: BEST PRACTICES FOR SUSTAINABLE PROCUREMENT. Available at: https://www.oecd.org/gov/public-procurement/Going_Green_Best_Practices_for_Sustainable_Procurement.pdf
- Ofgem (2010) New label launched for certified green electricity - press release. Available at: https://www.ofgem.gov.uk/publications/new-label-launched-certified-green-electricity-press-release

Bibliography

General

- REEB (2021) Real Estate Environmental Benchmark 2020. Available at: https://www.betterbuildingspartnership.co.uk/real-estate-environmental-benchmark-2020
- Taskforce on Climate-Related Financial Disclosures (n.d.) Taskforce on Climate-Related Financial Disclosures. Available at: https://www.fsb-tcfd.org/
- Taskforce on Nature-Related Financial Disclosures (n.d.) Taskforce on Nature-Related Financial Disclosures. Available at: https://tnfd.info/
- Thidell, Å. (2009). Influences, effects and changes from interventions by ecolabelling schemes - What a Swan can do? Doctoral dissertation, International Institute for Industrial Environmental Economics, Lund University.
- UNEP (2017) Comparative Analysis of Green Public Procurement and Ecolabelling Programmes in China, Japan, Thailand and the Republic of Korea: Lessons Learned and Common Success Factors. Available at: https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/UNEP_green_public_procurement_ecolabelling_China_Japan_Korea_Thailand_report.pdf
- USEPA. 2011. Energy-Efficient Product Procurement. A Guide to Developing and Implementing Greenhouse Gas Reduction Programs. Available at: https://www.epa.gov/sites/default/files/2015-08/documents/energyefficientpurchasing.pdf
- Volvo (2021) Volvo Cars is first car maker to explore fossil-free steel with SSAB. Available at: https://www.media.volvocars.com/global/en-gb/media/pressreleases/282789/volvo-cars-is-first-car-maker-to-explore-fossil-free-steel-with-ssab

Bibliography

Act on Promoting Green Purchasing

- Green Purchasing Network Malaysia (2017) A SAMPLING OF SUCCESSES IN GREEN PUBLIC PROCUREMENT. Available at: https://www.oneplanetnetwork.org/sites/default/files/case_studies_140317_web.pdf
- Ministry of the Environment, Japan (n.d.) Act on Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities. Available at: http://www.env.go.jp/en/laws/policy/green/1.pdf
- Ministry of the Environment, Japan (2016) Introduction to Green Purchasing Legislation in Japan. Available at: https://www.env.go.jp/policy/hozen/green/kokusai_platform/2015report/handbook_eng.pdf
- United Nations Environment Program (2017) FACTSHEETS ON SUSTAINABLE PUBLIC PROCUREMENT IN NATIONAL GOVERNMENTS. Available at: https://www.oneplanetnetwork.org/sites/default/files/factsheets2017.pdf

BREEAM

- BREEAM (2021a) How BREEAM Certification Works. Available at: https://www.breeam.com/discover/how-breeam-certification-works/
- BREEAM (n.d) Delivering Sustainable Buildings: Savings and Payback – Breakfast Briefing. Available at: https://tools.breeam.com/filelibrary/Presentations/DeliveringSustainableBuildingsSlides.pdf
- Frank Knight (2021) Season 3, Episode 4: How a building's BREEAM rating influences rental levels. Available at: https://www.knightfrank.com/research/article/2021-05-06-season-3-episode-4-how-a-buildings-breeam-rating-influences-rental-levels
- Parker, J. (2012) The Value of BREEAM. Available at: https://tools.breeam.com/filelibrary/BREEAM%20and%20Value/The_Value_of_BREEAM.pdf
- Soulti, E., and Leonard, D. (2016) The value of BREEAM A review of latest thinking in the commercial building sector. Available at: BREEAM-Briefing-Paper----The-Value-of-BREEAM--November-2016----123864.pdf

Bibliography

Buy Clean California Act

- ClimateWorks (2019) THE ROLE OF GREEN PUBLIC PROCUREMENT. Available at: https://www.climateworks.org/wp-content/uploads/2019/09/Green-Public-Procurement-Final-28Aug2019.pdf
- California Department of General Services (2021) Buy Clean California Act. Available at: https://www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Buy-Clean-California-Act
- Sierra Club (n.d.) Frequently Asked Questions About Assembly Bill 262, the Buy Clean California Act. Available at: https://www.sierraclub.org/sites/www.sierraclub.org/files/sce/sierra-club-california/PDFs/FAQFINALMarch29.pdf
- Sierra Club (2017) Letter from Sacramento: Concrete Facts About Cement and Climate Pollution Available at: https://www.sierraclub.org/california/letter-sacramento-concrete-facts-about-cement-and-climate-pollution

