

Consultation: Addressing carbon leakage risk to support decarbonisation

Response from UCL Institute for Sustainable Resources

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The UCL Institute for Sustainable Resources delivers world-leading research, teaching, and enterprise in the sustainable use of global resources.

This is a summary of a response submitted via the online questionnaire on the UK government website. We have chosen to answer the questions where we have specific expertise.

We would be delighted to discuss this consultation, or any of our other work. Please contact Katherine.page@ucl.ac.uk

Chapter 1: Carbon leakage policy measures

Question 1.0: *Does government's definition of carbon leakage reflect your understanding of the issue? Please explain your reasoning.*

Yes, agree.

The definition of carbon leakage is adequate. It may require further refinement in terms of defining the scope, which is considered, how to calculate the degree of carbon leakage and therefore adjustments, depending on framework conditions of trade parties. In many instances, it would be difficult to allocate the carbon and other environmental externalities associated with carbon and material intensive products.

Question 1.1 *Do you believe that the risk of carbon leakage in the UK is likely to:*

1. Increase
2. Decrease
3. Remain unchanged.
4. **Carbon leakage is occurring now.**

Please explain your reasoning, including when you think any change to the level of risk might occur.

The risk is high for some sectors, but carbon leakage is occurring now. We see it in energy intensive sectors, which have already been included in the ETS, and other sectors such as textiles, plastics, electronics and others.

Question 1.2: *What factors contribute to the risk of future carbon leakage that government should be looking at and that government should address? What evidence can you provide to support your view?*

- UK carbon price relative to other jurisdictions
- Other UK climate policies relative to other countries
- Impacts of climate and carbon leakage policy in other countries
- The cost and availability of technologies to transition from energy intensive production (as well as abatement technologies)
- The ability of a sector to transition to low emission production processes and the ability of customers to substitute to low carbon alternatives.

- *Lack of demand for low carbon products in the UK*
- *Other (please specify)*

Carbon leakage and displacement of production due to other factors, including institutional, socio-economic and other environmental impacts (e.g., waste water regulation, industrial land planning, etc) have already resulted in some relocation of primary industry, which have then translated into increased import dependency of processed goods and final goods. The embodied carbon of these goods can be higher than UK production. A combination of factors helps to explain this, specifically:

- UK carbon price relative to other jurisdictions
- Other UK climate policies relative to other countries
- Impacts of climate and carbon leakage policy in other countries

However, as noted above, it is likely that the carbon leakage is also linked to a broader definition of environmental impact leakage which is not only associated with carbon, access and prices of fossil fuels, taxation of carbon emissions. It is also linked to wider industrial policies, adequate transparency of carbon and other impacts of semi-processed and final goods, lack of support mechanisms to accelerate low carbon and circular transitions, subsidies to fossil fuel and support for fossil fuel projects. We also need to consider the finance sector context, and the limited attention to decarbonisation and environmental performance.

Question 1.3: *How should the government act to mitigate future carbon leakage risk? Please explain your reasoning.*

- *Government should focus on international and multilateral action to address carbon leakage.*
- *Government should focus on domestic carbon leakage measures.*
- ***Government should act on domestic measures alongside international and multilateral action.***
- *No additional government action on carbon leakage is needed.*

Chapter 2: Carbon border adjustment mechanism

Question 2.1: *Should a CBAM only apply to products in sectors that are subject to the UK ETS? Please explain your reasoning.*

The sectors currently subject to UK ETS are the energy intensive industries, the power generation sector and aviation. In a first instance, it makes sense to focus on these sectors to keep monitoring the effects of CBAM application manageable. However, in the future the CBAM should apply to all imported products, e.g., electronics, textiles.

