



ZERO CARBON COMMISSION ON UK EMISSIONS PRICING.

INTERIM REPORT JUNE 2020

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 'net zero' target.

This document is a work in progress, which presents an overview of the Commission's interim findings, and as such may not reflect the full views of individual commissioners. A full report will be released in late summer 2020.

If you would like to contribute towards the work of the Commission, or comment on these findings, please email zeroc@publicfirst.co.uk.

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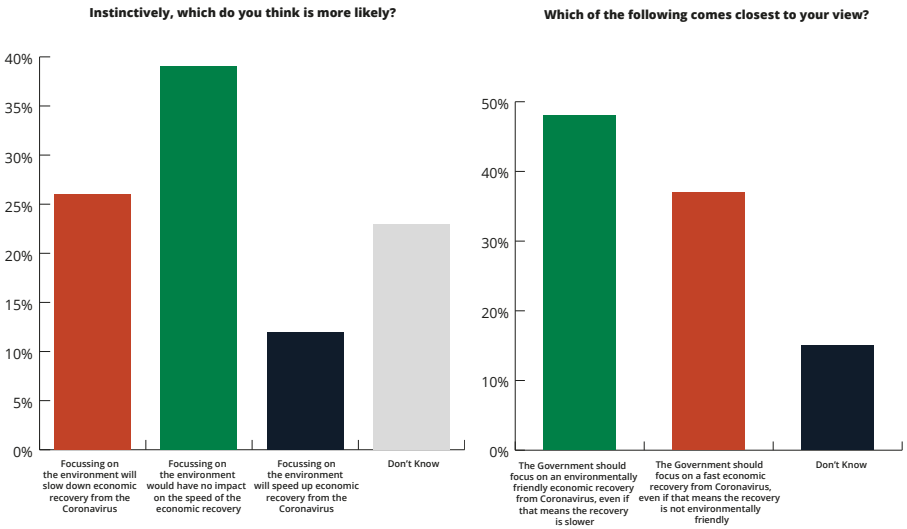


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1. OVERVIEW

Now is the time to introduce clear carbon pricing. People want a green recovery from COVID-19. They support the idea of government placing environmental conditions on the help they provide to businesses, and they think using environmental charges to fund some of our recovery is a good way to kill two birds with one stone. The majority think a focus on the environment is compatible with a rapid recovery - but if necessary, they would prefer a slower, environmentally friendly recovery.



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

People also want environmental policy that is fair. They think that those who contribute most to emissions should bear the burden of reducing them and that those who make efforts to decarbonise should be rewarded. They do not want those who cannot pay to suffer, and they think there is no point in charging people if they cannot switch to meaningful alternatives. They want to see job creation, not loss.

Managing this, as our economy starts to return to a new, and as yet uncertain, normal, is a massive challenge for governments and policy makers, and is the context in which the Commission has generated its proposals.

We are proposing a phased, sectoral approach to carbon charging to help fund a fair, green transition towards net zero. By 2025, there would be a simple carbon charge of £55/tCO₂e (carbon dioxide and equivalents) on greenhouse gas emissions across much of the economy, rising to £75/tCO₂e by 2030. It would repurpose or replace many of today's existing prices as an explicit carbon charge. The revenue would be used to support investment in green alternatives, provide funds to cushion households from cost increases, and contribute to core government spending in a way that also

incentivises consumer and business behaviour. Each sector requires a different pathway, and different complementary policies. That is the focus of the recommendations in this note.

What is a Carbon Charge?

A Carbon Charge (or tax) is a form of pollution tax. It requires people who produce, distribute, or use fossil fuels, or whose activities result in other types of greenhouse gas emissions,¹ to pay for every tonne of greenhouse gases that enter our atmosphere. This incentivises them to switch to another, lower emissions alternative.

There are lots of different ways of levying a carbon charge, and lots of different ways of spending the money. The purpose of this report is to understand what is going to be both feasible and effective in the UK.

¹ Our proposals include appropriate taxation of two other major greenhouse gas 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.

2. WHY WE NEED BETTER CARBON PRICING

Though significant progress has been made in the power sector, there are many parts of the UK economy where reductions in emissions have been slow or non-existent.² Government policy has been successful in some areas - as evidenced in the latest Committee on Climate Change Progress Report³ - but there is not yet a clear roadmap to net zero across the economy.

