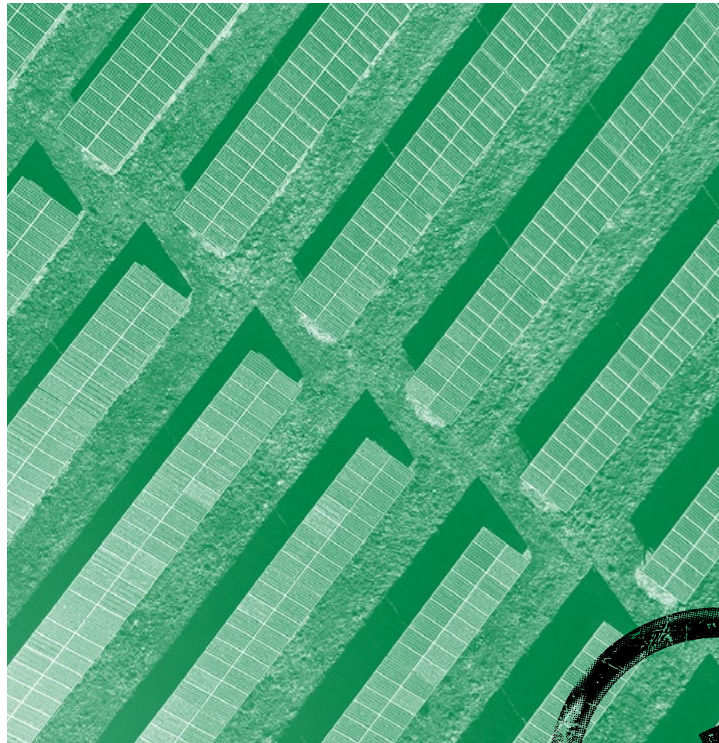


THE ZERO CARBON COMMISSION:

HOW CARBON PRICING CAN HELP BRITAIN ACHIEVE NET ZERO BY 2050

September 2020





ZERO
CARBON



**CARBON PRICING
LEADERSHIP COALITION**

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ABOUT THIS REPORT

The Zero Carbon Commission was formed in February 2020 to review the UK emissions pricing landscape, and explore how it might be re-designed to be consistent with the UK's legislated 'net zero' target. Our [interim report](#) was published in June and this is our final report.

The information in this report is supplemented by the following annexes:

- [Annex 1](#) - Public opinion: *Green recovery and environmental policy*
- [Annex 2](#) - Landscape: *International carbon pricing*
- [Annex 3](#) - UK Carbon Pricing: *Current state of play*
- [Annex 4](#) - Process: *Terms of reference and list of evidence*

Commissioners



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The Commission secretariat was provided by **Rachel Wolf**, who also authored this report.

Process

The Commission has:

- Held a series of six evidence sessions - in person and virtually - with expert witnesses;
- Run focus groups across the country, and conducted a large and detailed nationally representative poll (n=2,000);
- Commissioned independent analysis from **LSE and the Grantham Research Institute, Vivid Economics**, and the **University of Leeds** on the distributional impacts of a carbon charge on UK households and how to mitigate that impact; and from **Frontier Economics** on the impact of a Border Adjustment on the UK steel industry.

You can read more about the Commission's process, witnesses, and research [here](#).

Acknowledgements:

The work of the Zero Carbon Commission has been informed by a series of independent consultations and evidence sessions, as well as substantial public opinion, policy and economic research.

With thanks to **LSE and the Grantham Research Institute, Vivid Economics, the SCRC Centre for Climate Change Economics and Policy, the University of Leeds, Frontier Economics** and **Public First** for their research contributions.

Thanks also to the expert witnesses whose input has been so helpful in shaping the Commission's recommendations, as well as those who submitted written evidence. We would also like to thank all those who have provided input throughout the process of developing this report, and especially the following for reviewing draft versions: **Josh Buckland, Josh Burke, Gracia Marín Durán, Sam Hall, Mike Hemsley and Richard Taylor**.

Last of all, thank you to the **Zero Carbon Commissioners** for their time, which has been extensive, and provided pro bono. This includes **Baroness Bryony Worthington**, who unfortunately had to step down after our interim report on account of time constraints.

We are grateful for the following endorsements of our work:

“There is no more important part of the net zero ‘jigsaw puzzle’ than creating a charge on carbon, levied systematically across the economy. It ensures the polluter pays and inspires us to innovate to create solutions that we cannot imagine today. But for all of its potential, getting there will not be easy. This report outlines clearly the many challenges we face in realising the potential of a charge on carbon and crucially the solutions to them. The clock is ticking on the climate crisis. Time to get on with it.”

Mike Barry, Trustee, Blueprint for Better Business

“Government may have put a legally-binding net zero target in place, but it continues to lack a clear and considered strategy on how to achieve it. This limits the ability of local leaders to ramp up the design and delivery of successful net zero actions in our communities, where so much of the decarbonisation of our economy and society needs to happen. Carbon pricing risks being a blunt instrument which burdens lower income households, but this report shows that - if tailored to the needs of sectors and communities and accompanied with appropriate climate policies - it could be an effective tool for driving decarbonisation across the UK economy.”

Polly Billington, Director, UK100

“A higher carbon price is not a silver bullet for decarbonising the economy but it is a critically important part of the jigsaw. The reality is that for decades polluters have been free-riding on the environment and we’re all now paying the price, particularly the poorest across the world. Researching and campaigning on carbon taxes might not be glamorous but it is important, so this report is very welcome.”

Mike Childs, Head of Science, Policy and Research, Friends of the Earth

“This report provides an urgent call to action on the need to align incentives if we are to unleash the power of markets to solve the climate crisis. It’s ridiculous that we punish people for doing the right thing and subsidise dirty gas businesses by piling policy costs onto electricity bills. Individual action and systemic structures should never be in tension on something that poses such an existential threat as climate change.”

Clementine Cowton, Director of Policy, Octopus Energy Group

“The government has committed the UK to phasing out carbon emissions by 2050, requiring significant changes to all sectors of the economy. However, while there are many excellent approaches to decarbonisation in progress, there is no national strategy on how net zero will be achieved or funded. The Zero C report provides clear and detailed analysis and recommendations on how the application of carbon-pricing across the economy would provide a framework and incentives for an equitable and efficient transformation. Policy-makers, and indeed anyone concerned with action on climate change, will find it an invaluable resource.”

Professor Joanna Haigh, Emeritus Professor of Atmospheric Physics, Imperial College London

“Pricing carbon is an effective, market-friendly, and currently underused tool in the fight against climate change. Zero C’s excellent report sets out a politically and economically sound plan for introducing carbon charges across the UK economy. By backing complementary policies to support business switch to clean technologies and to cushion the impacts on low-income households, the Commissioners’ proposals avoid many of the common pitfalls of carbon pricing. As ministers plan for the Comprehensive Spending Review this autumn and COP 26 next year, I urge them to consider these recommendations as a way both to raise revenue post-COVID and deliver our 2050 net zero target in an economically efficient way.”

Sam Hall, Director, Conservative Environment Network

“This is the right initiative at the right time. Carbon pricing is one critical lever for enabling a rapid transition to a zero carbon country. As this report makes clear, it will take the full mix of subsidies, legislation, regulation and taxation to rewire our economy. The Commission’s report is helping get the carbon pricing ball rolling again, even if in some areas we need action to go even further and faster, as with aviation. These proposals have carefully balanced different imperatives such as ensuring it is the polluter who pays, while protecting and supporting those on low incomes. In this way, putting the right price on carbon is a practical tool to address, post-COVID, the climate crisis and the inequality crises that we all face.”

Harriet Lamb, Chief Executive Officer, Ashden

“To tackle the climate crisis every farmer needs to make changes to reduce carbon emissions and store carbon. As there’s a variety of land-use types across the UK, there is no silver bullet solution but there is a need and a huge appetite for action. This report offers practical approaches that encourage diversification within the agriculture industry, and provides a framework for the NFFN to support farmers in doing what’s right for them, their land and the environment.”

Martin Lines, Chair, Nature Friendly Farming Network

“Establishing a clear trajectory for carbon pricing across our economy will be key to ensuring businesses transition at the pace and scale required to achieve net zero emissions by 2050. The proposals outlined in this report offer a clear incentive for businesses to make long-term investment decisions regarding decarbonisation and circular production, which in turn will lower price barriers to sustainable living. Applying a carbon price upstream will help overcome the complexities inherent to assigning carbon prices at a product level, whilst placing the cost burden on those most responsible for emissions production”.

Benet Northcote, Former Director of Corporate Responsibility, John Lewis Partnership

“This report provides a comprehensive, carefully evaluated, and highly logical package of economy-wide and sectoral policy options to implement ambitious goals for progressively decarbonising the UK economy. The recommendations, from an outstanding group of Commissioners, will be extremely valuable to UK policymakers as they grapple with the practicalities of developing a new framework for climate mitigation strategy post-Brexit.”

Ian Parry, Principal Environmental Fiscal Policy Expert, International Monetary Fund

“Every nation must substantially upgrade its Paris Agreement commitment. COP 26 must be a global negotiation when major climate action sweeps through and enhances the world economy. The most efficient way to make that possible, to repurpose whole economies to do more good, is a fair, effective, economy-wide price on carbon that builds clean local economies. Every nation can do this in its own way, and every nation should commit to pricing pollution as part of its NDC.”

Joseph Robertson, Global Strategy Director, Citizens’ Climate Lobby

“A higher, simpler and more broadly applied carbon price is a crucial element in the fostering of a post-COVID economic recovery that is consistent with net zero emissions by 2050. The Zero C report contains detailed, thoughtful and pragmatic advice which the government would be well advised to heed. The drive to zero carbon will be at the core of the sustainable and inclusive growth story of the 21st century.”

Lord Nicholas Stern, Chair, Grantham Research Institute, London School of Economics

Introduction: Why now?

“We’ve got to do something about climate change and the coronavirus has not changed that...I feel like it can be a springboard for a change for everybody”

Woman, Stoke, focus group

In the next few years, the UK government must achieve three core goals – it must drive economic recovery; it must put us on a path to net zero by 2050; and it must deliver both while maintaining public consent. A new approach towards UK carbon pricing supports all three.

- **Economic recovery.** The revenue from a carbon charge can be recycled into creating jobs in green innovation; into other COVID-19 priorities; and back to households. It can drive a fair and green recovery from COVID-19.
- **A path to net zero.** A carbon charge can go some way towards filling the policy gap that has been identified in the UK’s net zero strategy. It cannot deal with climate change alone – but it should form the core of a viable roadmap, alongside a range of other sectoral regulations and subsidies. It would provide a clear signal of intent for UK climate leadership ahead of our hosting COP 26 in November 2021.
- **Public consent.** As our more detailed public opinion analysis ([Annex 1](#)) describes, 77% of the UK public view COVID-19 as an opportunity to change the way our society works, and 68% support the government’s net zero goal. There is absolute support for placing a price on the use of fossil fuels - including on household heating - which increases when charges are part of a clear, systemic approach towards decarbonisation.

What is a carbon charge?

A carbon charge is a form of pollution tax: it requires those responsible for greenhouse gas* emissions to pay for them. The majority of economists and environmental experts think it should be a central pillar of any decarbonisation strategy.

That is because a carbon charge makes the creation of greenhouse gases less attractive than cleaner alternatives, without dictating exactly what those alternatives need to be. Different solutions suit different people and industries – some houses might want to reduce their need for heating, while others

will want to buy a heat pump. Some industries can switch to renewable sources of energy, while others need to ‘capture’ their emissions. A carbon charge lets people and companies decide, but makes it financially more attractive to remove or reduce emissions than to produce them.