Question 2.2: *Are there products in your sector/sub-sector where the application of a CBAM would not be effective or feasible? Please explain your reasoning.*

While it is desirable to apply a CBAM for highly-carbon intensive sectors such as cement and steel, current carbon prices are not likely to sufficiently induce industrial transformation by themselves. Additional well-sequenced measures such as green public procurement for early lead markets and the application of maximum embodied or whole-life cycle carbon thresholds along supply chain segments are needed.¹ The focus on adequate protocols for accurate embodied carbon accounting in the built environment could act as a key driver for carbon leakage reduction. Other sectors where the future focus could be placed include automotive (EVs), electronics, renewable energy, textiles and plastics. However, other mechanisms such as mandatory product standards and demand-based policy mechanisms may be more effective in driving emissions reductions.

¹ Grubb, M., Jordan, N.D., Hertwich, E., Neuhoff, K., Das, K., Bandyopadhyay, K.R., van Asselt, H., Sato, M., Wang, R., Pizer, W.A., Oh, H., 2022. Carbon Leakage, Consumption, and Trade. *Annu. Rev. Environ. Resour.* 47, 753–795.
<https://doi.org/10.1146/annurev-environ-120820-053625>



Question 2.3: *If the scope of a CBAM is initially limited, should it be designed to potentially cover other products in future? Please explain your reasoning.*

Yes, agree.

Eventually most products should be covered by either a CBAM or product carbon footprint regulatory requirements with maximum carbon thresholds on an embodied or lifecycle basis. This would be best achieved through common international commitments and agreements.

Question 2.4: *Should the importer of products covered by a CBAM be responsible for meeting all CBAM requirements? If not the importer, who? Please explain your reasoning.*

Yes, strongly agree.

Question 2.5: *Should importers be required to provide accurate, independently verified emissions data for the products they import where available? Please explain your reasoning.*

Yes, agree.

If importers cannot provide accurate, independently verified emissions data for the products they import the government should assume relatively high emissions-intensive default values.

Question 2.6: *Should there also be an option for importers to use default values, where they do not or cannot provide accurate emissions data are? Please explain your reasoning.*

- *Agree, in all cases. There should be no requirement to provide data.*
- **Agree. However, there should be a requirement to provide all available data.**
- *Disagree. Importers must provide accurate emissions data.*

Question 2.7: *Are there any factors not presented in this chapter which government should consider for the calculation of default values? Please explain your reasoning.*

Default values should be set at sufficient levels of carbon intensity to make it attractive for importers to provide data.

Question 2.9: *What data could UK importers provide for Scope 1 emissions embodied within imported products on a product basis? Please explain your reasoning.*

Energy mixes, technology standards, energy use by stage of the value chain.

Question 2.10: *What alternative data sources would government need to consider when determining Scope 1 imported emissions on a product basis if these data cannot be provided by an importer? Please explain your reasoning.*

Default energy mixes of country of origin, energy intensities by processes (from LCA databases), transportation and logistics emissions at different stages of the manufacturing process and supply chain.

Question 2.11: *Do you agree or disagree a CBAM should be applied to Scope 2 emissions embodied within imported products? Please explain your reasoning.*

Yes, agree.

This is especially important as the degree of electrification of industrial processes increases, thus emission intensities of the energy grid could make a real difference.

Question 2.12: *What data could UK importers provide for Scope 2 emissions embodied within imported products on a product basis? Please explain your reasoning.*

Energy mix of manufacturing countries, electricity consumption and electricity mix by manufacturing stage, transportation modes. It is likely that for complex products, value chains will be geographically dispersed and, thus, would require complex data traceability systems to ensure accurate calculation of embodied emissions.

Question 2.13: *What alternative data sources would government need to consider to determine Scope 2 imported emissions on a product basis if these data cannot be provided by an importer? Please explain your reasoning.*

If the importer cannot provide Scope 2 data, the government should assume the worst possible energy mix in the exporting country. For example, if the exporting country still uses coal power, it should be assumed that the Scope 2 emissions are coal-based. The risk arising from country level averages is that there is no incentive to move from a dirtier to an average mix. However, it might be diplomatically challenging to not use country averages. In addition, using country average could also provide incentives for manipulating such averages.

Many regions are well represented in LCA databases and default country values can be applied.

