# The future of carbon pricing

A joint submission to the UK Government by the Grantham Research Institute on Climate Change and the Environment, the Institute for New Economic Thinking at the Oxford Martin School, and the Environmental Change Institute

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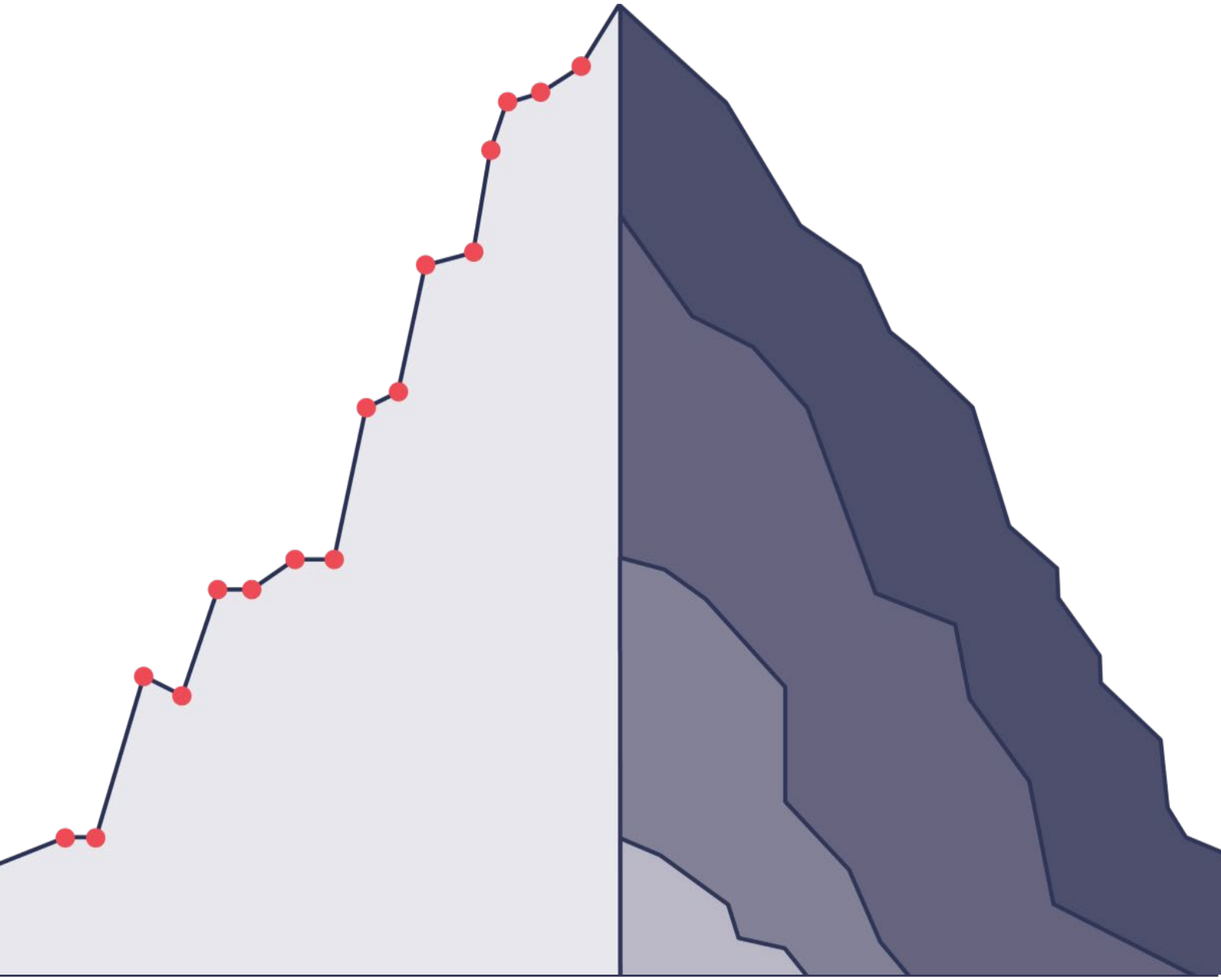

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### About this submission

This written evidence was submitted on 12 July 2019 to the joint consultation into 'The future of carbon pricing', being carried out by the UK government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland. More information about the consultation can be found at: www.gov.uk/government/consultations/the-future-of-uk-carbon-pricing

**Josh Burke**, **Baran Doda** and **Luca Taschini** of the Grantham Research Institute prepared responses to all questions except question 25, which was prepared by Josh Burke and by **Linus Mattauch** of the Institute for New Economic Thinking and the Environmental Change Institute, University of Oxford.