Carbon charges can also create a revenue stream which can be used to fund cleaner energy; to offset the rise in people’s bills; and for general government priorities.

*Our proposals include appropriate taxation of two other major greenhouse gas (GHG) emissions, Nitrous Oxide (N₂O) and Methane (CH₄) which are produced primarily by the agricultural sector. The term “carbon charge” is therefore used as a shorthand to cover all forms of GHG charge.

The proposals outlined in this report are designed to achieve all of these aims in a practical, fair and deliverable way. They also bear in mind the principles our research has identified with the public; sectors; and experts. They are that a **carbon charge must:**

- 1. Make it possible for individuals to switch to alternatives,** and for companies and businesses to capture the emissions they produce. People are not willing to see households burdened with charges they cannot escape;
- 2. Protect those on low and modest incomes** from substantial rises in costs, which is even more important as unemployment rises as a result of the pandemic. Without this as a core consideration, the policy will fail;
- 3. Prevent ‘carbon leakage’*** – we do not want UK-based manufacturers to move abroad because carbon pricing has increased costs – manufacturing jobs are important. Nor do we want to achieve net zero in UK production, only for consumers to buy ever-more imports with a high carbon footprint.

Other countries are already acting. Germany and Ireland have strengthened their commitments towards carbon pricing during the pandemic, and other nations have continued to implement theirs. They know the planet cannot wait. As we approach the global climate conference COP 26, all eyes will be on the UK. This is our opportunity to show that we are leading, not lagging, in the global fight against climate change.

*Carbon leakage refers to the situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to other countries with less stringent emission constraints. This could lead to an increase in their total emissions. The risk of carbon leakage may be higher in certain energy-intensive industries.

Summary: Our recommendations

Government as a domestic driver of net zero emissions

1. We are calling on the government to announce this year:

- a. **A clear carbon price trajectory reaching a minimum of £75/tCO₂e by 2030** charged ‘upstream’* on the producers of greenhouse gases. National and international studies have found this price is necessary to reach net zero emissions by 2050 - the UK’s legislated target.

The exception is transport:

- For surface transport, the price is already implicitly *higher* than this level through Fuel Duty (although this serves many purposes). Other policies are required to reduce emissions;
- For shipping, the price needs to be internationally set, however Fuel Duty relief for domestic commercial maritime vessels should be reconsidered;
- For aviation, we should be heading towards a consistent trajectory of £75/tCO₂e, and Air Passenger Duty (APD) should be slowly converted into a carbon charge. International pricing at a similar level should also be pursued.

For other sectors, the government should amalgamate a large number of overlapping pricing instruments into a simple carbon charge. This includes:

- The Carbon Price Support (CPS);
- The UK Emissions Trading System (UK ETS);
- Differentiated Climate Change Levy charges (CCL);
- Climate Change Agreements (CCA).

The carbon charge will not replace existing renewable support such as Renewables Obligations and Contracts for Difference (CfDs), but these should no longer be levied directly onto electricity bills. New support schemes for the expansion of renewables can be funded by general taxation or carbon charge revenues.

Carbon pricing alone will not get us to net zero; we need other complementary policies, which is why we also want to see:

*An ‘upstream’ carbon charge would be levied at the point of emissions production, rather than as an aggregate cost applied to an end product based on its embodied carbon footprint. In practice, this means it would be applied to fuel use (at the point of purchase), and on direct sources of emissions from industry, waste and agriculture.

b. A sectorally differentiated approach towards:

- How carbon charging is introduced in each sector before 2030;
- The complementary policies required, including internationally;
- The possible use of the revenue.

This approach is outlined in the table at the end of this executive summary. A carbon charge is not a silver bullet, and it must be accompanied by a range of sensible legislation, regulation, and support for renewables and alternative low-emissions technologies if it is to succeed. But a carbon charge is the core around which these policies can most effectively operate.

For most sectors, these charges can be brought in in 2021. However:

- For **domestic heating** – which will have the most immediate and substantive impact on household costs – the government should announce its trajectory immediately, for implementation within the parliament. This will give time for homes to reduce their reliance on gas and other heating fossil fuels such as oil – including through the uptake of energy efficiency measures – before the charge is introduced. It will also act as another incentive for them to do so.
- For **industry and agriculture**, we should delay the introduction of a changed carbon pricing regime until border arrangements are in place – ideally through a multilateral border carbon adjustment mechanism. If this cannot be achieved in this parliament, alternative subsidies should be put in place.

c. Governance mechanisms to create certainty. Reaching net zero requires millions of decisions – from individuals, businesses, investors, and innovators – to be made. The more certainty the government can provide on the direction of travel, the more likely it is that coordinated investment and buying decisions will be made. That is why underpinning these proposals the government must:

- Legislate for clear rules on how and why prices might change through to 2030;
- Also commit to long-term investment mechanisms for industry transition (such as Contracts for Difference to create new markets in carbon capture and hydrogen);
- Give new responsibilities to an existing body (such as a sub-committee of the Committee on Climate Change) or set up a new one to report on:
 - i. How the carbon price is affecting emissions;
 - ii. Its impact against UK Carbon Budgets;
 - iii. Any offshoring ('carbon leakage') of emissions and their cause. As part of this, the body should pay particular attention to the emissions arising from products consumed in the UK, including from products made abroad;

- iv. Impacts on consumers; and
- v. The amount of private investment being brought in.

We should be clear, no system will create complete certainty, because we live in a democracy. That means elected governments can change their minds.

That said, contractual mechanisms do tend to bind governments even more strongly than legislative ones, which is why many of our proposed complementary mechanisms also suggest contracts with the government. This is only possible when we know what technology we want to pursue – but that will be increasingly the case in the next decade for industry, agriculture, and even household heating. Carbon charges therefore become one of the ways of paying for those contracts.

d. The revenue from the charge - reaching approximately £27bn* per year by 2030 - could be used alongside other government expenditure to:

- **Help fund the COVID-19 recovery;**
- **Support innovation and investment in clean energy alternatives** – including emissions capture technologies, electrification, and hydrogen. The net increase in receipts could, for example, be effectively applied to mitigate risk and create investable markets to attract more private capital towards low-carbon innovation, using a variety of tools such as Contracts for Difference** (CfDs), and first loss guarantees;***
- **Cushion rises in household bills** – most immediately on gas, but also potentially on food, goods, and transport. The revenues from a carbon tax could, for example, pay for a £1000 dividend per UK household**** or more than fund the removal of renewables support costs away from consumer electricity bills into general taxation.*****

We have created a [tool](#) to allow people to look at the different impact of these choices. Our view is that as a minimum revenue must be used to cushion the bottom three income deciles from any rises in heat and electricity costs, and that a substantial part of revenue should be used to stimulate investment in new technologies.

To be clear, a carbon charge is neither the only policy required to get to net zero nor the only source of funding. More will be required to fund R&D and industry transition than a carbon charge is likely to raise. But carbon charges could form a very substantial part of the money needed, whilst driving the behaviour necessary to transition.

*Based on a £75/tCO₂ charge across most domestic sectors, revenue from a BCA for industry, energy and agriculture, and removal of the Red Diesel subsidy for agriculture and shipping. Fuel Duty on surface transport is excluded – as this is not a carbon charge in its entirety.

**CfDs have been shown to be particularly impactful in securing investment when longer term cash flow projections are uncertain or potentially volatile. In the UK, they have served to drive production and lower the costs of renewable energy.

***For example, the government could commit to meeting a portion of losses in the event of a loan defaulting, which would enable banks to provide cheaper loans, on account of reduced risk. This type of structure could be effective in driving the scaling up of earlier stage technologies, or alternatively to support the deployment of more private capital towards projects that are currently being funded by grants.

****Based on the redistribution of the £27bn revenue that is expected in 2030.

*****These costs are expected to reach up to £13.3bn by 2030, based on the levy cost framework for 2020, updated by CCC estimate of increased cost of supporting low carbon power.¹

2. We are not building our recommendations around the current proposed UK-ETS, which we think is suboptimal and does not provide enough coverage.

However, our proposals could be combined with a UK ETS by:

1. Applying a carbon charge to sectors not covered by the ETS, such as heating and agriculture;
2. Applying a more substantial floor price to manage the uncertainty caused by ETS fluctuations;
3. Strengthening the ETS cap to align with the UK's net zero target, and the 6th Carbon Budget.*

These proposals cannot be summarised in one sentence because the economy is complex, and we are aiming to affect every part of it. But what we are proposing is markedly simpler than the current regime ([Annex 3](#)), while dealing with a far higher percentage of emissions. We have crafted these proposals in a way that can maintain public consent – which is clearly critical to success in any democracy. A government committed to net zero by 2050 needs serious carbon pricing – and this report provides a roadmap for them to deliver it.

Government as a leader towards global net zero

3. The run up to COP 26, which the UK is hosting, is a perfect opportunity to create a 'high ambition club' of countries determined to reach net zero.

That club would seek to align on carbon pricing levels, and investigate options for a **multilateral border carbon adjustment (BCA)**. One mechanism for this is to agree a 'price floor,' implementing a BCA only where jurisdictions' prices fall short of that floor price.

The aim is for the entire world to adopt ambitious, implementable climate policies. A grouping of major countries would go a long way towards promoting and incentivising that outcome.

It would also be the best way – by some margin – of dealing with the legitimate concerns of industry and of agriculture over the impact of net zero policies (although there are second best ways of compensating industry and agriculture, which we explore).

At COP 26, the world's eyes will be on the UK. Every country will be debating how best to meet their climate obligations in the wake of COVID-19, and there is legitimate concern about jobs, manufacturing, and bandwidth. But there is a growing consensus that a return to 'business as usual' is not an option, and that we need to implement a 'green' recovery if we want to address the dual challenges of COVID-19 and climate change. COVID-19 has shown we can make unprecedented decisions, and 2050 is fast approaching. If not now, when?

*At the time of the 5th Carbon Budget recommendation the UK's projected share of the cap for Phase IV of the EU ETS was expected to be around 120 MtCO₂e in 2030. In the 5th Carbon Budget, the CCC estimated this was around 31 MtCO₂e higher than the actual emissions they would expect from the UK's traded sector over this period in order to comply with the 5th Carbon Budget.² In light of the new net zero target, BEIS have agreed to align the UK ETS cap with the CCC's new 6th Carbon budget pathway to net zero once the scheme is up and running.