DuboCalc

- DuboCalc (n.d.) DuboCalc. Available at: https://www.dubocalc.nl/en/
- European Commission (2013) GPP in practice. Available at: https://ec.europa.eu/environment/gpp/pdf/news_alert/Issue36_Case_Study78_Rijkswaterstaat.pdf
- OECD (2019), Public Procurement in Germany: Strategic Dimensions for Well-being and Growth, OECD Public Governance Reviews, OECD Publishing, Paris, https://doi.org/10.1787/1db30826-en.
- Rijkswaterstaat (2020) Sustainable procurement using DuboCalc and the CO2 performance ladder. Available at: https://gpp2020.eu/fileadmin/files/Training_materials/Training_reports_photos_etc/Sustainable-procurement-using-DuboCalc-and-the-CO2-performance-ladder_lr....pdf
- Zwan, J. (n.d.) The use of Dubocalc and the CO 2. Available at: https://slidetodoc.com/the-use-of-dubocalc-and-the-co-2/

Bibliography

EU Ecolabel

- European Commission (2021a) EU Ecolabel key figures. Available at: https://ec.europa.eu/environment/ecolabel/facts-and-figures.html
- European Commission (2021b) The European Ecolabel. Available at: https://ec.europa.eu/environment/ecolabel/documents/general.pdf
- European Commission (2020a) Strategic EU Ecolabel Work Plan 2020 – 2024. Available at: https://ec.europa.eu/environment/ecolabel/documents/EU%20Ecolabel%20Work%20plan%202020-2024%20Dec%202020.pdf
- European Commission (2020b) Report on the Identification of elements for a future strategy for the EU Ecolabel/ Available at: https://ec.europa.eu/environment/ecolabel/documents/Report on the Identification of elements for a future strategy for the EU Ecolabel.pdf
- European Commission (2005) EVER: Evaluation of EMAS and Eco-label for their Revision. Available at: https://ec.europa.eu/environment/ecolabel/documents/EU-Ecolabel-revision.pdf
- European Commission (2007) Revision of the EU Ecolabel Regulation (EC) No 1980/2000. Available at: https://ec.europa.eu/environment/ecolabel/about_ecolabel/revisions/revision_report2007.pdf
- WWF (2011) WWF view on the EU Eco-label and APP products. Available at: https://wwfeu.awsassets.panda.org/downloads/wwf_view_on_eu_ecolabel_and_app_for_companies_final_1.pdf

Bibliography

LEED

- Appelbaum, A. (2010) Don't LEED us astray. Available at: https://www.nytimes.com/2010/05/20/opinion/20Appelbaum.html?scp=1&sq=don%E2%80%99t%20LEED%20us%20astray&scse
- Barth, B. (2018) Is LEED Tough Enough for the Climate-Change Era? Available at: https://www.bloomberg.com/news/articles/2018-06-05/reconsidering-leed-buildings-in-the-era-of-climate-change
- Denzer, A., Hedges, K. (2011) The Limitations of LEED: A Case Study. Journal of Green Building. doi: https://doi.org/10.3992/jgb.6.1.25
- Fowler, K., Rauch, E., Henderson, J. (2010) Re-Assessing Green Building Performance: A Post Occupancy Evaluation of 22 GSA Buildings. Available at: https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-19369.pdf
- Fuerst, Franz and McAllister, Patrick M., Green Noise or Green Value? Measuring the Effects of Environmental Certification on Office Property Values (July 15, 2008). Available at: https://ssrn.com/abstract=1140409 or http://dx.doi.org/10.2139/ssrn.1140409
- Mark, L. (2013) LEED outstrips BREEAM across the globe – including Europe. Available at: http://www.architectsjournal.co.uk/news/leed-outstrips-breeam-across-the-globe-including-europe/8643464.fullarticle
- Schindler, S. (2013) Following Industry 's LEED : Municipal Adoption of Private Green Building Standards. Available at: https://core.ac.uk/download/pdf/234108624.pdf
- Scofield, J. (2013) Efficacy of LEED-certification in reducing energy consumption and greenhouse gas emission for large New York City office buildings. Available at: https://www.sciencedirect.com/science/article/pii/S037877881300529X
- Swearingen, A. (2014) LEED-Certified Buildings Are Often Less Energy-Efficient Than Uncertified Ones. Available at: https://www.forbes.com/sites/realspin/2014/04/30/leed-certified-buildings-are-often-less-energy-efficient-than-uncertified-ones/?sh=72e28db82554
- USA Today (2012) In U.S. building industry, is it too easy to be green? Available at: https://eu.usatoday.com/story/news/nation/2012/10/24/green-building-leed-certification/1650517/
- USGBC (2021) Guide to LEED Certification: Commercial. Available at: https://www.usgbc.org/tools/leed-certification/commercial
- USGBC (2021b) Why LEED. Available at: https://www.usgbc.org/leed/why-leed
- USGBC (2020) REDUCING OUR CARBON FOOTPRINT: BIG BENEFITS FROM HIGHER LEED ACHIEVEMENT. Available at: https://www.usgbc.org/sites/default/files/2020-11/Reducing-Our-Carbon-Footprint-Big-Benefits-from-Higher-LEED-Achievement.pdf
- USGBC (2018) LEED AND CLIMATE MITIGATION. Available at: https://www.usgbc.org/sites/default/files/LEED-and-Climate-Mitigation-Brief.pdf