Part of that roadmap must be carbon pricing. This is only one of the instruments the government has at its disposal – and needs to use – to reach net zero, but it is a powerful one. Analysis⁴ shows that, when used appropriately, a set carbon price is not only effective in driving down emissions, but can also generate substantial revenue. This can be used to invest in green alternatives, cushion low-income households from cost impacts, and help fund the COVID-19 recovery.

A clear carbon price trajectory allows markets to play a full role in the transition to net zero. It is fair – asking those who do the most damage to pay for it. It changes everyone's behaviour – from multinational corporations to individuals. It allows everyone flexibility in choosing how to shift to a net-zero world, and gives confidence to investors to support the development of low-carbon technologies.

In some sectors, adding more carbon pricing is unlikely to help us get to net zero because the price signal is already strong, and other policies are more important. In others, there are preconditions that need to be in place (as we explain below). But if the UK gets this right, it could underline its world-leading net zero target with meaningful action. If it does not, the path to net zero will be needlessly complicated and expensive. It is significant that some other countries, including Germany, Ireland, and Denmark, have recently voted in more extensive carbon pricing, including on gas.

Where the UK has introduced pricing – most notably in electricity – it has worked (in tandem with other instruments).⁵ Our emissions reductions in that sector have been greater than many other countries, and by combining a set price with complementary policies like 'Contracts for Difference' we have driven down the costs of renewables and crowded in private investment. We now have to repeat the trick in other parts of the economy. This can generate jobs, and move us to a better, greener future.

The recommendations in this report support the overarching view of the Committee on Climate Change, as expressed in their June 2020 Progress Report. A Green Recovery from COVID-19 is necessary, feasible and desirable, and carbon pricing – alongside other policies - can be used to incentivise the emissions reductions that are required across the economy.

² BEIS (2019), *Annex: 1990-2017 UK Greenhouse Gas Emissions*, final figures by end user. Available [here](#).

³ CCC (2020), *Reducing UK Emissions: 2020 Progress Report to Parliament*. Available [here](#).

⁴ Including work commissioned from LSE and Vivid Economics for the Commission. Available [here](#).

⁵ "UK Power sector emissions fell 67% from 2008 to 2019." CCC (2020), *Reducing UK Emissions: 2020 Progress Report to Parliament*, p.17.

3. OUR PROPOSALS

By 2025 there would be a general carbon charge on greenhouse gas (GHG) emissions across the majority of the economy. Surface transport would continue to be covered by existing price signals, which are expected to be strong enough when supported by other policy levers.

This would raise revenue for environmental transformation, provide funds to cushion the most vulnerable households from cost increases, and contribute to core government spending in a way that also incentivises consumer and business behaviour. It would ease the duplication and bureaucratic burden of current carbon taxation, and create clearer decarbonisation incentives.

Our proposals seek to create a much simpler system and more clearly understandable system than operates today, with different carbon pricing and investment roadmaps for specific sectors of the economy. We outline for each what we would charge, what we would do with the money, and what additional policies are required to accompany the introduction of carbon pricing.

The prices we have proposed are based on recommendations from LSE and are deemed by the Commission to be consistent with the government's 2050 net zero target, as well as being sensitive to the impacts of COVID-19. We expect our proposals to align to upcoming Carbon Budget recommendations.

Money for the government, and money from the government

We are not making any formal assumptions about what other money the government may spend on reaching net zero. Carbon pricing can provide a very substantial revenue stream to support the move to a cleaner economy. Some of the revenue can be used to reduce the impact on the poorest; and some for general government priorities. However, we are assuming the government will invest above and beyond that – particularly on infrastructure and to support upfront costs.

For example, carbon pricing can provide funding packages for energy efficiency improvements in households; or support CfDs for a wider set of solutions. However, we also think both of these funding streams should be available in advance of a substantial carbon charge, and that these are both legitimate forms of general investment expenditure from a government that has committed to £100 billion in capital investment over the parliament.

Clearly, we also cannot make a decision about the amount of money the government will want to pay down after its support for COVID-19, or how much will be required. This is one possible use of the revenue from a carbon charge, and one that has public support (on the grounds that taxes may have to go up, and this is a good way to do it). But how much taxes and spending will have to go up, and therefore the level of contribution of a carbon charge, is well beyond the scope of this Commission.