FIG 1: THE TRAJECTORY TO A SIMPLER £75/tCO₂e CHARGE IN 2030

Sector	What is needed	Price trajectory to £75/tCO ₂ e in 2030	Key additional regulation and legislation required	Key funding required
Electricity	<p>The situation: Electricity already faces overlapping and confusing carbon charges, which are collectively higher than the 2021 price we propose. These should be simplified.</p> <p>What should happen: Policy must reflect that we want sectors to electrify. It is perverse that we are heaping all of our taxes onto electricity.</p>	Initially reduce electricity bills, including by removing the costs of renewables support, and replacing the six overlapping charges already present on electricity bills with a single transparent carbon charge.	Continued provision of current renewables support, primarily through Contracts for Difference.	Households in the bottom three deciles should be compensated for increased costs above current bills. They should receive more compensation if they use the funding to switch to lower emitting alternatives. Comprehensive energy efficiency finance packages.
Heating	<p>The situation: Gas and heating oil face no domestic charges and low commercial charges.</p> <p>What should happen: This is the biggest distortion in current policy and a consistent carbon price must be introduced.</p>	Immediate announcement, followed by the introduction of a charge later this parliament. This gives households time to adapt their heating choices before the charge is introduced. Once introduced, the charge should be at a trajectory consistent with other sectors.	Requirements on landlords to implement energy efficiency improvements to EPC band C by 2035. From 2030, ban the sale and installation of traditional gas boilers in existing housing stock. Hydrogen ready boilers should be allowed if the government has decided to make the requisite investments in infrastructure.	
Waste	<p>The situation: Landfill tax is already substantial and emissions are decreasing in waste, although this has plateaued over the last few years.</p> <p>What should happen: There is a good case for carbon taxation on incineration, which produces substantial emissions.</p>	<p>Slowly increase landfill tax so it remains on the same carbon price trajectory as other activity.</p> <p>Introduce a new carbon charge on incineration and other energy from waste schemes (i.e Advanced Conversion Technologies).</p>	<p>Ban biodegradable waste going to landfill by 2025.</p> <p>Ban recyclable materials from disposal (incineration and landfill) by 2030.</p> <p>Promote energy efficiency in the production of energy from waste (EfW).</p>	Investment in upstream reduction measures (i.e reuse, recycling, composting etc).

Sector	What is needed	Price trajectory to £75/tCO ₂ e in 2030	Key additional regulation and legislation required	Key funding required
<p>Industry</p>	<p>The situation: Heavy industry receives free allowances for the majority of their emissions, and pay lower gas and electricity charges than other commercial players.</p> <p>What should happen: Multilateral agreement on border adjustments is the ideal, but in its absence other mechanisms can be used.</p>	<p>In the short-term, transition to UK ETS, but with a reduced cap and free allowance allocation, and an increased floor price.</p> <p>Once a BCA is in place, or equivalent mechanisms, we should transition to a carbon charge.</p>	<p>A border carbon adjustment is by far the optimal outcome, and the UK should seek to join other ‘high ambition’ countries in putting one in place.</p> <p>In its absence, industry and agriculture should be compensated at the border for exports.</p>	<p>Industry needs funding for investment in the transition, including in carbon capture and storage, and alternative options such as electrification and hydrogen development. This should be designed to maximise the crowding in of private sector money.</p>
<p>Agriculture</p>	<p>The situation: Emissions reductions in food production may in the long term come from diet change (less meat consumption) and new technologies (e.g synthetic meats), but negative emissions are also a major opportunity (although this should not remove responsibility on other sectors to move to net zero). In addition, very heavily emitting activities in agriculture should be disincentivised.</p> <p>The solution: We should incentivise agriculture to move away from producing greenhouse gases while maintaining a level playing field. We should also incentivise land-use change that contributes to carbon storage, as part of the redirection of public subsidy that will occur as the sector transitions from the CAP to the proposed Environmental Land Management scheme.</p>	<p>Remove red diesel subsidy and align gas and electricity carbon charges with other commercial entities.</p> <p>Once an international BCA is in place, introduce a carbon charge on all greenhouse gases (including methane and nitrous oxide) at the equivalised rate.</p>	<p>Emissions measurement to inform development of a stronger regulatory framework over framing practices (including the management and use of fertiliser at the farm level).</p>	<p>Funding for land-based carbon removals (i.e tree planting, peat restoration) should be prioritised.</p> <p>Investment in the development of standardised emissions measurement systems.</p>

Sector	What is needed	Price trajectory to £75/tCO ₂ e in 2030	Key additional regulation and legislation required	Key funding required
Surface transport	<p>The situation: There is already a high tax on fuel, but other barriers (such as cost and infrastructure) are preventing the switch to electric vehicles.</p> <p>What should happen: The government needs to ensure far more rapid development of EV charging infrastructure and support, as well as supporting the development of electrification and alternative fuel options for HGVs (including refuelling infrastructure).</p>	<p>Fuel Duty should rise in line with inflation.</p> <p>As electric vehicles become mainstream, the government will need to look at road pricing to address other impacts of driving, including congestion.</p>	<p>The ban on purchasing ICEs should be moved to 2030, and should cover plug-in hybrids.</p> <p>Increased carbon pricing should be considered on ICE vehicles in use in the 2030s and beyond.</p> <p>Regulations to require electric charging facilities in all petrol stations, commercial and supermarket car parks, office and housing developments.</p>	<p>EV support: Introduce more competitive financing products for electric vehicles, as well as better publicised incentives for purchase.</p> <p>Greater investment in charging infrastructure.</p> <p>HGV support: Support for electrification and alternative fuel development, as well as refuelling infrastructure for long-distance HGVs.</p>
Aviation	<p>The situation: APD results in very different implicit carbon prices for different flights, and does not reward the use of low carbon fuels and more efficient aircraft.</p> <p>What should happen: We should be pursuing an international carbon price on aviation fuel, but in its absence APD should become aligned to emissions (i.e. become a carbon charge that disincentivises frequent flying).</p>	<p>Align APD to emissions of flying (distance; fuel carbon intensity; and space taken up on plane e.g. in business class).</p>	<p>End air miles and other flight incentive programmes.</p> <p>Include emissions from international aviation in UK carbon budgets.</p> <p>Require domestic aviation to be net zero by 2045 at the latest.</p>	
Shipping	<p>The situation: There is no carbon price on international shipping, and commercial vessels (including ferries, fishing and tug boats) are eligible for Fuel Duty relief.</p> <p>What should happen: International shipping should be managed by the IMO through a carbon price.</p> <p>If necessary, the UK should track to the EU which has promised to introduce pricing by 2023 via the EU ETS if the IMO does not.</p>	<p>Remove Fuel Duty relief for commercial maritime vessels.</p>	<p>Include emissions from international shipping in UK Carbon Budgets.</p> <p>Domestic shipping should be required to be net zero by 2040 at the latest.</p>	

Why carbon pricing

The 10 arguments for carbon pricing

Carbon pricing has become an increasingly popular policy instrument in many countries.³ Economists⁴ generally agree that putting a price on carbon is the single most effective policy for reducing emissions.

The arguments for a pricing regime:

- 1. It ensures that polluters pay.** Carbon charging puts the cost on those who create emissions, and those who use emission-heavy products. If you change your behaviour, you pay less.
- 2. It is effective.** In the UK the most extensive carbon pricing is on the power sector. A detailed analysis by Ofgem found that of all the overlapping carbon policies, pricing policy had been the single most effective by some margin in reducing emissions, and has driven the switch away from the use of coal.
- 3. It doesn't expect governments and regulators to predict the future.** No government – however brilliant – knows exactly how to regulate us to net zero and stay there. Carbon pricing allows people to innovate and shift their approach. It also gives decision making power to the people closest to that decision. For example, carbon capture and storage works better in some industry sites than others – a price allows industry to choose what technology to deploy and where.
- 4. It encourages everyone to change their behaviour.** Our entire economy is run on fossil fuels. Moving to net zero requires us to change everything from what we buy, to how we get around, to how we heat and light our homes. Billions and billions of decisions by companies and individuals need to become greener; pricing emissions across more of our economy can help guide those decisions and facilitate a 'net zero' transition.
- 5. It drives innovation.** According to the OECD – and other recent studies⁵ – carbon pricing can spur 'green' growth by creating better investment conditions for innovation in addressing environmental problems, and create new markets from the demand for 'green' technologies.⁶
- 6. It drives global change.** A domestic carbon price combined with a border adjustment provides an incentive for countries that wish to avoid border charges to implement their own domestic carbon pricing policies, while still leaving room for very different regulatory action and approaches across different countries.

The arguments for pricing over cap and trade:

- 7. Uncertainty in price undermines investment.** The price in cap and trade fluctuates and is very uncertain (depending on the demand and supply of allowances). The price for the EU-ETS fluctuated substantially in the first few months of COVID-19. This makes long-term investment in carbon reduction more challenging, and doesn't consistently shift actors' behaviour.
- 8. Cap and trade is more administratively complex than a carbon price.** This adds to cost and compliance issues, especially for smaller businesses who do not have the capacity to engage in full with these schemes.
- 9. Cap and trade systems are susceptible to exceptions.** We have often ended up with 'grandfathering' - very significant free allowances in earlier parts of the scheme for industries to get their political buy-in. This reduces revenue from the scheme - and if sectors think it is plausible they can persuade governments to give free allowances, they are less likely to make significant investments in emissions reductions.
- 10. The complexity of cap and trade systems make it much harder for households to understand and plan.** Many of the shifts we want to initiate are at individual and household level - an opaque system undermines the ability of people to respond to costs.

Carbon prices in 2030

We have chosen £75/tCO₂e as our proposed 2030 price after looking at the range of prices different expert groups have calculated as being necessary to stay on track for net zero emissions by 2050. This includes:

- **In the UK**, LSE found that a shadow price consistent with net zero would start at £50 (with a range of £40–100) per tonne of carbon dioxide and equivalents (tCO₂e) in 2020, reaching £75 (£60–140) in 2030 and £160 (£125–300) per tCO₂e in 2050.⁷
- **Internationally** the High-level Commission on Carbon Pricing estimates that the explicit carbon price consistent with achieving the Paris Agreement would be around US\$40-80/tCO₂ (£30-60/tCO₂) by 2020 and \$50-\$100 by 2030.⁸

The predicted UK-ETS price falls well short of this level and only accounts for approximately 1/3 of UK domestic emissions.

Carbon pricing as part of a system-wide approach

To hit net zero by 2050, we will need a combination of legislation and regulation, taxation, and subsidies, depending on the precise problems we face in different parts of the economy. They will often need to work in tandem - for example helping overcome major upfront costs while incentivising day-to-day behaviour. Carbon pricing alone will not get us there.

There are obvious trade-offs. Regulation requires top-down views of how products should be made, and what different innovations and choices will cost. You can do that for simple commodities with long-term, consistent trends (like electricity), but other parts of the economy are much more complex (like the entire production and distribution of food, clothing, and other goods we buy). They are also harder to regulate. Subsidising action towards net zero can be effective, but you are asking the general tax-payer to pick up the burden regardless of whether they are causing problems in the first place. Charges concentrate the payments on the people who cause emissions – but if we value their activity, we can't add so much cost that they go out of business or cannot afford to live their life.

That is why we are proposing carbon charging as the core of a system that has complementary policies across all of these categories, depending on the precise challenges that sectors face. We explore those policies below.

Electricity

Our pricing proposal:

A single, simple charge on energy companies. This will replace different existing carbon prices on electricity including:

- EU ETS (EU trading scheme price, currently on course to be replaced by a UK equivalent).
- CPS (the additional price the UK government places on electricity bills).
- CCL (the additional price the UK government places on commercial actors).

We are also proposing that legislation is introduced to move RO and CfD costs (the cost of renewable and nuclear support) onto general taxation, rather than continuing to include them on energy bills. Germany has set a precedent, recently moving some renewable levies off bills as part of their recovery stimulus package.⁹

Other financial support needed:

Electricity is already becoming predominantly powered by renewable sources of energy. Current support for renewables – which is primarily issued through Contracts for Difference – should continue, because they have been highly effective at driving the use of renewables in the power sector.

The argument for change:

- **Overcharging.** Most roadmaps to net zero involve electrifying as much of our economy as possible. Yet the UK puts more charges on the use of electricity than other fuels.* The costs are significant. Consumers and businesses pay more today than our proposed carbon price. This is an irrational distortion – especially since we want to encourage the use of clean electricity – and most countries take the opposite approach, accompanying modest electricity charges with additional taxation on gas and oil. Instead we want a carbon charge that is consistent with other sectors, and which encourages people to switch to renewable sources of energy, and reduce their energy use.
- **Lack of transparency.** Current charges are also deeply confusing. Our polling showed that most people do not realise they pay environmental charges on their bills, and that the current approach towards carbon pricing is too complex for all but the most expert policy-makers to understand.