Question 2.14: *Should the government consider the use of product level electricity 'content' benchmarks and country level averages to calculate Scope 2 emissions from purchased electricity?*

Yes, agree.

Question 2.15: *If yes, how should country level Scope 2 average emissions be calculated? Please explain your reasoning.*

Only where no better data exists, default country/ regional data can be used. This may provide incentives to adequate traceability of data to reflect better performance.

However, existing LCA databases do provide a good basis for the calculation of Scope 2 average emissions. Where data gaps exist, LCA studies may help to address them.

Question 2.16: *Should a CBAM be applied to the Scope 3 emissions embodied within imported products that are also indirectly covered by the UK ETS? Please explain your reasoning.*

Yes, strongly agree.

Scope 3 emissions monitoring will help to address the decarbonisation of the value chains of energy intensive products and can help to address carbon leakage from broader systemic perspective.

Question 2.17: *What data could UK importers provide for Scope 3 emissions embodied within imported products on a product basis? Please explain your reasoning.*

Start with ISO-compliant Product Carbon Footprints (PCFs) and Environmental Product Declarations (EPDs) and increase requirements over time for product-specific data, starting with the most suitable sectors (to be analysed). Full traceability systems may be enabled through block chain technologies.

Question 2.18: *What alternative data sources would government need to consider to determine Scope 3 imported emissions on a product basis if these data cannot be provided by an importer? Please explain your reasoning.*

In the beginning default values in existing databases would be sufficient. Over time, requirements for product-specific data could be strengthened. In many cases it is less important to reward relative differences between the same materials but to make sure more carbon intensive materials are subjected to significantly

higher carbon prices than less carbon intensive materials. Really low carbon material producers should be more eager to provide data as part of their business model.

Question 2.19: *Do you have further comments on the inclusion and measurement of emissions embodied in imported products as part of a CBAM?*

Eventually Scope 3 emissions will need to be taken into account as otherwise there could be incentives to only import products into the UK that are already at least semi-assembled. For example, rather than import steel products directly from producer country A and declaring Scope 1 and 2 emissions from there, an additional manufacturing step in country B could turn the Scope 1 and 2 emissions from country A into Scope 3 emissions.

Question 2.20: *Should the price applied by a CBAM be comparable to the effective domestic carbon price paid, including accounting for any discounts available through free allowances or compensation? Please explain your reasoning.*

Yes, strongly agree.

As long as free allowances are given out, it would not be fair to importers to have to pay the full carbon price. This requires the parallel successive phasing out of free allowances and the successive phasing in of full border carbon adjustments.

Question 2.22: *Should the price applied by a CBAM to imported products be based on the value of the effective carbon price differential between the UK and the country where that good was produced? Please explain your reasoning.*

The price to be paid in the UK should at least be based on the *effective* and not just the *nominal* carbon price paid abroad, also taking energy taxes etc into account.² Ideally, a way should be found to also take into account the costs incurred through complying with product standards such as the proposed recast of the EU Eco-design Directive into an EU regulation and the EU battery carbon footprint rule.^{3,4} While this is extremely complicated, HM Government should try to seek consensus with trading partners on how to use Border Carbon Adjustments (BCAs) to incentivise the adoption of ambitious regulatory requirements for maximum product carbon footprints. Otherwise, there is the danger that BCAs could inhibit the adoption of mandatory product standards.

Question 2.23: *Would it be practicable for importers to provide information on the effective carbon price already paid on products in the originating country? Please provide details.*

This is one of the weaknesses of border carbon adjustments compared to product carbon footprint regulatory standards, which do not need any such pricing information.

Question 2.24: *What issues might arise in taking into account a carbon price already paid in another country when calculating the price applied by a CBAM? Please explain your reasoning.*

² Dominiononi, G., Esty, D.C., 2023. Designing effective border-carbon adjustment mechanisms: aligning the global trade and climate change regimes. *Arizona Law Review* 1.