A. THE ELECTRICITY (OR POWER) SECTOR

Simplifying a complex inconsistent approach



Our proposal: A single, simple charge on energy companies which will replace three different existing carbon prices on electricity.



The charge: £40/tCO₂e rising to £55/tCO₂e by 2025 and £75/tCO₂e by 2030. This is consistent with current electricity prices on households (and likely increases) but reduces prices on SMEs.



What we do with the money: The revenue could be used to subsidise Contract for Difference costs, such that they are no longer entirely borne by electricity bill payers.

The power sector already has extensive, and complex, carbon pricing instruments. Power generators pass charges to households, who pay a combination of a fluctuating EU ETS cost; an additional cost (the Carbon Price Support (CPS)) of £18/tCO₂e, and also pay for the costs of zero emissions subsidies through a range of mechanisms.

SMEs pay all of these costs and an additional charge (the Climate Change Levy (“CCL”)). A simplified summary of these costs are below.⁶

Effective carbon price before COVID-19 on electricity without any renewable subsidies (CFD, RO)⁷

Bill Payer	ETS cost £/tCO ₂	CPS cost £/tCO ₂	CCL cost £/tCO ₂	Status quo £/tCO ₂	Our single charge proposal £/tCO ₂
Households	£23	£18	N/A	£39	£40
Business	£23	£18	£29	£70	£40

⁶ Industry does not pay these costs, which we cover in a later section.

⁷ ETS cost based on a price of €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. EU ETS price information available [here](#).

CCL cost 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. CCL rates available [here](#).

The carbon conversion is 0.309 kge / kWh. BEIS (2018), *Government GHG Conversion Factors*. Available [here](#).

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

This combination means that before COVID-19 (in February 2020) households were already paying almost £40/tCO₂e on electricity, and SMEs much more. Again, this is before the additional cost on bills of zero emissions subsidies, which will be substantial for some time. The CfD mechanism in particular is now well understood and effectively driving investment at scale, however, electricity bill payers fund the costs. In an ideal world, we would spread these costs – and pay for them either with revenue from carbon (or general) taxation, or by sharing the costs across gas and electricity bills. Germany has set a precedent, recently moving some renewable levies off bills as part of their stimulus package.⁸

Despite recent falls, existing electricity carbon prices are on a long term upwards trajectory: it is expected that the introduction of the market stability reserve will lead to increased EU ETS prices, and the Carbon Price Support rate, which has been frozen several times and is well below its original planned trajectory, is also likely to increase.

The UK's current approach – to place a series of costs onto electricity bills, and very little on anything else – is unusual. Most countries in the EU that have their own domestic carbon pricing focus it on the areas that are not already paying for decarbonisation (such as gas). Our current policy is causing major distortions – it makes electricity more expensive than other, more emitting alternatives (such as gas) and means investment is not being encouraged in other sectors where emissions need to reduce.

⁸ Clean Energy Wire (2020), *Germany gives energy transition mild boost with economic stimulus programme*. Available [here](#).

B. RESIDENTIAL AND COMMERCIAL GAS

The sector where simple carbon charging would make the biggest difference



Our proposal: A single, simple charge on energy companies



The charge: For SMEs, £40/tCO₂e from 2020. For households, £46/tCO₂e from 2022 (to give them time to adopt energy efficiency measures or new forms of heating). For both, it would rise to £55/tCO₂e by 2025 and £75/tCO₂e by 2030. The net effect on SMEs, after electricity costs reduce, is marginal in the first year.



What we do with the money: In order to ensure households can respond to the charge and we are not intensifying inequality, there needs to be energy efficiency support for all households, and compensation for the poorest.



What else is needed: Requirements on landlords to implement energy efficiency improvements to EPC band C by 2035. From 2030, ban the sale and installation of traditional⁹ gas boilers in existing housing stock.

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, France, Sweden, and more recently Ireland and Germany.

We are proposing removing these distortions by placing a single carbon price on gas,¹⁰ which is broadly equivalent to that already paid on electricity.