*This is not true of surface transport if you count all of Fuel Duty as a carbon charge, which we would dispute.

FIG 2: EFFECTIVE CARBON PRICE BEFORE COVID-19 ON ELECTRICITY

Bill Payer	ETS cost £/tCO ₂ **** <small>(Cost of EU-ETS trading scheme)</small>	CPS cost £/tCO ₂ <small>(Additional cost charged by UK government)¹⁰</small>	CCL cost £/tCO ₂ ***** <small>(Additional cost to commercial companies)</small>	Status quo before RO and CfD £/tCO ₂	RO and CfD costs £/tCO ₂ ***** <small>(Equivalentised cost of renewables support)¹²</small>	Our single charge proposal £/tCO ₂
Households*	£23	£18	N/A	£41	£121	£40 (Rising to £55 in 2025 and £75 in 2030)
Business**	£23	£18	£29	£70	£121	

Energy industry support for carbon pricing

On 1st June 2020, top UK energy companies signed a letter from the Corporate Leaders Group calling for Government to deliver a green COVID-19 recovery plan. Their requests included the implementation of “clear policy signals to support growing private sector investment, such as tax incentives and carbon pricing.”

Previously, in November 2019, CEOs/Chief Executives from major energy companies wrote short essays in Energy UK’s *Energy and our Environment* publication to mark the tenth anniversary of the Climate Change Act. Many of these essays signalled support for a form of carbon pricing and for border carbon adjustments.

*We have chosen not to treat VAT at 5% as a carbon price subsidy because it applies across all energy.

**Industry does not pay these costs, which we cover in a later section.

***Based on price of EURO 25.66/t on 19 February 2020. We have assumed, outside COVID-19, there would have been an upward trajectory as the EU-ETS tightened its scheme.

****Based on CCL rates before COVID-19. These are due to decrease by about 10% for electricity, and increase by about 40% for gas by 2021. This would still leave a substantial discrepancy. The carbon conversion is 0.309 kge / kWh (BEIS, 2018).¹¹

*****Represents the equivalentised carbon price of renewables support costs on energy bills, converted from CCC estimates on p/kWh for CfD and RO costs, in 2020 and in 2030; and a conversion rate of 0.256 kg of CO₂ p/kWh (conversion rates taken from pre-COVID ETS modelling).

Heating

Our pricing proposal:

A carbon charge on all heating fuels (including gas and oil) should be introduced on businesses immediately, at a rate of £40/tCO₂e, rising to £55 in 2025, and £75 in 2030.

The charge on households should be announced immediately and introduced later in this parliament to give households some time to adapt while providing clarity about future prices.

Households should be able reduce the charge with sensible decision making. For that reason, we are also proposing that energy efficiency and transition support be offered well in advance of the charge being implemented. These could be part-funded by carbon charge receipts.

Other financial support needed:

- **Compensate households.** In our view, households in the bottom three income deciles should be compensated for increased costs above current bills. They should receive more compensation if they use the funding to switch to lower emitting alternatives. A new Commission on Fuel Poverty should be created to look at the best way of implementing compensation and provide recommendations within six months.

Other regulation and legislation needed:

- **Energy efficiency.** Landlords should be required to implement energy efficiency improvements to EPC band C by 2035.
- **Boilers.** From 2030, the government should ban the sale and installation of traditional gas boilers* in existing housing stock. Hydrogen ready boilers should only be allowed as part of this if the government has decided to make the requisite investments in infrastructure – it is crucial that new boilers actually contribute to lowering buildings' emissions.
- **Phase out of coal.** Sale of coal for heating should be phased out by regulation.

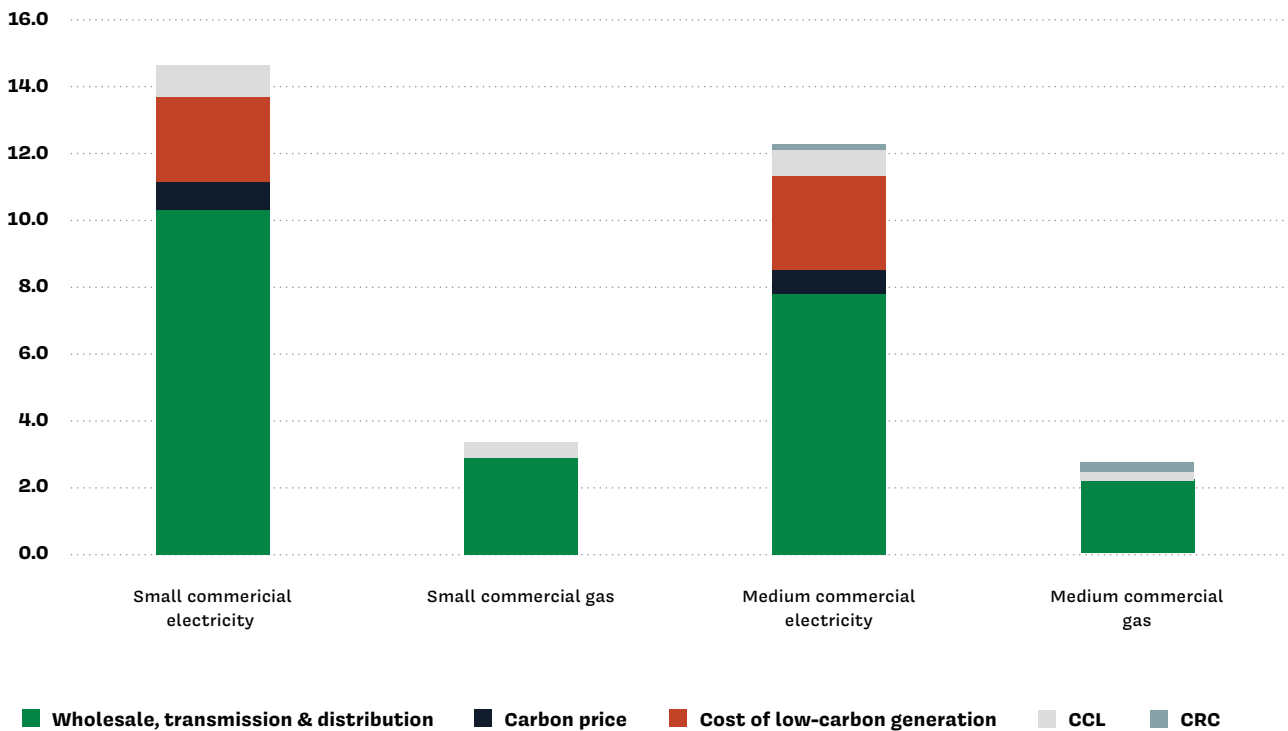
The argument for change:

- **Undercharging.** If electricity is the sector that is most overtaxed, heating is the most undertaxed. At the moment, households face no carbon pricing on gas or heating oil. Commercial buildings do – but at a much lower cost than electricity. This is in contrast to many other countries – including Canada,¹³ France,¹⁴ Sweden,¹⁵ and more recently Ireland¹⁶ and Germany.¹⁷ At present in the UK, this differential treatment results in prices which incentivise the use

*By 'traditional' we mean gas boilers which are neither able to burn hydrogen, nor sold with a heat pump.

of high-carbon products. For example, consumer gas prices are ¼ the price of electricity, creating an incentive to use gas. If our goal is net zero emissions, this should be addressed.

FIG 3: COMPARISON OF ELECTRICITY AND GAS PRICES IN THE COMMERCIAL SECTOR



Source: CCC (2017). Energy prices and bills – impacts of meeting carbon budgets. Analysis based on BEIS (2016). Quarterly Energy Prices.

- Technical uncertainty.** There is uncertainty about whether we want gas to be a) replaced by hydrogen; b) replaced by zero-carbon district heating; c) replaced with heat pumps; or d) some combination of all three. It is therefore difficult to use the same mechanisms for investment – such as Contracts for Difference – as we did in electricity, or tell households exactly how to switch. This is an area where the government needs to make rapid progress – and in particular evaluate the most credible routes and ways of incentivising innovation and change – before regulation can be finalised.

The acceptability and impact of carbon charges on household heating

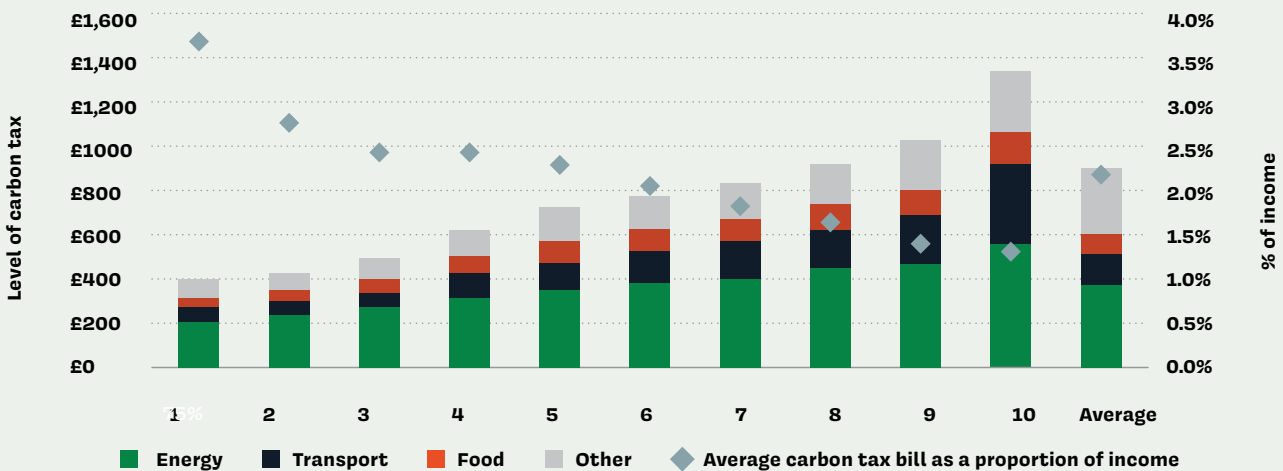
Heating is both the most distorting part of our current UK carbon pricing system, and the one that makes people most nervous. There is understandable concern over the impact of a carbon charge on people’s heating bills and the dissatisfaction that this could cause.

Impact. As part of the Commission’s work, we asked LSE and Vivid Economics to look at the impact of a carbon charge on bills¹⁸, both by income and household type (for example, some households have higher heating bills because they live in a colder part of the UK).

They found that, even with a general economy-wide charge, the carbon charge only contributes

0-7% of the energy bill increases predicted to 2030 (although we note that carbon charge cost would be minimal for wholly electric houses). They also found these could be negated in large part by implementing energy efficiency improvements and low-carbon heating (including heat pump installation), which – through driving a reduction in energy usage - could reduce gas emissions by 9% and electricity emissions by 43% by 2030. The charge was predominantly paid by people on higher incomes (who use more energy), although by proportion of income the charge before rebates (which we propose) is regressive.

FIG 4: TOTAL CARBON TAX FOR EACH DECILE IN 2030, SPLIT BETWEEN FOOD, TRANSPORT, ENERGY AND OTHER.