³ European Commission, 2022. Proposal for a Regulation of the European Parliament and of the Council Establishing a Framework for Setting Ecodesign Requirements for Sustainable Products and Repealing Directive 2009/125/EC. COM(2022) 142 final.

⁴ Peiseler, L., Bauer, C., Beuse, M., Wood, V., Schmidt, T.S., 2022. Toward a European carbon footprint rule for batteries. *Science* 377, 1386–1388.

If only nominal and not effective carbon prices are credited, it could create incentives for, e.g., reducing energy taxes in favour of increasing carbon prices. This might result in higher nominal carbon pricing but less effective carbon pricing.²

Question 2.25: *Do you have any views on how a CBAM could be designed to ensure maximum simplicity? For example, by following the mechanism for other border charges such as tariffs and excise duties. Please explain your reasoning.*

A CBAM would be much simpler by not taking into account any carbon prices paid abroad. However, such a simplified version would raise the issue of double-pricing and disadvantaging imports from regions already implementing carbon pricing.

In future, enhancing traceability and reporting requirements for products, would make the application of CBAMs more accurate and transparent.

Chapter 3: Mandatory product standards

Question 3.1: *Were mandatory product standards introduced, should the above criteria be used to decide on its initial sectoral scope? Are there other criteria that should be considered? Please explain your reasoning, including any alternative criteria.*

Energy and material intensity.

Question 3.2: *Which option, if any, would be most appropriate for the initial sectoral targeting of a mandatory product standard? Are there other/additional sectors which should be considered for early targeting, for example to address the risk of substitution? Please explain your reasoning.*

- Option 1: Targeting steel only
- **Option 2: Targeting steel, cement, and concrete**
- Option 3: Targeting steel, cement, concrete, and chemicals
- Other

While initially targeting only a couple of sectors makes sense the UK Government should also closely track EU legislative procedures on issues such as the proposed recast of the Eco Design Directive^{3,4,5} and proposed battery regulation, which both seek to target product's lifecycle emissions. Sectors such as textiles, construction, industrial and electric vehicle batteries, which may be targeted through the Digital Product Passport EU regulation would need to be considered in the scope, if not initially, in a second phase. In addition, recently introduced maximum thresholds for whole life carbon emissions in Denmark¹ would be a type of mandatory product standards worth considering.

Question 3.3: *Which option, if any, would be most appropriate for emissions scope of a mandatory product standard? Please explain your reasoning, and details of any alternative options.*

- **Option 1: Scope 1, 2, and some upstream Scope 3 emissions**
- Option 2: Scope 1, 2, and some upstream and downstream Scope 3 emissions
- Other

Downstream Scope 3 emissions always need to rely on assumptions about future behaviour (e.g., user behaviour in buildings), practices (e.g., in what way buildings will be recycled), technological performance (e.g. battery charging capacity over time), or developments (e.g. the carbon content of the grid). While information about upstream emissions may not be available in a straight-forward manner, sufficient measurement and proper institutions could make this information more reliable. It therefore makes sense to

⁵ European Commission, 2020. Proposal for a regulation of the European Parliament and of the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020. COM/2020/798 final.

have separate standards for upstream embodied emissions and for downstream emissions. This will also make it easier to benchmark embodied emissions standards and provide orientation to market participants. In addition, there is no direct economic benefit from reducing upstream emissions for the consumer. Yet durability and energy consumption, which tend to be coupled to downstream emissions, affect the economic calculus. This is another factor that strengthens the case for different legislation targeting downstream and upstream emissions (see reasoning by Peiseler et al., 2022 with regard to battery regulation)⁴.