Bibliography

California Low Carbon Fuel Standard

- Berkeley Law (2019) CALIFORNIA CLIMATE POLICY FACT SHEET: LOW CARBON FUEL STANDARD. Available at: https://www.law.berkeley.edu/wp-content/uploads/2019/12/Fact-Sheet-LCFS.pdf
- Bowyer, C., Skinner, I., Malins, C., Nanni, S., Baldock, D. (2015) Low Carbon Transport Fuel Policy for Europe Post 2020. Available at: https://www.transportenvironment.org/sites/te/files/publications/2015_07_Low_carbon_transport_fuel_policy_for_Europe_post-2020.pdf
- California Air Resources Band (n.d.a) LCFS Verification. Available at: https://ww2.arb.ca.gov/lcfs-verification
- California Air Resources Band (n.d.b) LCFS Meetings and Workshops. Available at: https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/lcfs-meetings-and-workshops
- California Air Resources Board (2019a) Appendix B ECONOMIC ANALYSIS – SENSITIVITY RISK SCENARIOS. Available at: https://ww2.arb.ca.gov/sites/default/files/classic/regact/2019/lcfs2019/appb.pdf
- California Air Resources Board (2019b) Cleaner fuels have now replaced more than 3 billion gallons of diesel fuel under the Low Carbon Fuel Standard. Available at: https://ww2.arb.ca.gov/news/cleaner-fuels-have-now-replaced-more-3-billion-gallons-diesel-fuel-under-low-carbon-fuel
- California Air Resources Band (2020a) Low Carbon Fuel Standard. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-09/basics-notes.pdf
- California Air Resources Band (2020b) Unofficial electronic version of the Low Carbon Fuel Standard Regulation. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf
- California Air Resources Band (2021) Latest state Greenhouse Gas Inventory shows emissions continue to drop below 2020 target. Available at: https://ww2.arb.ca.gov/news/latest-state-greenhouse-gas-inventory-shows-emissions-continue-drop-below-2020-target
- Green Car Congress (2008) Biofuel Companies Question ARB's Inclusion of Indirect Effects in Low Carbon Fuel Standard. Available at: https://www.greencarcongress.com/2008/10/biofuel-compani.html
- Green Car Congress (2009) Group of Scientists and Economists Urge Inclusion of Indirect Land Use Change Effects for Biofuels and All Transportation Fuels in California LCFS. Available at: https://www.greencarcongress.com/2009/04/usc-lcfs-20090421.html
- Kelly,C. and Pavlenko, N. (2020) Assessing the potential for low-carbon fuel standards as a mode of electric vehicle support. Available at: https://theicct.org/sites/default/files/publications/LCFS-and-EVs-dec2020.pdf