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# Executive summary

**Headline issues**

- Carbon pricing must be a key component of the plans to deliver on the UK's recently adopted net-zero emissions target. We therefore welcome the UK's post-Brexit commitment to carbon pricing that is at least as ambitious as the current pricing mechanisms.
- We recommend that the UK government pursues efforts to assess the impact of a likely reduction in the number/volume of transactions and the associated increase in transactions costs in a standalone UK emissions trading system (ETS). This assessment may well conclude that a standalone UK ETS is a sub-optimal solution.
- In our view, a standalone UK ETS, even one with latitude to increase scope, is likely to be a very costly option for the UK. This would therefore be a less preferred option than a carbon tax. However, both a carbon tax and a standalone ETS raise competitiveness issues that may need to be addressed using measures such as border carbon adjustments, tax exemptions or free allowances.

While the operation of the EU Emissions Trading System (ETS) has not been without problems, the reforms that have been implemented or are in the pipeline have helped to establish a substantive price signal.

UK installations account for approximately 10 per cent of emissions covered by the EU ETS. Our academic research shows that cost savings generated by emissions trading are far greater if the jurisdiction is part of a much bigger market (Doda and Taschini, 2017; Doda et al., 2019). Accordingly, negotiating an agreement to remain a member of the EU ETS or establishing a UK ETS that is linked to the EU ETS immediately or as soon as practicable will continue to benefit UK in the future. If the former is politically infeasible, we agree with the Government that the latter is the preferred option.

Establishing a UK ETS involves opportunities and risks for the UK. On the one hand, the UK can re-optimise its system design swiftly and flexibly without seeking the approval of other EU member states. This process could be informed by the important lessons learned from the UK's participation in the EU ETS and more broadly from other emissions trading systems that have proliferated around the globe since the EU ETS was established in 2005.

On the other hand, significant divergence from the EU ETS's core design features will likely make linking negotiations with the EU more complex. It may cause delays in reaching a linking agreement, result in a costly restricted linking arrangement (Quemin and de Perthuis, 2018), or even preclude an agreement altogether, resulting in a standalone UK ETS.

A standalone UK ETS is likely to be very costly because:

- Finding counterparties for permit transactions will be more difficult, reducing the number/volume of mutually beneficial transactions that would have taken place in a larger market
- Fewer/smaller transactions will raise transaction costs
- Divergent prices in the UK ETS and EU ETS may have undesirable competitiveness implications for the UK

In our view a standalone UK ETS would be the worst outcome. Therefore, if linking is not an option, we would advocate for a carbon tax complemented by measures to address competitiveness issues instead. (See Mehling et al., 2019 for WTO compatibility and Helm et al., 2012 for political theory of border adjustments.)