Question 3.4: *Which value chain option, if any, would be most appropriate to target with a mandatory product standard? Please explain your reasoning, with reference to specific sectors if possible, and details of any alternative options.*

- *Option 1: Upstream products*
- *Option 2: Midstream products (broad scope)*
- *Option 3: Midstream products (narrow scope)*
- *Option 4: Downstream or end-user products*
- **None of the above**

To optimally transform industry and make sure to stay in line with climate targets there should be parallel product standards for different segments of supply chains. For instance, mandatory product standards could help to take the worst performing steel and cement products off the market. Further downstream, regularly decreasing maximum carbon thresholds for embodied emissions in buildings could make sure that at the level of buildings there will be greater competition for the lowest-carbon options, which could provide more opportunities for bio-based materials. The greater use of bio-based materials in buildings (e.g., wood) could also help to sequester carbon from the atmosphere and store it in buildings, which would somewhat reduce the need for carbon removal via BECCS and CC(U)S for industrial emissions.⁶

It will be important to also assess the balance between refurbishment of existing buildings and construction of new buildings in terms of overall lifecycle carbon emissions, ideally with realistic assumptions about the carbon intensity of the future electricity grid. Such holistic assessments would be required to go beyond the product scope and encompass urban planning.

Taking the worst performing steel products off the market could help to reduce the embodied emissions of domestically produced cars. The adoption of mandatory battery carbon footprint standards could help to reduce the emissions associated with both domestic and imported cars.

When regulating downstream products, such as vehicles, it is preferable to have different pieces of legislation covering different sustainability aspects (e.g., embodied emissions and durability). It takes far longer to develop comprehensive legislation covering all relevant sustainability or whole life cycle aspects and the greater complexity of such legislation opens it up to more lobbying and capture by industry.⁴ While there can clearly be trade-offs between, for example, seeking to reduce embodied emissions and durability, there should be minimum requirements for all aspects.

The use of conservative default values for mandatory maximum carbon footprint standards for final products, and assuming high embodied emissions associated with the different product elements, could effectively improve deliverability of the policy while providing strong incentives for producers to collect emissions information from suppliers.^{1,4,7}

⁶ CCC The Sixth Carbon Budget <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf>

⁷ Grubb, M., Hourcade, J.C., Neuhoff, K., 2014. Planetary economics: energy, climate change and the three domains of sustainable development. Routledge, London and New York, pp. 46–78.

Question 3.5: *Which option, if any, would be most appropriate for targeting the point of obligation for a mandatory product standard for domestically produced goods? Please explain your reasoning, with reference to specific sectors if possible, and details of any alternative options.*

- *Point of Sale*
- *Point of Production*
- ***Other***

To reduce the possibility that the regulation is challenged with reference to international trade agreements, there should be regulation targeting the point of sale, which would treat domestic products and imports in the same way. Once this is in place, regulation targeting the point of production could be added purely for domestic products, but imports would not need to be considered.

Question 3.6: *What considerations should government consider when targeting the point of obligation for imported goods? Please explain your reasoning, with reference to specific sectors if possible.*

The point of obligation for imported goods should always be the point of sale, to maximise equal treatment with domestic products. This would reduce the potential for challenge with reference to international trade agreements.

Question 3.7: *Do you agree or disagree that any mandatory product standard should apply to imports? Please explain your reasoning, including any details of the possible impacts for your sector.*

Yes, strongly agree.

Question 3.8: *Do you agree or disagree with the proposed principles for setting thresholds and increasing the stringency of mandatory product standards over time? Please explain your reasoning.*

Yes, strongly agree.

Question 3.9: *Should mandatory product standards be delivered in stages, broadly moving from a less stringent, relatively focussed application in the late 2020s to a more stringent and potentially broader application during the 2030s? Please explain your reasoning.*

Government could introduce initial MPS earlier (from 2026) for those products covered by the EU's CBAM, since industry will need to prepare for the associated data provision and CBAM implications.

Chapter 4: Cross cutting policy issues for CBAM and MPS

Question 4.1: *What specific challenges for countries at differing stages of development to the UK, in particular least developed and low income countries would the government need to consider in the future design of any carbon leakage measures? Please explain your reasoning.*

Developing countries may be disproportionately affected by the CBAM, particularly those that are highly dependent on the export of carbon-intensive products. These countries may not have the resources or infrastructure to transition to low-carbon production methods and have less capability to update existing technologies.