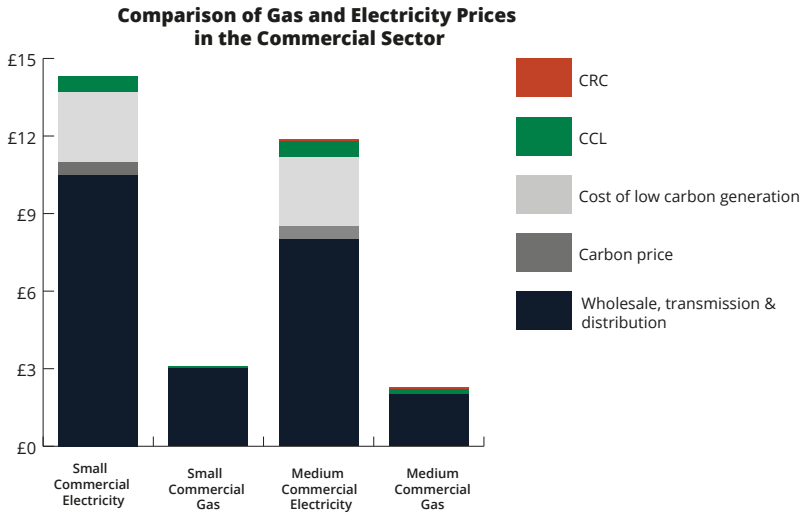
Taken together with our electricity proposals this would mean:

- SMEs pay more on their gas but less on their electricity – taken together their bills barely change;

⁹ By 'traditional' we mean gas boilers which are neither able to burn hydrogen, nor sold in a hybrid combination with a heat pump.

¹⁰ We would also expect this charge to be applied to heating oil, and are exploring how funding could be extended to drive uptake of plausible alternatives for off-grid buildings and homes.

- Households pay the same on their electricity but more on their gas (if they do not change their heating system or insulate)



Source: CCC. Analysis based on BEIS (September 2016), *Quarterly Energy Prices*.

There are two issues that this charge alone does not address:

- A simple charge is regressive – the poorest will be the most affected;
- There are large up-front costs to switching from traditional gas heating and cooking to alternatives - and to increasing house energy efficiency.

It is therefore essential that **before** the charge is introduced:

- As part of a COVID-19 stimulus package, the government makes available attractive energy efficiency and decarbonisation finance mechanisms to the majority of households to allow people to switch to lower their heating bills. This could either be energy efficiency measures (like insulation) or new forms of heating (like heat pumps or hydrogen ready boilers), and should be more extensive than the current schemes focused on the poorest, and with more investable delivery mechanisms than the Green Deal;¹¹
- Compensation is given to the poorest: analysis commissioned from Vivid Economics and LSE suggest that most of the regressive elements of the charge can be mitigated if compensation mechanisms are focused on the poorest 30%.¹²

¹¹ Green Finance Institute (2020), *Financing energy efficient buildings: the path to retrofit at scale*. Available [here](#).

¹² The Grantham Institute on Climate Change and the Environment (LSE), Vivid Economics and the University of Leeds (2020), *Distributional Impacts of a Carbon Tax in the UK*. Available [here](#).

This is important morally – but it is also vital, as we describe below, for public consent.

We undertook extensive polling and focus groups to find out if this proposal could gain public consent. We tested both absolute support for a carbon charge (noting that it would raise heating bills), but also relative support for different elements.¹³ We found high levels of support if:

- **People felt there were credible alternatives** - which is why the upfront availability of energy efficiency finance options, and continuing to explore electric and gas technologies such as heat pumps and the use of Hydrogen in the current gas grid, are crucial.
- **People knew the poorest would be cushioned from the effects** - which is why providing targeted compensation is necessary.
- **People knew that the rest of the economy was paying too** - most importantly, people wanted to feel their own efforts were part of a wider, holistic approach towards protecting the environment, which is one reason it is vital that we address all sectors in a transparent manner.

What our proposals for gas and electricity mean for government revenue

At the moment, almost all carbon pricing is treated as general revenue by the government. Because we have evened out the charges on electricity and gas, the only new net source of revenue for the government from our proposals comes from the gas charge on households, once compensation for the poorest has been given and energy efficiency has been supported. This is likely to be small initially but will increase over time as the price goes up (although obviously it will reduce again as people change their behaviours). We found substantial public support for using some carbon charging revenue for general purposes (the public are clearly completely unaware that the government already does this, which is unsurprising given the the lack of transparency in the current system) as well as to fund switching to greener alternatives.