# Consultation submission: The future of carbon pricing

## Chapter 1: Design of a UK Emissions Trading System

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| 1 – 2 | [Not answered] |
| 3 | **a) Do you agree with the proposed scope of a UK ETS? (Y/N)**<br><br>Yes. We agree with the proposal that the UK ETS scope is aligned with the EU ETS in the short term but we recommend that the UK ETS gradually move towards an expanded scope in the medium term.<br><br>**b) Please expand on your answer, providing evidence in support of your response where possible.**<br><br>In theory a unique globally harmonised carbon dioxide-equivalent price, increasing at an appropriate rate and applying to all emitting sources, is necessary to deliver cost-effective reductions in greenhouse gas emissions (Bowen, 2011; Fankhauser and Hepburn 2011a; Fankhauser and Hepburn 2011b).<br><br>In practice, no global regulator with the mandate to impose and enforce such a carbon price exists. Consequently, carbon prices differ across jurisdictions (World Bank, 2019), and across sources within a jurisdiction. For example, the carbon price facing UK emitters in different sectors of the economy varies widely (Advani et al., 2013). Bringing more sources within the scope of the same carbon pricing regulation will improve its cost-effectiveness by equalising the abatement costs at the margin. |
| 4 | **a) Do you have any suggestions for which sectors might be included in scope in the future? (Y/N)**<br><br>Yes. Transport and the residential and commercial heating sector could be included in the scope in the medium term.<br><br>**b) Please expand on your answer, providing evidence in support of your response where possible.**<br><br>The most significant sources of emissions that are currently not included in the EU ETS, albeit regulated otherwise, are transport and the residential and commercial heating sectors, which account for 21 per cent and 13 per cent of EU28 greenhouse gas emissions, respectively. The scope of several other existing ETSs include these sectors, for example those of New Zealand, California and Quebec, and Chinese pilot schemes such as Shenzen's and Beijing's. The South Korean system covers the residential and commercial heating sectors but excludes transportation (ICAP).<br><br>There is evidence that suggests carbon pricing is a necessary and effective but not individually sufficient instrument for reducing emissions from transport (Sterner, 2012) and heating (Chaudry et al., 2015).<br><br>Following Brexit, the scope of a UK ETS could be expanded to include these sectors, to account for 24 per cent (transport) and 17 per cent (residential and commercial heating) of UK greenhouse gas emissions. The regulation could be applied upstream to minimise any undue burden on small emitters. An expanded scope along these lines would have the benefit of providing a consistent carbon price signal in a broader range of sectors and increase market depth/liquidity for a standalone UK ETS. It would reduce the burden on the complementary |

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| | decarbonisation policies that agents in these sectors face. It has the drawback of making linking negotiations with the EU potentially more complex and brings up domestic distributional issues because carbon pricing in transport and the residential sector can be particularly regressive. |
| 5 – 11 | [Not answered] |
| 12 | **a) Do you agree with the concept of introducing a SAM [Supply Adjustment Mechanism], similar in function to the EU ETS MSR, for a UK ETS? (Noting that a SAM cannot be operational immediately and we will consult on the specific details at a later date.) (Y/N)**<br><br>Yes. We agree that a SAM should be introduced.<br><br>**b) Please expand on your answer, providing evidence in support of your response where possible**<br><br>Economic shocks, technological progress or the introduction of new policies can influence the efficacy of cap-and-trade programmes, as has been evidenced in the case of the EU ETS (European Parliament and Council, 2015). A key lesson from the 2008–2012 economic downturn in Europe is the importance of building flexibility into cap-and-trade systems (Taschini and Duffy, 2014; Kollenberg and Taschini, 2016; Hepburn et al., 2016; Doda, 2016; Kollenberg and Taschini, 2019). In Europe, the absence of institutional rules permitting adjustments of the cap in the face of new information contributed to the need to invoke different, potentially less-efficient, regulations (Grosjean et al., 2014; Ellerman et al., 2015). In response to the growing supply–demand imbalance, the European Commission (EC) has introduced the Market Stability Reserve (MSR) that has started to operate in 2019 (European Parliament and Council, 2015). The EC MSR adjusts the number of allowances auctioned based on the size of the aggregate bank, i.e. the sum of firms' individually held banks of allowances.<br><br>The upcoming consultation on the Supply Adjustment Mechanism (SAM) should pay due attention to the potentially complex interaction that may arise between the MSR and SAM when the UK ETS is linked with the EU ETS. For example, if the SAM is not carefully aligned with the MSR, it is possible that the SAM is rendered ineffective, or even that the mechanisms work at cross purposes with each other when the two systems are linked.<br><br>Also, it should be noted that making it easier to adjust the UK cap might have some drawbacks. Greater flexibility may infer potential for political interference, which could adversely affect the credibility of the Government's commitment to a given time profile for the emissions cap and introduce new uncertainties into the system (Harstad and Eskeland, 2010). This in turn can make linking negotiations with the EU potentially more complex. |
| 13 | **What factors should be considered when setting the thresholds for a standalone UK ETS SAM?**<br><br>In principle, the objective of a SAM is to make the standalone UK ETS responsive to shocks and, in the spirit of the EU ETS MSR, tackle unexpected supply–demand imbalances. Therefore, the factors that should determine the design of a standalone UK ETS SAM (intake rate and threshold levels, for example) are fundamentally linked to the causes of possible market imbalances that may develop in the UK allowance market.<br><br>In every cap-and-trade system, regulated firms have to decide how much they want to offset their emissions (either by abating or by purchasing allowances), considering not only the current but also the expected future cost of doing so. Under the usual assumption of rising abatement costs with increasing amount of abatement, firms start accumulating allowances and then draw them down (Rubin, 1996; Schennach, 2000; Kollenberg and Taschini 2019). The rationale for banking is quite intuitive: if tomorrow's discounted expected cost is higher than today's, it is worth banking allowances, whether obtained by abating more emissions today or by purchase, and either using them to cover some of tomorrow's emissions or selling them for profit later on. How much banking will occur and for how long depends on the values |