Question 4.2: *How can the government best support countries at differing stages of development to the UK, in particular least developed and low income countries? Please explain your reasoning.*

Overall, there is an opportunity to align policies for CBAMs and MPS with UK development policies and programmes, many of which have an explicit aim to support sustainable development and climate action in

low- and middle-income countries. Without this integration, there is a risk that the UK is seen as imposing unacceptable costs on these countries – and constraining their development.

To ensure this integration, the UK government could, for example, provide support to developing countries by recycling the revenues from CBAM. This could include funding for low carbon energy, technology collaboration, sustainable agriculture, finance for adapting to the impacts of climate change, and providing technical cooperation to improve measurement and transmission of product carbon footprints.

Question 4.10: *There may be a risk of carbon leakage from increased imports of processed products produced using intermediate inputs that would have been covered by UK carbon leakage measures if imported directly. Is this a significant concern for you? Please explain your reasoning.*

Yes, agree.

Question 4.11: *If you answered yes, in which sectors do you foresee material issues, and why?*

Automotive, where steel and plastics are added abroad.

Question 4.12: *What are your views on the relative merits of the potential options presented above for addressing potential downstream impacts of carbon leakage measures? Are there alternative options for addressing this issue?*

Downstream impacts of carbon leakage measures for the domestic market are ideally addressed by also adopting product carbon footprint standards for final products, such as vehicles. In addition to maximum carbon thresholds, different quantities of embodied emissions could also result in different taxation classes.^{1,8}

Question 4.18: *Should mandatory product standards apply to all UK manufactured products intended for export? Please explain your reasoning and provide details of any impacts this would have on your sector.*

- **Yes**
- **No**
- **Don't know**

Mandatory product standards should eventually also apply to UK manufactured products intended for export to guarantee the decarbonisation of UK industry. However, as it is preferable to target the point of sale to guarantee equal treatment of domestic products and imports, exports could be targeted in a second step, somewhat less urgently. In principle, export thresholds could also lag those applied at the point of sale. Such a lag could allow time to phase in higher ambition standards for the domestic market earlier.

Question 4.19: *Should the use of carbon credits to offset emissions be considered within the assessment of a product? Please explain your reasoning.*

- **Yes**
- **No**
- **Don't know**

Offsets are highly speculative and uncertain, and their impact on emissions are dependent on many assumptions. In contrast, measurements of embodied emissions can be extremely precise. The use of offsets would drastically increase the complexity and weaken the rigour of product assessments.

Chapter 5: Growing the market for low carbon products

⁸ European Political Strategy Centre, 2016. Towards Low-Emission Mobility. Driving the Modernisation of the EU Economy. EPSC Strategic Notes.

Question 5.1: Which of the following statements corresponds most with your view?

In order to maximise the effectiveness of a labelling scheme, both in terms of consumer usability and implementation costs, a system of embodied emissions should include:

- **Embodied emissions data only**
- *Energy efficiency style lettered and coloured ratings only*
- *Both embodied emissions data and energy efficiency style lettered and coloured ratings*
- *I do not agree with any of these options*

The government should provide effective climate policy rather than relying on consumer choice. Any letter and colour style would need to be regularly updated as low carbon options progress. This needs resources that could be better invested. Public and private procurement will be able to deal with embodied emissions data.

Question 5.2: *Should the government adopt mandatory labelling for products that are required to have their embodied emissions reported? Please explain your reasoning.*

If businesses are required to report product emissions to government anyway, their costs for labelling would be drastically reduced.

However, adoption of mandatory labelling depends on whether the intention is for a customer facing label in order to compare embodied emissions across products. If a label was intended to inform customers this would have to be thoroughly tested to ensure it doesn't create confusion and unintentionally lead to consumer choices that have knock on impacts for other environmental metrics, such as biodiversity decline.