Type of Energy User	Electricity	Gas
Households	Pay the same as previously expected. Government revenue unaffected.	Pay a new charge . Funding needs to flow into compensation and energy efficiency (which may be supplemented). As the charge increases, the remainder can be used for general spending.
Commercial	Pay less than previously expected. Government revenue goes down.	Pay more than previously expected. Net effect, with electricity, is marginal for government.

Note: Government revenue would be affected if CfD costs moved to general taxation. It would not be affected if they were spread across electricity and gas bills.

¹³ Relative support was tested through a conjoint analysis which randomised different elements of carbon taxation and complementary policies to see how they affected relative support for the policy. For example, higher costs reduced support, but increasing taxes on business as well as households increased support.

As well as our carbon pricing policies, and our compensation mechanisms, we also highlight three other complementary mechanisms, which could support the introduction of carbon pricing:

- A ban on the sale and installation of traditional gas boilers by 2030.
- Require landlords to improve energy efficiency – either by funding themselves, or by taking advantage of our proposed new financing measures. Otherwise renters will pay a higher carbon charge, but be unable to address the energy efficiency of their homes.

In other words, carbon pricing is important and necessary – but it is not a silver bullet. It works alongside regulation.

C. TRADE EXPOSED INDUSTRY

A move to a simpler, more transparent system that maintains competitiveness



Our proposal: A single, simple charge on industrial emissions as soon as a BCA or equivalent mechanism is in place – by 2025 or earlier if possible. Until then, we would recommend sticking with the UK's current proposal of linking a UK ETS to the EU scheme. This will mean retaining free allowances for much of industrial emissions, but phasing these out gradually between 2021 and 2025.



The charge: £55/tCO₂e in 2025 rising to £75/tCO₂e by 2030 (this matches the trajectory on other sectors of the economy).



What we do with the money: Revenue should support investment in industrial transformation, including in supporting CfDs for Carbon Capture, Utilisation, and Storage and research and the scale deployment of hydrogen production and use technologies. As with the household system, the government needs to commit to these mechanisms in advance of the full carbon charging system being implemented.



What else is needed: A Border Carbon Adjustment (BCA) or equivalent is a prerequisite to this mechanism working. There may also need to be funding for other forms of net zero technologies, much of which we expect to be funded from the increased R&D spending already committed by the government.

No country has a single, simple carbon charge across the entire economy. Trade-exposed industry is dealt with separately even in the countries – like Sweden, or Canada – that have aimed for universal and substantial carbon prices.¹⁴ This is because all countries are worried about manufacturing companies 'offshoring' their emissions (moving overseas). That is a reasonable concern – offshoring would not reduce global emissions, and would be bad for the UK economy. While it does not seem that, to date, higher UK pricing on electricity has been a driver of offshoring,¹⁵ additional costs could

¹⁴ University of Grenoble, Simon Fraser University and University of Gothenburg (2019), *Carbon Taxation: A Tale of Three Countries*. Available [here](#).

¹⁵ CCC (2015), *Technical note: low-carbon policy costs and the competitiveness of UK steel production*. Available [here](#).

have a substantial impact on industry decisions. UK emissions on a consumption basis - including those resulting from the production of imported goods - was at 772m tonnes in 2017¹⁶ (compared to 505m tonnes on a production basis). These have fallen by only 17% since 1990.¹⁷

However, industry emissions are substantial and must be tackled now if we are serious about achieving net zero emissions by 2050. Investment is long-term (for some industries, there is only one investment cycle to 2050), and many of the easy wins for decarbonisation of the sector have already occurred. A clear price trajectory alongside vehicles to derisk private sector investment could make a very substantial difference to industry behaviour.

For these reasons - a desire to maintain competitiveness, while sending a clear investment signal - our focus is on getting a Border Carbon Adjustment (BCA) in place. We recognise that this is ambitious - and that other mechanisms should be explored in parallel should this not be achieved - but the conditions are unusually propitious. The majority of EU members states are now signed up to the introduction of a BCA mechanism, and the UK's hosting of COP 26 next year is a good moment to foster global agreement about an optimal approach to the most competitively exposed sectors. This should combine (i) the long term pursuit of an international carbon pricing regime and (ii) the legitimate use of domestic carbon prices and BCAs until that regime is in place. That should then, alongside mechanisms to support investment in decarbonisation technologies, send a strong signal for capital investment from the private sector. If we should fail to deliver a BCA by 2025, we can then consider other compensation mechanisms for industry in exchange for reducing free allowances.