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| | embedded in the firms' expectations. For example, an unexpected negative shock to aggregate emissions demand would result in a reduction of the required abatement and a surplus of allowances, or alternatively, a longer banking period. In this instance, the allowance market imbalance is a surplus of allowances (in excess of the expected bank) that might not be dealt with by the UK market itself within a reasonable amount of time.<br><br>We recommend that the Department for Business, Energy and Industrial Strategy (BEIS) consult with the UK stakeholders to identify the desirable timeframe within which a given reduction of the domestic surplus is achieved. Thus, in setting the appropriate thresholds of the standalone UK ETS SAM, the Government should consider if the reduction of the domestic surplus is accelerated post-SAM and achieved within the desired timeframe. We suggest to test the robustness of SAM by computing – for example – the number of years it would take SAM to absorb the potential surplus, i.e. the variation of emissions in the UK ETS sectors, caused by (1) more stringent UK renewable energy targets, or (2) technological innovation, or (3) UK ETS link to a system that announces a post-link coal phase-out. |
| 14 | **What factors should be considered in determining at what point in Phase I of a standalone UK ETS a SAM should be introduced?**<br><br>Similarly to the EC MSR, the standalone UK ETS SAM will adjust the number of allowances auctioned as a function of the size of the aggregate bank, i.e. the sum of UK firms' individually held bank of allowances. When the UK ETS starts the aggregate bank is zero. Firms will first accumulate allowances (the bank is increasing) and then draw them down (the bank is decreasing).<br><br>The SAM could be parameterised and introduced from the start of the standalone UK ETS with the implication that it can only adjust the supply of allowances after the end of the first compliance year when the aggregate bank becomes known. In order to avoid unnecessary intervention, the SAM should be activated only when the aggregate bank is outside the pre-determined range defined by upper and lower thresholds.<br><br>Alternatively, the SAM could be introduced after the first three years of the compliance period – e.g. from 2020 to 2023 – and parameterised based on the UK ETS market experience and dynamics during this period. In this case, the SAM could only adjust the supply of allowances after this period and only if the aggregate bank is outside the range announced at the beginning of the third year.<br><br>There is no theoretical reason why a SAM cannot coexist with an Auction Reserve Price (ARP), since the latter operates in the primary market while the latter in the related yet distinct secondary market. Our response to question 16 below provides more details on why an ARP may be desriable in addition to a SAM. |
| 15 | **a) Do you agree that the proposed CCM [Cost Containment Mechanism] strikes the appropriate balance between effectively addressing in-year price spikes without responding too frequently to shorter term upward price fluctuations, thereby avoiding market disruption? (Y/N)**<br>Yes<br>**b) Please expand on your answer, providing evidence in support of your response where possible.**<br><br>Under Article 29a of the ETS Directive, the European Commission is required to hold a committee meeting to discuss the possibility of increasing the supply of allowances if, for more than six months, the European Union Allowances (EUA) price is more than three times the average price from the previous two years. This relates to the crucial point of short-term market management. It is interesting to note that the possibility to invoke Article 29a could also induce a self-adjusting behaviour by market participants. When the price of allowances rises over the specified period more quickly than the reference period, firms will expect an intervention in the market. In particular, when there is a relatively big rise in the price trend, firms would expect an injection of allowances. So, for those firms possessing an excess of |