Bibliography

California Low Carbon Fuel Standard

- Lima, L., Bacchi, M. (2018) Global Ethanol Market: Commercialization Trends, Regulations, and Key Drivers. Available at: https://www.sciencedirect.com/science/article/pii/B9780128045343000136
- Parson, T. and Hecht, S. (2018) Major Policy Attacks on California's Low Carbon Fuel Standard and Why They're Off-Target. Available at: https://legal-planet.org/2018/11/05/major-policy-attacks-on-californias-low-carbon-fuel-standard-and-why-theyre-off-target/
- Science Direct (n.d.) Low Carbon Fuel Standard. Available at: https://www.sciencedirect.com/topics/engineering/low-carbon-fuel-standard
- Skone, T. (2017) Governmental Regulations, Guidance, and Standards Employing Life Cycle Analysis. Available at: https://www.sciencedirect.com/science/article/pii/B9780124095489100752
- Sperling, D. (2018) How (Almost) Everyone Came To Love Low Carbon Fuels In California. Available at: https://www.forbes.com/sites/danielsperling/2018/10/17/how-almost-everyone-came-to-love-low-carbon-fuels-in-california/?sh=63672cac5e84
- TransportPolicy (n.d.) CALIFORNIA: FUELS: LOW CARBON FUEL STANDARD. Available at: https://www.transportpolicy.net/standard/california-fuels-low-carbon-fuel-standard/
- Tyner, W. (2020) Biofuel economics and policy: The Renewable Fuel Standard in 2018. Available at: https://www.sciencedirect.com/science/article/pii/B9780128154977000336

Swan Ecolabel

- ETC (2019) Miljömärkta tvålar innehåller palmolja. Available at: https://www.etc.se/klimat/miljomarkta-tvalar-innehaller-palmolja
- ETC (2020) Satsning pa biobransle har dubblat utslappen. Available at: https://www.etc.se/sites/all/files/atoms/files/2020/10/biobransle_201001_14.pdf
- Lange, P., Kjeldsen, U.,Tofteng, M.,Krag, A., and Kasper Lindgaard (2014) The coexistence of two Ecolabels. Available at: https://norden.diva-portal.org/smash/get/diva2:715474/FULLTEXT01.pdf
- Nicolaisen, K., and Bugge, H. (2018) Ecolabelled Textiles in the Nordic Countries. Available at: http://norden.diva-portal.org/smash/get/diva2:1250020/FULLTEXT01.pdf
- Ny Teknik (2018) Ingenjörernas kritik: Svanen ignorerar GMO-vetenskap. Available at: https://www.nyteknik.se/miljo/ingenjorernas-kritik-svanen-ignorerar-gmo-vetenskap-6900069

Bibliography

Swan Ecolabel

- One Planet Network (2021) The Nordic Ecolabel – The Swan. Available at: https://www.oneplanetnetwork.org/initiative/nordic-ecolabel-swan
- SVD (2018) ”Hur länge ska Svanen få strunta i vetenskapen?”. Available at: https://www.svd.se/hur-lange-ska-svanen-fa-strunta-i-vetenskapen
- Swan Ecolabel (2021) Why the Nordic Swan Ecolabel? Available at: https://www.svanen.se/en/how-to-apply/why-nordic-swan-ecolabel/
- Swan Ecolabel (2014a) Annual report 2014. Available at: https://www.oneplanetnetwork.org/sites/default/files/nordic_ecolabel_annual_report_2014.pdf
- Swan Ecolabel (2011) Engangbatterier. Available at: http://www.svanemaerket.dk/-/criteriadoc/1053
- Suikkanen, J., Nissinen, A., and Wesnæs, M. (2019) Nordic Swan Ecolabel and Product Environmental Footprint. Available at: http://norden.diva-portal.org/smash/get/diva2:1354808/FULLTEXT01.pdf
- Tidningen Syre (2020) Replik: ”Svanen måste tåla kritik”. Available at: https://tidningensyre.se/2020/16-december-2020/replik-svanen-maste-tala-kritik/
- TV4 (2019) Kritiken mot Svanenmärkningen: ”Inte de absolut bästa miljöprodukterna” Available at: https://www.tv4.se/klipp/va/12511781/kritiken-mot-svanenmarkningen-inte-de-absolut-basta-miljoprodukterna

About PA.

We believe in the power of ingenuity to build a positive human future in a technology-driven world.

As strategies, technologies and innovation collide, we create opportunity from complexity.

Our diverse teams of experts combine innovative thinking and breakthrough use of technologies to progress further, faster. Our clients adapt and transform, and together we achieve enduring results.

An innovation and transformation consultancy, we are over 3,300 specialists in consumer, defence and security, energy and utilities, financial services, government, health and life sciences, manufacturing, and transport. Our people are strategists, innovators, designers, consultants, digital experts, scientists, engineers and technologists. We operate globally from offices across the UK, US, Europe, and the Nordics.

PA. Bringing Ingenuity to Life.

Corporate Headquarters
10 Bressenden Place
London
SW1E 5DN
+44 20 7730 9000

paconsulting.com