Once a BCA or similar mechanism is in place, we would envisage the phasing out of all the current exemptions and overlapping requirements applicable to a given industry. Instead, they would pay the same carbon charge on their fossil fuel inputs as households and the commercial sector, and also pay for other CO₂ and GHG emissions that emerge as by-products of those industrial processes.¹⁸ Until then, particularly given our need for economic recovery, we should maintain the proposed UK ETS for industry emissions, using auction receipts to fund investment vehicles. Although this system is flawed (as we describe later), it will give certainty and continuity to industry for the next few years as they prepare for new mechanisms to come into play.

That means, in effect, that the UK would continue to i) give free allowances to industrial emissions; ii) exempt industry from the majority of gas and commercial electricity charges through Climate Change Agreements and compensation. We should, in line with the current proposals for a UK ETS, slowly make that regime tougher and begin to phase out free allowances, but the focus should be on transitioning to a BCA mechanism. This also gives industry time to recover in the aftermath of COVID-19.

¹⁶ DEFRA (2020), *The UK's Carbon Footprint 1997 - 2017*. Available [here](#).

¹⁷ CCC (2020), *Reducing UK Emissions: 2020 Progress Report to Parliament*. Available [here](#).

¹⁸ For instance cement production emissions arise not only from the combustion of fuels to generate heat but from the chemical reaction which converts CaCO₃ into CO.

What is a “Border Carbon Adjustment”?

A “Border Carbon Adjustment” would charge products the equivalent of a carbon charge when they enter the country, and rebate domestic manufacturers the cost of a carbon charge when they export. It is not a perfect measure - and there are both technical and political challenges to implementation - but it deals with a substantial part of the competitiveness challenge. This is why steel and other manufacturers are increasingly calling for a BCA mechanism, and why the majority of EU member states have signed up to propose one on limited products. Our own analysis - commissioned from Frontier Economics - suggest a BCA could support British competitiveness against key competitors if they were not yet willing to apply adequately high carbon prices domestically.

There are a number of different ways a BCA can be implemented - it can be differentiated by country, by product, or both. The amount it charges can be based on a product's exact emissions (which is technically extremely challenging) or a 'benchmark' which individual importers can appeal against (a preferred option for many).

There are technical challenges to a BCA, but the bigger concern has been political. While there are ways of constructing a BCA that would meet the requirements of the WTO, it is likely there would be disputes (the mechanism could remain in place during that dispute).

A BCA is designed to be temporary - the aim is for carbon charging to exist across the globe. China has been moving to its own carbon pricing regime, and pockets of the US already have one in place (these are the two largest global emitters by far). The purpose of a BCA in the long term is to encourage the world to decarbonise, while supporting the transition of industry within countries that are first movers to net zero.

We also need to support private sector investment into key technologies such as Carbon Capture, Utilisation, and Storage (CCUS), hydrogen, and continued electrification. These are the dominant plausible technologies for addressing most industrial emissions - although their relative and absolute attractiveness depends on the exact location and type of industry. They have not yet been developed at the scale needed to drive down costs. Scaling these has the added benefit of job creation, which will enable a transitional approach towards net zero, rather than driving job loss in certain areas of the UK.

Using revenue from a carbon price, supplemented by the government in the coming years, to support temporary Contracts for Difference in these technologies will allow industry to get going, properly, now. As the technologies scale, as has happened with renewables, they should become much less expensive and the need for these mechanisms will fade.

D. AGRICULTURE

Starting to bring the sector in line with the rest of the economy



Our proposal: A single, simple charge on all agricultural emissions once a BCA or equivalent mechanism is in place – by 2025 or earlier if possible. In the meantime, starting to remove the current exemptions on red diesel in agriculture, and investing in pilot emissions measurement schemes that can inform the development of stronger regulation over farming practices. Agriculture would pay the same charges on gas and electricity as other commercial entities from 2021 (although this is a small proportion of their expenditure and emissions). As with all sectors, we assume that the additional costs could be passed on to consumers, creating increased incentives to adopt lower carbon diets .