Note: Shows impacts of a carbon tax at £50/tCO₂e in 2020, £75/tCO₂e in 2030 for all sectors with no revenue recycling (i.e. energy efficiency improvements and a household dividend, both of which are designed to bring down costs). 'Other' includes consumables such as furniture, glassware and education.

Source: Burke, J et al (2020). *Distributional Impacts of a Carbon Tax in the UK: Report 2, Analysis by Income Decile*. The Grantham Institute on Climate Change and the Environment (LSE), Vivid Economics and the University of Leeds.

Acceptability. We polled the introduction of a carbon charge on heating in a number of different ways and found more support than opposition for all of them. Further analysis found that the following elements increased support:

1. Knowing that the entire economy – including large businesses and aviation – were paying too.
2. Provision of funding for energy efficiency and switching to cleaner alternatives.
3. Good use of the money, including: supporting transition to cleaner energy; supporting general priorities such as the NHS; and reducing tax bills. In focus groups support for the poorest was also a major factor (though less in polling).
4. People were price sensitive – and most so about future prices (the final price in several years was the most important for relative support).

Industry

Our pricing proposal:

Energy-intensive industry (EII) should eventually pay the same carbon price as other commercial sectors (£75/tCO₂e by 2030). Operators are a substantial source of GHG emissions, and we need to find a way to reach net zero within the sector without damaging economic competitiveness. Incentives funded from the receipts from carbon pricing offer one option.

Other financial support needed:

EII needs funding for investment in the transition to net zero, including in carbon capture, utilisation and storage (CCUS) and other viable alternatives such as electrification and hydrogen. This should be designed to maximise the crowding in of private sector finance, which is likely to require Contracts for Difference (CfDs) or equivalent mechanisms. In electricity the combination of supplier obligation followed by a carbon price and CfDs enabled the UK to move away from coal towards clean energy, whilst lowering costs – a similar transition is required for industry.

Other legislation and regulation needed – the border carbon adjustment:

The only way to make a substantial carbon price on trade-exposed EII possible, is to shield operators from being undercut on costs by competitors who do not face equivalent charges. Otherwise we not only lose manufacturing, but consumers may buy more carbon-intensive goods from elsewhere. That would not reduce global emissions – which is the purpose of our proposals – and is a fundamental challenge that needs to be overcome in order to achieve net zero emissions by 2050. To date, no country has found a solution to this challenge in relation to carbon pricing – even those with the most extensive carbon charges, like Sweden, offer free allowances for EII. The EU is at the forefront of addressing this policy challenge.

That is why we think a border carbon adjustment (BCA) should be the focus of the UK's international efforts in the lead up to COP 26 and beyond. There is an opportunity to create a 'high ambition club' of countries determined to reach net zero that would seek to align on carbon pricing and the implementation of a multilateral border carbon adjustment (BCA). One way to achieve this is to agree a carbon price floor between high-ambition countries; where carbon prices fall below the floor price, a BCA would be implemented.

Obviously, the eventual goal is for the entire world to adopt ambitious, implementable, climate policies. A grouping of major countries would go a long way towards promoting and incentivising that outcome. The EU has already made its interest in a BCA clear.

It would also be the best way – by some margin – of dealing with the legitimate concerns of industry and agriculture over the impact of net zero policies (although there are second best ways of approaching compensation, which we explore).

It would take some years to implement a BCA which is why in the meantime, we think there should be a gradual reduction in the ‘free allowances’ that industry receives under the current carbon pricing regime (the ETS, transitioning to a UK ETS, which has an excess of free allowances), alongside a strengthening of the proposed Auction Reserve Price - currently £15/tCO₂e.

The argument for change:

One of the most striking lessons from other countries ([Annex 2](#)) is that, while they have been willing to address gas and much of commercial emissions via taxation, they have placed total or almost-total exemptions on trade-exposed industry and agriculture. This is also the case in the UK (with the exception of electricity charges, where we have been willing to place higher costs on industry than other countries). Of the two countries with the most comprehensive carbon charging:

- Sweden has maintained ETS exemptions and free allowances on covered industry;
- Canada has a separate mechanism for large trade-exposed industry and exempts 90% of average emissions for the most trade-exposed.

The EU ETS has maintained the vast majority of industries on its ‘carbon leakage’ list through to 2030 – a total of about 94% of industrial emissions, while 98% of industrial emissions have been covered by the carbon leakage list for the period 2015-2020.¹⁹ All of these companies get free allowances. The EU ETS does not cover agriculture. In the UK, meanwhile, industry requirements are opaque and often negotiated through bespoke “Climate Change Agreements” with the government.

The reason for exemptions and compensation is that every country is worried about losing manufacturing overseas. When relative labour costs already provide a reason to relocate from highly developed countries (which tend to be the ones with carbon charges), this concern is intensified. That is wholly reasonable.

At the same time, we cannot allow industrial emissions to continue if we are serious about reaching net zero by 2050. This is why most proponents of a carbon charge on industry – including those in the companies likely to be affected - think that a BCA is by far the best solution.

Border carbon adjustments (BCAs)

A BCA can work in a number of ways, and is complex for two reasons:

Technical issues. Measuring the emissions intensity of products is complex. One method is to estimate the carbon emissions of products entering the country (in which case you're bound to be over generous to some and overly punitive to others).^{*} The alternative is to try and measure the exact emissions intensity of all goods, many of which have gone through complex supply chains (this is even more challenging in agriculture than it is in industry). Our preference is the former.

Political and legal issues. There are strict rules under WTO on admissible tariffs. While there have been a number of designs proposed that would, according to their authors, be technically admissible under WTO rules²⁰; it is likely that there would be disputes. This is particularly complex in the midst of Brexit negotiations. The justification under WTO law would be that the BCA is needed to protect "human, animal or plant life and health" and "to conserve exhaustible natural resources," both of which have the advantage of being true.

At core, the justification for a BCA under WTO law must be environmental – rather than solely for economic competitiveness.

Our view is that we cannot let the best be the enemy of the good. Multilateral co-operation is the primary goal, which means we should accept that:

- At least initially, it will only apply to some goods that are relatively simple to monitor and at significant risk of carbon leakage (such as steel and cement) but present a high proportion of carbon emissions in industry;
- Would distinguish between countries that have a 'carbon floor price' and those that do not (and the former would not be charged);
- Allows foreign exporters to demonstrate that they beat the benchmark (so a zero carbon producer in a country without carbon pricing could avoid the charge). This is important in terms of WTO justification; it does create distortions – but all trade regulations and tariffs do.

This is, to be clear, not a perfect solution. But the imperfection of the status quo is much worse.

Fundamentally, we need to recognise that WTO rules are highly formal manifestations of political agreement, and that we are in a period of global flux where trade rules – and international rules more generally – are likely to change. If a sufficient number of countries and regions agree to a BCA, it will happen.

^{*}Under WTO law, this could be considered as discrimination against or between foreign producers on an 'arbitrary or unjustifiable' basis, which is not permitted under Article XXIV GATT. The implementation of a BCA should therefore be accompanied by a procedural mechanism that allows foreign producers to challenge estimated or 'default' carbon values – especially where they are considered to be too high – and demonstrate the 'real' carbon intensity of their products.

The competitiveness challenge and what BCAs would achieve

Industry often highlights its relatively high electricity charges – while they do not pay the entirety of the ETS or CCL charges, they do pay the Carbon Price Support and also for renewables support.

Has this led to offshoring? There has certainly been a loss in manufacturing in recent decades, which is one of the main drivers of reduced emissions in the sector. However, a number of studies – including a Committee on Climate Change commissioned paper – have not found measurable damage to businesses' competitiveness as a result of these policies, and there is no evidence that they have caused carbon leakage or hurt levels of investment.²¹ The report also found that allowances were – currently – too broadly applied.

However, the current regime has much lower carbon pricing than we are proposing. It is plausible that increasing prices *without* taking other measures will lead to offshoring. This is not only bad from a domestic economic viewpoint but also, and fundamentally, from a global environmental perspective.

What might happen with a higher charge and a BCA?

We commissioned Frontier Economics, a specialist microeconomics consulting firm, to analyse the impact of a £50/tCO₂e raising to £75/tCO₂e carbon charge on the steel sector, with and without a BCA. Their analysis shows that the cost of carbon is only a small share of total steel input costs. More importantly, Frontier Economics found that if the government were to implement a carbon charge alongside a BCA, the impact would be threefold:

1. It would increase the competitiveness of the UK-based steel sector against some of its largest competitors.
2. It would improve the average competitiveness of UK-based steel production by reducing the difference in cost of production in the UK compared to some overseas producers.
3. It would raise between about £270 million and £850 million per year, depending on the design and breadth of the tax.

Industry support for pricing with BCAs

Industrial leaders have increasingly called for a BCA system, in conjunction with carbon pricing, as a route to net zero.

ArcelorMittal has consistently supported the introduction of BCAs in the UK alongside consistent carbon pricing.²²

Heidelberg Cement has been vocal in its support of a BCA.

BASF has echoed these calls: “We need a competitive CO₂ price globally, but until then we need compensation on the border, otherwise our products will be so expensive that we will not

be able to sell them on the global market. One way to implement border measures would be to define carbon benchmarks for product groups, and apply these to all imports, regardless of which country the product comes from. Applying the tax to products, rather than specific countries, could help ensure it complies with World Trade Organisation rules.”

Heidelberg Cement and BASF are two of several German Energy Intensive Manufacturers who have voiced their frustration with the lack of policy triggers to help them with the deep emissions cuts they have committed to.

Alternatives to a border carbon adjustment

If a BCA should prove impossible, then a price regime on industry would require us to consider the following mechanisms:

- 1. Compensate trade exposed sectors:** Under a carbon charge, energy intensive trade exposed (EITE) businesses could be compensated by either lowering their carbon charge rates (which is the current process, but removes incentives for decarbonisation) or through recycling carbon tax revenues (which is partially done through compensation mechanisms now).
- 2. Support for low-carbon alternatives:** Where there is a societal benefit (i.e through driving price reductions) the government could significantly increase the funding it gives to low carbon alternatives of energy intensive products. This could either be paid for through general taxation, in which case households would bear higher costs, or through revenues from a carbon charge (in which case, trade would still be facing higher production costs than overseas competitors). This relies on their being alternatives ready at scale – which are currently being developed (for example in Sweden).
- 3. Standards:** The UK could raise emissions standards for products sold in the UK, excluding emissions intensive products from the domestic market. This would protect the UK domestic market from emissions intensive imports, but would do nothing to support British exporters.

Agriculture

Our pricing proposal:

By 2030, agriculture should face the same simple £75/tCO₂e charge as other sectors. This includes:

- Inputs, such as heating and electricity and fuel (where the current ‘red diesel’ subsidy should be removed), and;
- Outputs, such as methane (CH₄) and nitrous oxide (N₂O).

The rate for greenhouse gases other than CO₂ (£/tCO₂e) would be equivalent to their environmental impact – which is 28 times the rate per tonne for methane, and 265 times the rate for nitrous oxide.*

A carbon price on inputs would be applied in 2021, in line with other sectors of the economy. As with heavy industry, a carbon charge would not be applied to output-based emissions (methane, nitrous oxide) until a border agreement is in place, by 2025 at the latest.

Other financial support needed:

The same contractual mechanisms we discussed for industry – including carbon capture – will also be relevant for agriculture, although funding for land-based carbon removals (i.e tree planting, peat restoration) should be prioritised as public subsidy is re-directed away from the Common Agricultural Policy (CAP), towards payment for the provision of ‘public goods’.