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| | allowances, it would be in their interest to sell in advance of the injection; for those firms having a shortage of allowances, it would be in their interest to wait until the injection, ultimately reducing prices.<br><br>It is important to notice that Article 29a opens the opportunity for discretionary intervention in case of a significant price increase. EUA price levels in the past months have not been high enough to invoke Article 29a. Also, given current price levels and the introduction of the EU ETS MSR, it is unlikely that the European Commission will intervene.<br><br>We agree with the proposal that the UK ETS will have a CCM in place. As it is proposed, a UK committee will decide on the required market intervention in response to an excessive (linking) price increase. So, although the proposed design of CCM mimics Article 29a, its discretionary nature may prove that the anticipation of possible uncoordinated market intervention will make linking negotiations more difficult. |
| 16 | **a) Should a transitional Auction Reserve Price be implemented to provide minimum price continuity during the transition from the EU ETS to a UK ETS? (Y/N)**<br>Yes<br>**b) Please expand on your answer, providing evidence in support of your response where possible.**<br><br>The scope of a future ETS must be at least as ambitious as existing arrangements regarding the level of the price, the sectors that are covered and the exemptions that are granted.<br><br>The auction reserve price must be set at such a level that ensures power sector decarbonisation continues at pace. This necessitates price levels of at least the current levels to ensure that there is not a resurgence in coal generation in the early 2020s. Analysis by Aurora Energy Research suggests that the price level faced by coal generators must be £40 to prevent the resurgence of coal generation from 2020–2025.<br><br>At the same time, the methodology behind the ARP needs a clear objective. At the moment it is not clear what this is. The risk of this approach is that if the objectives are unclear, then it is almost impossible to arrive at an optimal set of policy solutions, and the risk of inefficiency or unintended outcomes is high. The objective therefore needs to be clear and inform the methodology.<br><br>If the ARP is purely transitional until the SAM comes into effect, then the SAM would have to be consistent with net zero. However, in the event that future linking of a UK ETS with its EU counterpart is unsuccessful, the ARP could act as an effective minimum price guarantee. In this regard, it is no longer about aiding the transition to a new linked ETS, but it could be an effective way of ensuring the total carbon price (ETS plus CPS) remains at a level consistent with net zero. Recent research by the Grantham Research Institute examines how to price carbon to reach net-zero emissions in the UK. We recommend that a shadow price that is target-consistent with net-zero would start at £50 per tonne of carbon dioxide ($tCO_2$) in 2020, rising to £75 in 2030, and rising to meet the cost of negative emissions technology at £160 by 2050. The auction reserve price may be useful to ensure this price trajectory is maintained. |
| 17 | **a) Do you agree with the proposed approach to phases? (Y/N)**<br>Yes<br>**b) Please expand on your answer, providing evidence in support of your response where possible.**<br><br>The length of a commitment period is relevant for market efficiency. This is particularly the case when investments to reduce emissions require many years for investors to recover their costs, including the cost of capital. If commitment periods are short, investors are forced to guess the emission caps and design elements that will be set by future revisions, and make an attempt on anticipating any potential changes in the underlying structure of the UK ETS market. |