The charge: £55/tCO₂e in 2025 rising to £75/tCO₂e by 2030, and applied to N₂O and CH₄ emissions, as well as CO₂.



What we do with the money: The charge would be used to support the subsidy system for agriculture, with a focus on R&D in the mitigation of methane and nitrous oxide emissions, and negative emissions.



What else is needed: A BCA (or equivalent mechanism). Through the Common Agricultural Policy (CAP) reform process, continue to incentivise the land use changes necessary for net zero emissions across the country. This should include investment in pilot emissions measurement schemes that can i) inform the development of a stronger regulatory framework for farming practices (including the management and use of fertilizers at the farm level) and ii) enable the development of accurate negative emissions payment schemes.

To date, agriculture has been exempted from almost every measure the UK and the EU has put in place for emissions (this is also true in other countries).¹⁹ It is also a uniquely complex sector.

The Agricultural sector's emissions

- Emissions are predominantly from methane (from livestock) and nitrous oxide (from the use of fertilizer).
- Agriculture is a major possible 'sink' as well as source of emissions – with the right incentives, land can be used to capture emissions and help the sector get to net negative emissions and the UK to net zero.

Economic considerations

- The sector as a whole is used to substantial and complex subsidies that direct activity. As we leave the EU, the subsidy system is being re-engineered, in part to drive environmental progress. Our priority should be to ensure any continuing subsidies deliver a substantial net reduction in GHG emissions.
- Like industry, the sector is very trade exposed – we get much of our food from other countries, and relatively small differences in prices can affect consumer behaviour (though WTO rules would allow state support to compensate for these). In the wake of COVID-19, food security is also an issue.

Practical considerations

- There are potentially perverse effects from carbon pricing. It is important, for instance, 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.
- 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.
- There are not clear examples of successful and sustained approaches to these challenges in other countries. While some countries originally put in place fertilizer taxes, these have since been dropped (Sweden's was dropped in 2009; Norway's in 2000; Austria's in 1994; and Finland's in 1995).²⁰

Despite these complexities however, we are clear that the objective should be to extend carbon (and carbon equivalent) pricing to cover the greenhouse gases resulting from food production. This reflects the reality that:

Pricing can be effective. Farmers are as likely to respond to positive price incentives (as well as subsidies) as any other sector. That is true of their use of different kinds of

¹⁹ Vivid Economics (2020), *Policy framework for deep emissions reductions and carbon removals in agriculture and land use in the UK*. Available [here](#).

²⁰ Swedish Environmental Research Institute et al (2017). *Nitrogen and agriculture in the Nordic countries - policy, measures and the way forward*. Available [here](#).

machines, and of their general choices around emissions. Those positive price incentives should act in parallel with direct payments for negative emissions. This includes land use change.

The main challenges are trade, and associated measurement. Second, we recognise that – as with industry – there are trade issues which make a BCA important. This should, as with industry, be our target for multilateral action through COP 26 and beyond. There are, however, measurement challenges with a BCA in agriculture that are more complex than in many other areas, which make creation of effective product benchmarks (which do not currently exist) challenging. Since agriculture is outside the EU's carbon pricing regime this is also, currently, out of the scope of the EU's proposed BCA.

We therefore think that investment in effective, scaled emissions measurement systems on farms must be an immediate focus for the government - this is critical for pricing harmful emissions but also for rewarding negative emissions. It is also vital for driving understanding about how different farming practices contribute to the production of GHGs, and informing the development of regulation that can address this. Whilst developing a BCA must still be a primary focus, we accept that it may take longer to put one in place multilaterally than for industry, where carbon pricing is already used in a wide range of countries. This is why effective monitoring techniques and the development of stronger regulation is so important in the meantime.

We are recommending that CO₂ emissions from electricity and gas inputs would be treated in the same way as other sectors of the economy, and be taxed in line with the proposals described above (i.e before a BCA or equivalent mechanism is in place). The red diesel exemption on fuel should be phased out, increasing the incentive for farmers to switch to electric machinery. Once a BCA or equivalent measure is in place, we are recommending that a methane tax and a fertiliser tax should be introduced at the equivalent price applied to most of the rest of the economy (£55/tCO₂e assuming its introduction in 2025).