Other regulation and legislation needed:

- Agriculture needs a border adjustment – and the same considerations we described in the industry section apply. Relatively small changes in food prices can make a substantial difference to purchasing habits, which could drive higher-emitting agriculture overseas. In our view it is feasible to develop border adjustments for food products, based on farming practices in countries of origin. As with heavy industry, importers would be offered the chance to demonstrate that product emissions are lower than country-based standards.
- In addition, and to support a border mechanism, the UK can and must lead the development of more robust and accurate measurements of agricultural emissions. Emissions volumes based on crude estimates, rather than true measurements, can undermine the effectiveness of any carbon policy applied in this sector, which has often been presented as a barrier towards implementation. These measurements can also help us develop better science-based regulation for the sector, to further facilitate the transition towards net zero.

*Figures based on IPCC 5th Assessment report, 2014 (AR5) and based on GW100 (cumulative forcing over 100 years). The impact of methane over 20 years is significantly greater (CH₄ = 84 t/CO₂e/tCH₄).

- It is also important that taxing fertiliser use (which can increase yield from a given hectare of land) does not lead to deforestation to increase the area of farmed land available. Regulation should be introduced to account for this, including a ban on the use and extraction of peat.

The argument for change:

Around the world, agriculture has been exempt from charges on emissions. However, it is a substantial source of methane and nitrous oxide emissions in particular, and in a net zero world we can no longer avoid major transformation. Under most scenarios, we need to enable a dietary shift towards lower levels of consumption of meat and dairy products, and move away from intensive farming practices, such as those which are driving the destruction of ecosystems for animal feed like soya. The Government's recent announcement of a law²³ to ban large businesses from purchasing products grown on illegally deforested land is a good step in the right direction, as is the redirection of public subsidy away from the CAP, towards a system that prioritises emission reductions and environmentally-focused outcomes.

Farmers are as likely to respond to positive price incentives as any other sector. We know they respond to subsidies, and they will also act if there is carbon pricing on electricity, fuel, fertiliser, and methane.

There are two major opportunities:

- **Supporting negative emissions through subsidy.** The UK is redesigning the complex system of agricultural subsidies as we exit the EU, and it must use this opportunity to offer proper payments for negative emissions. Alongside this, the UK should pioneer the creation of a negative emissions market to drive private sector investment in land use change, and seek multilateral support at COP 26. Doing so will reflect agriculture's role as both a source and a sink of greenhouse gas emissions.
- **Supporting emissions reductions through charges.** Agriculture produces some emissions from the use of electricity and transport. On the latter, it is exempt from usual charges through the red diesel subsidy, which undermines the incentive to move to electric vehicles. The largest share of emissions, however – and unusually – come from other greenhouse gases. Nitrous oxide, from fertiliser, and methane have a major effect on global warming. A charge on them will accelerate positive changes in farming practices, and will support the delivery of carbon capture.

Until we address both of these, we will be missing opportunities to remove and reduce emissions, which will make achieving net zero by 2050 substantially less likely.

Surface transport

Our pricing proposal:

Existing high pricing on road fuel should be maintained, increasing in line with inflation. For rail, there is an argument for ending the red diesel subsidy, but given the other environmental benefits of public transport, this should wait until pre-COVID levels of use are restored.

By 2030, the government will also need to put a road pricing regime in place to mitigate congestion and provide additional tax revenue as Fuel Duty receipts decline with the uptake of Electric Vehicles (EVs).

Other financial support needed:

At present, EVs are more expensive to buy up front than internal combustion engine autos, and demand for affordable vehicles outstrips supply. This premium is forecast to disappear by around 2024-27, but vehicle purchase incentives should remain for a few more years.

Another important priority however, is to ensure the rapid and extensive development of charging infrastructure, both via direct local / national government investment and via regulation to require widespread charge point installation across petrol stations, commercial and supermarket car parks and all new office and housing developments. In addition, support is needed to foster electrification and hydrogen infrastructure for heavy-goods vehicles.

Other regulation and legislation needed:

Most government action required in road and rail is regulation, not pricing, but the government should deliver a clear roadmap for phasing out diesel-only trains by 2040.

The ban on ICEs and plug-in hybrids should be brought forward to 2030. The density and speed of electrical charging infrastructure also needs to increase.

The argument for change:

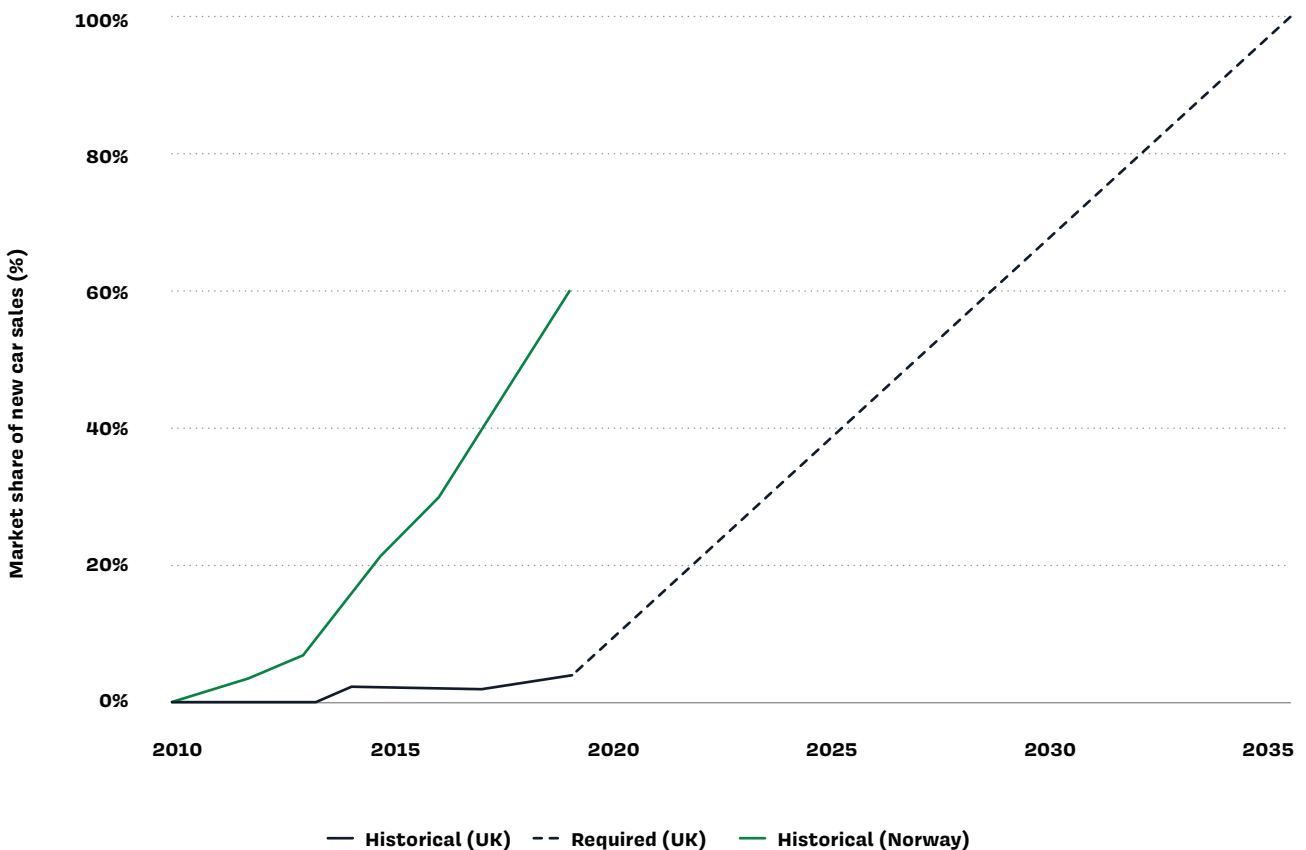
- **‘Carbon price’ on road and rail.** It is impossible to calculate a carbon price for cars because Fuel Duty serves many purposes (if all were ascribed to carbon, which it should not be, it would be at £190/tCO₂e). Despite this, people still use traditional cars.
- **There is a subsidy on the use of red diesel for rail** – which might somewhat delay its electrification – but there are also very good reasons to encourage the use of public

transport, which is currently depressed because of COVID-19, so this should at least be delayed until passenger levels recover. It is also important that rail transport is prioritised over flying where possible.

- **Carbon pricing may need to increase on existing ICEs beyond 2030** to encourage their retirement.
- **Viable alternatives.** For both road and rail (with the exception of heavy goods vehicles) there is a very clear alternative: electrification, which will become increasingly possible for almost all car users as ranges continue to rise. Multiple new EV launches now offer ranges of 150 – 300 miles, and still higher ranges will be possible in the coming years. Since the average person travels 18 miles per day across all transport options,²⁴ slow charging at home will meet many consumer needs. Faster charging capabilities in public spaces will however be required both for consumers who cannot install home chargers, and to reassure people that they can make longer journeys when required.

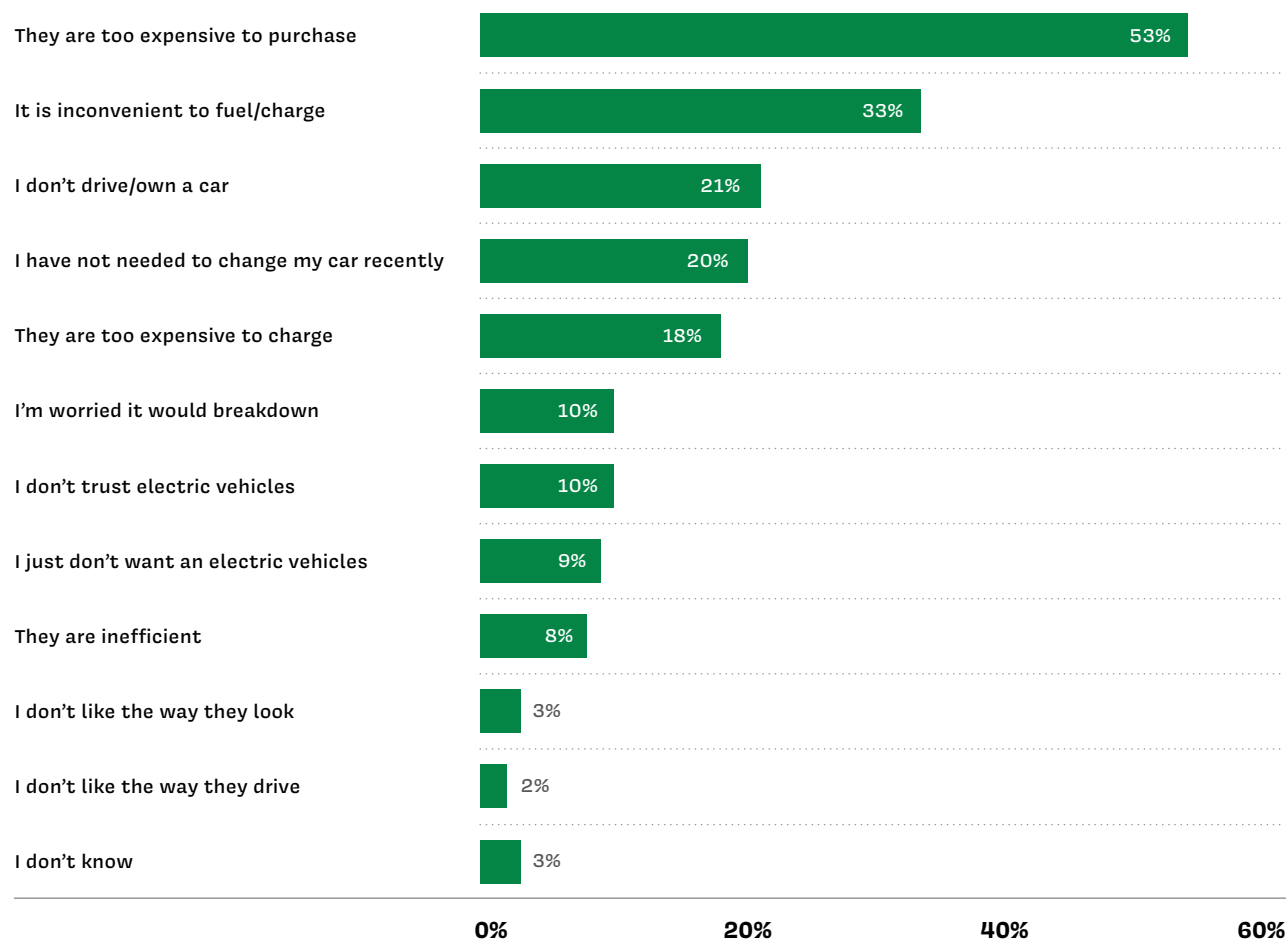
Our polling found that cost and lack of charging infrastructure were the biggest barriers to purchase, and this should be the focus of government action.