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| | We agree with the proposal that the UK ETS initial phase will have a similar length to the EU ETS. Minimising any difference in the length of the regulated periods will significantly reduce investment and price distortions. Moreover, it will likely make linking negotiations with the EU potentially less complex. |
| 18 – 24 | [Not answered] |
| 25 | **a) Do you consider that we should create a fund for industrial decarbonisation under a linked or a standalone UK ETS? (Y/N)**<br><br>Yes but this should not be the only use of the revenue.<br><br>**b) Please expand on your answer, providing evidence in support of your response where possible.**<br><br>Revenue recycling from emissions trading systems has in the past received less attention than revenue recycling from carbon taxes. However, there is much that can be learnt from how revenue is recycled from carbon taxes. Addressing the lack of public support for carbon prices is becoming an ever more important concern as many governments commit to more ambitious emissions reduction goals. The low penetration of carbon pricing is in large part due to people's aversion to taxes generally, and to carbon taxes more specifically. Making carbon pricing more politically acceptable is thus a key precondition for more stringent and effective climate action.<br><br>Surveys show that individuals do not think a carbon tax on its own is effective in reducing emissions. Voters show a preference for earmarking the tax revenues for additional emissions reductions and are particularly keen on support for low-carbon research and development, along with subsidies to promote deployment (Carattini et al., 2017; Klenert et al., 2018).<br><br>To date a great amount of political effort has been put towards granting exemptions or allowances to energy-intensive industries, often by means of grandfathering. However, ETS systems can initially be designed to transfer value to industry and transition over time to transferring value to citizens: the EU ETS, for instance, continuously increases the share of auctioned allowances over time.<br><br>So it is a question of how revenue recycling could both create real value to the economy and at the same time contribute to broad public support for reaching climate targets.<br><br>In the UK, revenues from the EU ETS were so far put into the general government budget. There is a consensus in the academic literature that this is the worst way to raise public support for carbon pricing (Kallbekken et al., 2011; Maestre-Andres et al.,2019; Carattini et al., 2017; Klenert et al., 2018). While in the UK climate politics is less polarised and there is more consensus than in other countries about the way forward, if much of the planned decarbonisation is to be carried out through carbon pricing, the importance of maintaining policy support may be increasing. This is especially true should the national ETS be expanded to include sectors beyond the EU ETS, such as transport and heating.<br><br>The general consensus in the literature is that the use of revenue recycling from carbon pricing that is most convincing to citizens is either some form of direct compensation to citizens or some locally visible 'green' infrastructure spending. Carbon dividends are popularised in the US by the Climate Leadership Council and have received broad support from American economists (www.econstatement.org/).<br><br>Countries with high carbon taxes, such as Sweden and Switzerland, were successful in their implementation because the used a mixed strategy of revenue recycling with revenues being used partly for direct compensation to citizens, partly for green infrastructure spending and partly for industry compensation. On balance, we recommend that these options are assessed as potential uses of revenue recycling in conjunction with allocating some revenue for an industrial decarbonisation fund. |