Question 5.3: *Which level of IDDI pledge would best support the decarbonisation of UK industry? Please explain your reasoning.*

- *Level One: Starting no later than 2025, require disclosure of the embodied carbon in cement/concrete and steel procured for public construction projects*
- *Level Two (in addition to level one): Starting no later than 2030, conduct whole project lifecycle assessments for all public construction projects, and, by 2050, achieve net zero emissions in all public construction projects.*
- *Level Three (in addition to levels one and two): Starting no later than 2030, require procurement of low emission cement/concrete and steel in public construction projects, applying the highest ambition possible under national circumstances.*
- **Level Four (in addition to levels one, two and three): Starting in 2030, require procurement of a share of cement and/or crude steel from near zero emission material production for signature projects.**

Immediate disclosure of GHG emissions associated with cement/concrete and steel for public construction projects would increase transparency of supply chain emissions, helping to prioritise decarbonisation. Reuse and use of recycled materials should be prioritised, alongside with the procurement of near zero emission new materials.

Chapter 6: Emissions reporting framework

Question 6.8: *Do you have a preference for how default values could be calculated? What are the advantages or disadvantages of the options?*

- *Option 1: Default values are calculated to represent the average embodied emissions of a product, considering production method and the region of origin*

- **Option 2: Default values are calculated to be stringent, for example representing the ‘worst available technology’ for the manufacture of a given product, or a penalty (for example, 20%) is added to the industry average.**
- *Option 3: Default values are calculated using UK industry data, initially using sources such as the UK ETS and other compliance schemes.*
- *None of the above*
- *No preference*

Chapter 7: Designing the mechanism for embodied emissions reporting

Question 7.1: *Should government pursue a Life Cycle Assessment-based approach?*

Yes

Question 7.2: *What is your preference for the type of Life Cycle Assessment methodology framework that should be adopted? What are the advantages or disadvantages of each option?*

- **Option 1: A life cycle assessment methodology that includes Scope 1, 2 and some upstream Scope 3 emissions at a minimum. It would be aligned with internationally recognised standards from the International Organisation for Standardisation (ISO) and would require third-party verification. Ideally, the chosen methodology would already be in use by parts of industry in the UK and other jurisdictions. An example of such a methodology is the European standard BS EN 15804:A2.**
- *Option 2: Businesses use sector-specific international standards where they exist, and if these do not yet exist, government and industry would develop them collaboratively. An example of such a methodology is ISO 20915. Emissions scope and third-party verification would be the same as Option 1.*
- *Option 3: Businesses use UK-developed standards where they exist, and if these do not yet exist, government and industry would develop them collaboratively. An example of such a methodology is PAS 2050. Emissions scope and third-party verification would be the same as Option 1.*
- *None / Other*

Options 2 and 3 result in incomparable assessment across different product types.

PAS 2050 is an LCA methodology, but only looks at greenhouse gas emissions. It is necessary to look beyond this to environmental co-benefits and trade-offs to get a fuller picture.

Option 1 is preferable as a full LCA which enables other indicators to be included. However, there is still a need to have harmonised reporting.

Question 7.3: *Should CO₂e/mass (including performance metric where relevant) be used as the metric for embodied emissions reporting and form the basis of any subsequent policy? If you disagree, please explain why and suggest an alternative metric.*

There are different considerations here. From an equity standpoint, including social factors in complementary policy could be really valuable, and separating social factors from environmental factors doesn't seem to align with international practice.

The measurement also depends on the sector e.g. for livestock it is not done on mass, but on monetary unit. For instance, for cows, beef would drive the monetary value, not leather or milk.



Usually there are co-products, so when measuring by mass, you may not include the co-products sufficiently in the metric.

Question 7.4: *Should mass (of product) be the appropriate unit of measurement for your sector? If not, please explain your reasoning and suggest your preferred unit of measurement.*

Within the energy sector, it makes sense to measure per energy unit. However, it depends on the definition of 'product', as energy imported should be counted as a product, as well as physical consumable products. Product quality also needs to be included in assessments of embodied carbon. Maximising for low embodied carbon could result in lower durability or quality – and it is especially important to avoid this in cases such as construction materials.