FIG 5: THE TRAJECTORY REQUIRED TO REACH 100% ELECTRIC CARS BY 2035



Source: Birkett, E (2020). Route '35: How a California-style ZEV Mandate can deliver the phase-out of petrol and diesel cars. Policy Exchange.

FIG 6: WHAT HAS PREVENTED YOU FROM BUYING AN ELECTRIC VEHICLE, IF ANYTHING? PLEASE SELECT WHICH APPLY



Source: Public First (June 2020). Green Recovery. P = 2,000.

On a lifetime ‘total cost of ownership’ basis electric vehicles are cheaper – suggesting the government needs to do more to advertise and explain benefits to the public – but high up-front costs and low car availability remain barriers towards uptake. The issue with charging infrastructure is also serious and requires more rapid delivery at higher density.

FIG 7: COST COMPARISON BETWEEN ELECTRIC VEHICLES AND INTERNAL COMBUSTION ENGINE VEHICLES

Cost	Electric Vehicles	Petrol engine
Annual fuel cost	£221	£1,322
Total ownership cost	£25,289 (with plug-in grant)	£26,134

Source: Energy Systems Catapult (2020). Ending the sale of new petrol, diesel and hybrid cars and vans: consultation response.

Aviation

Our pricing proposal:

We want to see a single, international carbon price on aviation fuel, which is currently untaxed. This is a true 'carbon' price, and encourages the adoption of sustainable aviation fuels and more efficient aircraft.

In the meantime, the Air Passenger Duty (APD) should be adapted to reflect the emissions from travel.* That means:

- Higher APD prices for business class passengers on long distance flights, who currently face a lower effective carbon charge than other passengers;
- An additional distance band, to manage the sharp differences in effective charges for different length flights (for example, people flying to the USA face a much higher implicit carbon charge than those flying direct to Australia, because they are charged the same APD for a shorter and less carbon-intensive flights).
- Allowing discounts on APD for the use of sustainable fuels. Electric flights should not face any charge, although fully electric flights are not expected for commercial routes before 2050.

The trajectory of APD should continue to be towards an average £75/tCO₂ by 2030 from its current £65/tCO₂ average.**

Other financial support needed:

The changes should be announced immediately but implementation is unlikely to happen before 2022, at which point airlines will be returning to a more stable position post COVID-19.

Other regulation and legislation needed:

The government should look at banning the provision of air miles, which acts as an effective subsidy for those who fly the most.

Emissions from international flights departing the UK should also be included in UK Carbon Budgets.

The government should require UK domestic aviation to achieve net zero emissions by 2045 at the latest, given opportunities to electrify over shorter distances, and to regulate for the uptake of zero carbon fuels.

*International restrictions on linking APD to carbon will need to be overcome.

**This condition is not met if you count VAT exemptions on fuel as a subsidy, but there is still a significant implicit tax with the subsidy.

The argument for change:

International agreement is ideal, but unlikely to emerge soon. Global aviation is subject to international rules relating to many aspects of operation, agreed and administered through the International Civil Aviation authority (ICAO) which has agreed a framework for airline emissions offsetting called CORSIA.²⁵ This represents a step forward but falls well short of what is required to achieve net zero emissions, as CORSIA only places constraints on growth in emissions to 2035 – rather than imposing reductions – and it does not cover all international aviation.

There is not yet any international agreement at ICAO level on a 2050 emissions target, or any international agreement on an aviation fuel tax.²⁶

The EU ETS, meanwhile, includes intra-European flights within its carbon pricing system, but the majority of allowances are currently free.²⁷

COVID-19 is a good time to reset expectations. Businesses are reconsidering their approach to travel in the wake of COVID-19 – this is a good time for us to incentivise, through our domestic taxation, a structural reduction in the long-term demand for flying.

The current price is sufficient today, but will not be by 2030. While APD is not an explicit carbon price, if you allocate it all as a carbon charge, it is higher than the rate we are proposing for other sectors today. By 2030, that will not be the case.

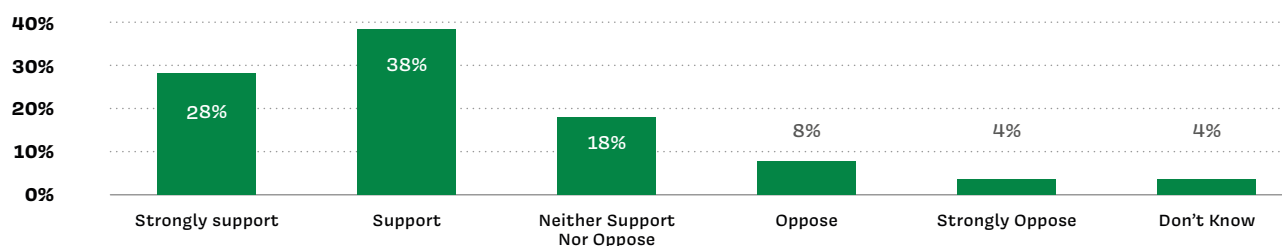
FIG 8: COMPARISON OF POSSIBLE RATES OF APD

Air Passenger Duty	Average price per tonne CO ₂
Rate if treated entirely as carbon charge	£100
Rate with VAT exemption as subsidy	£65
Proposed 2030 rate	£75

Source: Public First Analysis (2020)

- The current system does not reflect emissions. At the moment airlines which use lower carbon fuel, or more efficient planes, face the same taxation as those who contribute significantly more in emissions.
- The current system taxes wealthy passengers less. For some flights, business class passengers face a lower effective carbon price than economy passengers. This is unfair. The longest-distance fliers also pay a lower rate of tax.

FIG 9: SUPPORT OR OPPOSE: THE GOVERNMENT RAISES TAXES ON FREQUENT FLIERS AND BUSINESS CLASS FLIERS (MAKING THEIR TICKETS MORE EXPENSIVE) BECAUSE THEY CAUSE MORE AIR POLLUTION



Source: Public First (June 2020). Green Recovery. P = 2,000.

Shipping

Our pricing proposal:

We would like to see an international carbon price managed through the IMO (International Maritime Organisation). The EU has also made clear this is their ideal situation, but that in its absence it will impose its own price through the ETS by 2023. If that happens, the UK should follow.

On domestic emissions, the removal of Fuel Duty relief for commercial maritime vessels should be explored. This would serve as an effective carbon price on the sector.*

Other legislation and regulation needed:

Internationally, the UK should use its leadership at COP 26 to ask the IMO to increase the ambition of their global target from a 50% reduction to a 100% reduction in GHG emissions by 2050, as well as introduce forceful policies as rapidly as possible, such a carbon fuel levy and incentive mechanism or a fuel mandate.

The CCC has made a number of sensible proposals on the transition to zero-carbon shipping.

These are:

- Investment in supply chains for hydrogen or ammonia fuels.
- Investment in port infrastructure, including electricity for vessels at birth.

As with aviation, international shipping should be included in UK Carbon Budgets.

Beyond this:

- The government should require UK domestic shipping to achieve net zero emissions by 2040 at the latest, given the simplicity of electrifying over short distance.**
- The government should also extend the Renewable Transport Fuel Obligation (RTFO) to encourage the uptake of low carbon fuels in maritime, such as low carbon ammonia and hydrogen.***
- The UK should introduce regulations that would restrict ships from docking unless they comply with the low carbon policies.

*An impact assessment should be carried out to explore a) how this would affect transport choices (and whether it would drive an increase in air travel), b) options and cost of switching to alternatives (including electrification) and c) whether vessels of a certain size – such as small independent fishing vessels - should be exempt.

**For example, Norway has put regulation in place that requires 100% electrification of all car ferries by 2025.

***This should be accompanied by strong sustainability criteria to prevent the use of some biofuels, based on their negative biodiversity impacts (e.g deforestation to enable mass production of Palm Oil).

The argument for change:

- **International commitment, but not a concrete price.** The IMO has agreed to reduce global international shipping emissions by at least 50% by 2050 compared to 2008 levels, and to pursue efforts to phase them out entirely. While the ambition is significant, it has not yet been backed up by concrete policy proposals or fuel taxation, and will need tightening to align to net zero by 2050.

Support for a shipping carbon price

The International Chambers of Shipping (ICS) has supported a hypothecated carbon tax with the revenue used to support low carbon technologies. It is opposed to a trading system (ETS).

Waste

Our pricing proposal:

Landfill tax has been extremely effective and achieved a number of goals – including emissions reductions (because less waste is going to landfill). It should continue and increase in line with our other carbon taxation to the equivalent of £75/tCO₂e in 2030.

The carbon charge should be extended to incineration emissions. While we recognise the value in generating energy from waste (EfW), resultant CO₂ emissions should not be exempt from carbon taxes: they contribute to climate change too.* Carbon capture on all EfW plants should be the long-term objective, and – alongside other measures – a tax on incineration would increase incentives to recycle and/or generate less waste.

Other financial support needed:

As in many of the other sectors, support for carbon capture technologies is likely to be important in waste, to be able to retrofit energy from waste plants and reduce their emissions.

Other legislation and regulation needed:

The transfer of biodegradable waste to landfill – which contributes to methane emissions – should be phased out via regulation by 2025. This in turn, as the CCC has highlighted, requires universal collection of separated food waste, garden waste, paper/card, wood and textile streams.

As long as EfW remains a core part of the UK's waste strategy, efficiencies in generating power and/or heat for local demands should be maximised.

We also support the implementation of Extended Producer Responsibility (EPR) mechanisms outlined in the Government's Resources and Waste Strategy,²⁸ and would hope to see these extended to other product types beyond packaging. This could be accompanied by a ban on the incineration and landfill of recyclable materials by 2030 at the latest.**

Restrictions on the export of waste overseas should also be tightened, to ensure that waste is only exported to countries where it will be recycled rather than used in landfill or incineration. Otherwise waste will become its own offshored industry.

*Increasingly EfW is looking like a high-carbon option, both on the grid and for heating, and as such will not be a critical part of the UK energy mix in the long term, unless emissions can be addressed.

**In July 2020, the UK Government agreed to transpose certain aspects of the European Union's Circular Economy Package into UK law.²⁹ This includes article 10(2) which will make it illegal for separately collected waste that is prepared for re-use or recycling from being accepted at waste incinerators or landfills. Our recommendation relates to all recyclable materials, rather than only those which have been separately collected.