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| 26 – 32 | [Not answered] |
| 33 | **How could a UK ETS evolve over the coming years in order to ensure the system delivers for future challenges and encourages innovation within business?**<br><br>A UK ETS could evolve over time to consider negative emissions and linking with markets other than the EU ETS.<br><br>Beginning with the former, it has been suggested that the Sustainable Development Mechanism under the Paris Agreement, a successor to the Clean Development Mechanism (CDM), might usefully be expanded to analogously include international trades in negative emission offsets (Honegger and Reiner, 2018). This is because the Committee on Climate Change (CCC) considers that even in its 'Further Ambition' scenario – its pathway to net-zero – there will be around 90 $MtCO_2e$ a year of residual emissions that negative emission technologies will have to remove.<br><br>However, incentivising negative emissions via their future inclusion within positive emissions markets (such as the EU ETS) is not an optimal solution. By amalgamating positive and negative emissions markets, a natural link is created, whereby emitters substitute positive emissions for negative emissions, before prices eventually equalise. Consequently, demand for positive emissions falls with a corresponding price response. This would necessitate far more intervention in the positive emissions market to ensure price stability. Instead we propose that incentivising negative emissions could be achieved by a government-led public procurement scheme where the Government is the main source of UK demand for negative emissions. Based on an understanding of the efficacy of low-carbon policies, the Government would purchase negative emissions in proportion to the residual carbon output that its policies have not succeeded in avoiding. Public procurement through a competitive auction mechanism is preferred to a general subsidy for negative emissions where the Government would reward all producers with a fixed level of support (akin to feed-in tariffs), as an auction is more responsive to technological progress (Burke et al., 2019).<br><br>A second way in which a UK ETS could evolve over time would be to consider future linking beyond the EU ETS. Our research highlights two types of gains from linking ETSs in two different jurisdictions, namely effort- and risk-sharing gains. The former derives from the differences across ETSs in the *expected/anticipated* marginal cost of emissions reductions. The latter is generated by *unexpected/unanticipated* changes in the marginal abatement cost due to business cycles, weather and technology shocks (Doda and Taschini, 2017; Doda et al., 2019).<br><br>The magnitude of effort- and risk-sharing gains from linking ETSs bilaterally can be substantial. Moreover, linking tends to deliver greater benefits to smaller systems. These provide the theoretical underpinning for our advice that a UK ETS linked to the EU ETS is a much better option.<br><br>Our research also shows that the reasoning does not generalise to multilaterally linked ETSs without transfers between jurisdictions (Doda et al., 2019). For example, consider the case where the UK ETS is already linked to the EU ETS. If the UK finds it beneficial to link its ETS to a third system in the future, which indirectly links the EU ETS to the third system as well, it is not a foregone conclusion that this leaves the EU better off as well. This is true despite the fact that in aggregate the three systems are better off than before.<br><br>These findings suggest that being linkage-ready is important because linkages between ETSs unlock benefits that individual unlinked systems cannot deliver. However, it can leave some incumbent systems worse off. We recommend that the UK assess future linkages carefully and consider well-designed transfer mechanisms in advance to ensure all parties can gain from market expansion. |

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| 34 – 36 | [Not answered] |
| 37 | **a) Do you agree with the proposal that banking and borrowing arrangements in a UK ETS should mirror those of Phase IV in the EU ETS as described above? (Y/N)**<br>Yes<br>**b) In the case of a standalone UK ETS how can we best balance the potential ability to bank allowances with the UK's wider decarbonisation goals?**<br><br>See answer to 37c.<br><br>**c) Please expand on your answer, providing evidence in support of your response where possible.**<br><br>Unrestricted linking between two systems leads to the propagation of the less stringent banking and borrowing options to the combined market. Thus, banking and borrowing arrangements in a (linked) UK ETS should mirror those of Phase IV in the EU ETS, especially since divergences in temporal flexibility options are likely to prove a significant barrier to negotiating a linking agreement.<br><br>Suppose the UK ETS introduces some limitation on banking of (domestic and non-domestic) allowances and suppose that there are no restrictions on allowance exchange between systems. In such a scenario, the UK ETS provides an additional pool of allowances that installations in the linked EU ETS can use for their current compliance, leading to (i) a new source of demand for the allowances in the linked UK ETS that could not otherwise be banked in the standalone UK ETS, and (ii) a free-up of allowances in the EU ETS that could be used for banking. If the system with the banking restrictions is big relative to the one without, market distortions may emerge due to the banking restrictions under linking. Conversely, the impact on the linked market price is likely to be negligible if banking restrictions apply only in the small ETS.<br><br>In the case of a standalone UK ETS, unlimited banking provisions allow firms to respond to UK-specific shocks. When these provisions alone are not sufficient because the market is faced with severe allowance demand shocks, the Supply Adjustment Mechanism (SAM) can help pick up the slack.<br><br>However, our research shows that a standalone UK ETS is unlikely to generate as many benefits as a UK ETS linked to the EU ETS (Doda and Taschini, 2017; Doda et al., 2019). Under these circumstances the UK may well be better off adopting a carbon tax that can allow firms to allocate their abatement effort optimally over time under the stable signal provided by the tax. In other words, the case for a carbon tax as the UK's main carbon pricing policy instrument is much stronger against the alternative of a standalone UK ETS, provided equivalent measures are in place to address competitiveness concerns that arise for both instruments. |
| 38 – 79 | [Not answered] |

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