The argument for change:

- **Pricing is working in waste.** Landfill emissions have reduced by 77% since 1990. Revenue from the landfill tax is steadily declining – a sure sign of its effectiveness at discouraging activity.
- **However, incineration trends are concerning.** The CCC and others have highlighted the increasing trend in EfW emissions (both from incineration and other waste plants), and stagnation in terms of meeting recycling targets. They have proposed that waste conversion plants retrofit carbon capture systems to help address the emissions generated through this process.

Creating certainty

Reaching net zero requires decisions from everyone – individuals, businesses, investors, and innovators – to be made consistently, and within a framework that sets a clear direction of travel. That is why underpinning these proposals the government must:

- Legislate for a clear price trajectory through 2030, accompanied by clear rules relating to how that price trajectory might be changed in response to its impact (for example, it could be raised in certain sectors if it was not having the desired effect on the UK meeting its Carbon Budgets);
- Also commit to long-term investment mechanisms for UK industry's transition (such as Contracts for Difference for CCUS and hydrogen);
- Give new responsibilities to an existing body (such as a sub-committee of the Committee on Climate Change) or set up a new one to report on:
 - i. How the carbon price is affecting UK projected emissions;
 - ii. Its impact against the UK meeting its Carbon Budgets;
 - iii. Any offshoring ('carbon leakage') of emissions and their cause. As part of this, the body should pay particular attention to the amount of emissions consumed in the UK, including from products made abroad and imported into the UK;
 - iv. Impacts on consumers; and
 - v. The amount of private investment being brought in.

We should be clear that no system will create complete certainty, because we live in a democracy. That means elected governments can change their mind.

That said, contractual mechanisms do tend to bind governments even more strongly than legislative ones, which is why many of our proposed complementary mechanisms also suggest contracts with the government. This is only possible when we know what technology we want to pursue – but that will be increasingly the case in the next decade in industry, agriculture, and even household heating. Carbon charges therefore become one of the ways of paying for those contracts.

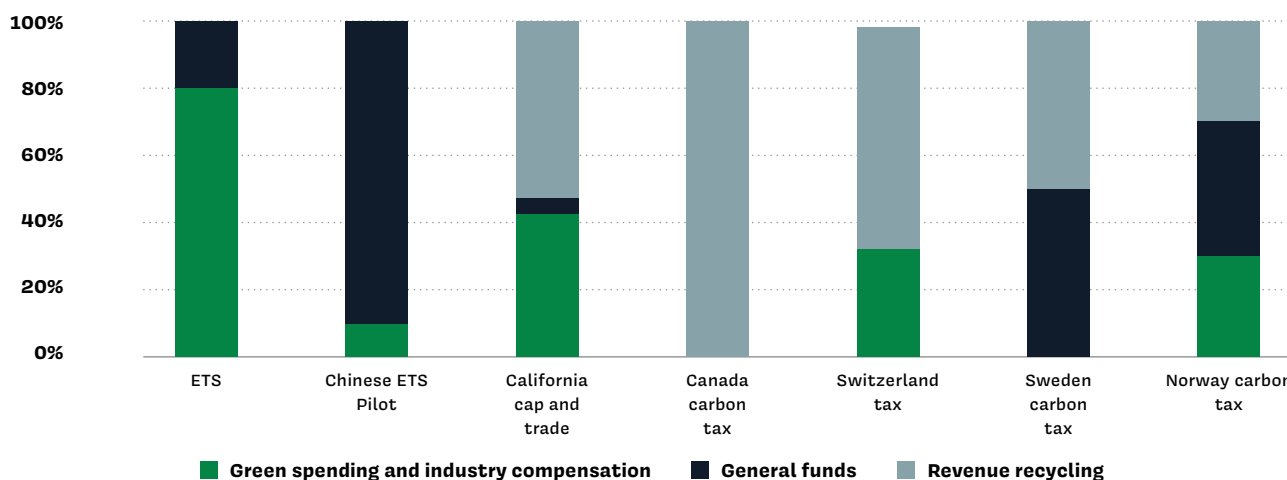
Rebates, recovery, and transformation: using money from carbon charges (and elsewhere)

In our [interim report](#), we highlighted different ways in which the revenue from a carbon charge could be used, which fell into three broad categories:

- 1. To fund COVID-19 recovery.** Sweden, for example, uses a substantial amount of its revenue from carbon taxation for general purposes. Our current carbon pricing revenue is substantially used as general revenue.
- 2. To fund innovation and net zero.** For example, carbon charge revenues can be used to fund new Contract for Difference* mechanisms in hydrogen, CCUS for industry and negative emissions in agriculture.
- 3. To compensate households.** In Canada, the revenue from carbon charging upstream (on the suppliers of fuels) is applied as a tax rebate to households across the country. Many households end up better off as a result. This is also the core of many US proposals for carbon tax.

The second and third can be combined – for example in our interim report, we suggested that some of the carbon charge revenue could be used to fund household energy efficiency upgrades, and their transition to lower carbon alternatives.

FIG 10: GLOBAL USE OF REVENUE FROM CARBON PRICING



Source: Carl, J, Fedor, D (2016). *Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world.* Energy Policy.

NB. One study suggests that trading schemes tend to lead to less revenue recycling than carbon tax schemes.³⁰

*It's worth noting that because we cannot predict exactly what a CfD will cost the government, you cannot perfectly align a price with funding.

Our tool

We have created a [tool](#) that enables you to input your own assumptions and preferences and see what this would mean for households, the net zero transition, and the COVID-19 recovery under our proposed price.

What is clear from our public opinion research ([Annex 1](#)) is that people think all three of these are valid options for spending, but that mitigation of household costs must be prioritised for a carbon charge to gain popular support.

Mechanisms for rebates

Through the course of the Commission a large number of possible rebate mechanisms have been proposed for compensating either all households, or less well-off households, from the cost of carbon charges. These fall into two categories:

1. Who gets the money

- a. **Everyone.** The simplest mechanism is a flat dividend scheme. In Canada's federal system, receipts from a carbon tax on fuel are allocated to households – who end up being net beneficiaries of the policy. Residents of small and rural communities get 10% higher payments. In Switzerland two thirds of the revenue are distributed back to households and businesses.
- b. **Lower-income families.** If all tax receipts are not recycled purely to households, then meaningful redistribution needs to go to lower-income families.

2. How they get the money

We recommend that a Fuel Poverty Commission is tasked with recommending the precise mechanisms for returning money to households. Options could include:

- a. **Tax returns.** In Canada virtually all individuals file tax returns – even if they have no income – and they claim the payment through that (with one person choosing to claim for the household).
- b. **Money.** Switzerland pays a flat 'cheque' to residents (and offers payroll deductions to businesses).
- c. **Benefits.** If focused on lower income families, the carbon tax could be paid as a supplement to existing benefits.
- d. **Energy efficiency.** Dividends could either be hypothecated towards energy efficiency, or a matching scheme could be put in place to encourage households to use the money for energy efficiency.
- e. **'Community funds.'** Under this model, local authorities would receive the funding to spend on general community benefits.

All of these have merits. Our view, however, is that in the current climate you do not need to use all carbon charge revenues for rebates: the public understand that taxes must go up to help fund the COVID-19 recovery, and they are supportive of investment in clean energy. Funding should therefore focus on compensation for the poorest 30% of families - i.e those who sit within the bottom three income deciles. Any remaining money directed towards households should be used to support energy efficiency improvements and transition to less emitting alternatives.

Negative emissions

Designing a negative emissions incentive scheme was out of scope for this Commission, so we haven't designed a mechanism, nor recommended a price. However, we recognise that Negative Emissions Technologies (NETs) have a key role to play in achieving the UK's 2050 net zero target, and that – for sectors such as waste, agriculture and heavy industry – carbon removal (and circular production) must be incentivised alongside total emissions reductions if this target is to be met. This is especially true of agriculture, where the CCC have found that extensive land use transformation is required to achieve the UK's net zero target.³¹ However, carbon removals in agriculture should not be used as an excuse for other sectors not to reduce their emissions; deep decarbonisation is required across the UK economy.

The Government's 2017 Clean Growth Strategy³² made reference to the potential for developing a '*stronger and more attractive domestic carbon offset market*', which should be explored further. The CCC have also explored how incorporate GHG removals into an ETS.³³

Post-script: if there is a UK-ETS

The government has announced its intention to create a UK-ETS,³⁴ either linked to the EU ETS or standalone. After considerable consultation, the government has decided:

- Not to increase the scope of the UK ETS to agriculture, land use, or put a price on waste incineration (as was recommended by the CCC). The sectors affected will be the same as in the EU ETS.
- To maintain the system of free allowances (which exempts the vast majority of industry emissions to account for international competition) that would have existed under the EU ETS.
- To align the UK ETS cap with the CCC's new 6th Carbon Budget pathway to net zero (once the scheme is up and running).

The main difference from the EU ETS is that the UK scheme will not allow international credits (this may change over time).

There will be an auction reserve price of £15/tCO₂e to safeguard the value of UK carbon allowances during the move to the new scheme.

We think this is the wrong decision. It is unambitious, and does not provide enough coverage. It also fails to deal with the major issues of the current EU-ETS – including long-term price predictability and provision of free allowances – and as such constitutes a lost opportunity to forge a new post-Brexit system that is a world leader in emissions reductions.

However, if the UK is determined to forge ahead with a UK-ETS, we propose:

- **In electricity** where the ETS will apply, still moving the costs of renewables support into general taxation;
- **In heating**, introducing a new carbon price as other countries within the ETS have done;
- **In industry** a more rapid phase out of free allowances, linked to the BCA we have proposed;
- **In waste** increase landfill tax over time, alongside the introduction of an incineration tax;
- **In agriculture** introducing a pricing regime alongside new subsidy arrangements (scheduled for provision via the Environmental Land Management System);
- **In aviation** continuing with the proposed adaptation of the Air Passenger Duty;
- **In shipping** remove Fuel Duty relief for domestic commercial maritime vessels, and for shipping to be included in the UK ETS if an international carbon price is not implemented through the IMO.

Across this, linking to the EU's proposed border carbon adjustment remains vital.

One test of the UK-ETS will be the price that companies end up paying for their emissions – a serious trajectory, consistent with net zero, will result in prices that are similar to the ones we have proposed in this paper.

Finally, whilst we acknowledge that the Government has recently put forwards a proposal for a carbon emissions tax that could act as an alternative to the UK ETS,³⁵ we do not believe that the legislated price,^{*} scope, nor approach towards free allocation is consistent with the 2050 net zero goal.

The proposals we have outlined in this section for a hybrid system should therefore be based on the price and allowance-free approach outlined in this document, rather than that presented in the Carbon Emissions Tax consultation.

*A price of £16/tonne CO₂e was set out in 2019 Finance Act Legislation, and an indicative rate for 2021 will be set out in the Autumn Budget. HMT's subsequent Carbon Emissions Tax (CET) consultation (July 2020) has proposed a price based on average December 2021 and 2021 EU ETS allowances, with scope to reduce the rate if it turns out to be higher than the average EU ETS auction clearing prices. As it currently stands, both price proposals are significantly lower than the price required to achieve net zero emissions by 2050, especially given the CET consultation only proposes charging for emissions above certain allowances - as modelled on phase IV of the EU ETS - and would only be applied to operations that are currently involved in the EU ETS.

Endnotes:**Summary: Our recommendations**

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2. Committee on Climate Change and Vivid Economics (2019). Annex: The Future of Carbon Pricing. [Available here.](#)

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