Revenue from fertilizer and methane taxes should be used to encourage shifts in agricultural practice. We would envisage the revenue from carbon charging in agriculture to be used for a mixture of some of the carbon capture technologies recommended by the NFU (again, probably through a contractual mechanism); and to supplement the new subsidy system the UK government is putting in place post-CAP, which is designed to support positive environmental changes.

E. AVIATION

Differentiating APD to reflect carbon emissions



Our proposal: In an ideal world, there would be an internationally agreed tax on aviation fuel. The UK should pursue this. In the meantime, we should continue to use Air Passenger Duty (APD) as the primary tax, but align it with the carbon content of aviation fuel, and slowly begin to move it towards the same effective carbon charge as the rest of the economy. The price would increase more sharply for business class passengers on long distance flights. None of these changes would come in before 2022, when the airlines have had the opportunity to recover from COVID-19.



The charge: From 2022, we would recommend slowly increasing the carbon charge on APD to reach a trajectory of £75/tCO₂e for both economy and business class passengers by 2030. We would also introduce an additional 'distance band', and enable flights which lower the carbon content of fuel to reduce APD accordingly.



What we do with the money: General revenue.



What else is needed: Continued pressure on international processes including CORSIA. Inclusion of emissions from international aviation in UK carbon budgets. Action to discourage frequent flyer programs which create incentives for additional flights.

The ideal approach to aviation would be to impose an internationally agreed tax on fossil fuel-based jet fuel at a high enough rate to drive decarbonisation. Securing this agreement should be the UK's long-term objective. It could be administered and overseen by the International Civil Aviation authority (ICAO), in line with its existing regulatory role over many aspects of Global aviation operations. It could work in tandem with the ICAO's recently agreed framework for carbon offsetting (CORSIA) which represents a step forwards, but falls well short of what is required to achieve net zero emissions both in terms of ambition (a 50% rather than 100% reduction by 2050) and instruments (with no international agreement on an aviation fuel tax).

Until such an international agreement is achieved, the UK can create disincentives for carbon intensive flight, and incentives for the development of low carbon alternatives, by adjusting the existing Air Passenger Duty to better reflect carbon dioxide emissions. This is a good time to make such a change – businesses are reconsidering their approach to travel in the wake of COVID-19.

The APD imposes a tax per passenger flight with different bands for economy, and business and first-class seats; and for distances below and above 2000 km. In 2019 it was equivalent to about £100 per tonne of CO₂ emitted.^{21,22} In addition, VAT is not charged on international flights. If you treat this as a subsidy, the effective carbon tax reduces to around £65/tCO₂.²³ Of course, APD is not only charged to reduce greenhouse gas emissions - it also acts on other aspects of flight such as noise pollution. It is therefore not reasonable to consider it as a carbon tax in its entirety, which reduces the effective carbon price of APD further.

There are also two design issues with this implicit carbon tax:

- It makes no attempt to differentiate on the basis of carbon intensity. A company which uses more energy efficient planes, or which reduces fuel burn by slower cruising, still pays the same rate of APD. And if companies now begin to use lower carbon sustainable aviation fuels (SAF), the APD rate would remain the same. This is an area of exciting innovation which should be encouraged.
- The effective rates of APD do not fully reflect the different carbon intensity of different classes of seat and distance. While Business class seats are charged more than Economy, Business class still faces a lower effective tax rate both on an APD-only basis and even more so when foregone VAT is taken into account. Moreover, since there is no differentiation between a 5,000 km flight to New York and 16,000 km flight to Sydney, the latter faces a far lower effective carbon price.

We therefore recommend that, as a second-best policy to the introduction of an aviation fuel tax, APD rates should be adjusted into two ways:

- **Low carbon flight reductions** should be introduced, with charges applied in proportion to a company's use of zero carbon aviation fuels. It should be made clear in advance that if and when electric or hybrid flight becomes commercially feasible for shorter distances, the APD will either not apply at all, or only apply at a greatly reduced level.
- **Better alignment of flight specific charges.** APDs for business and first-class tickets should be increased to bring carbon equivalent pricing in line with economy class. A new higher band for very long distance flights should be introduced.

The current APD system is charged per flight and does not apply a higher charge for frequent flyers. Meanwhile airline frequent flyer programs can act as incentives for

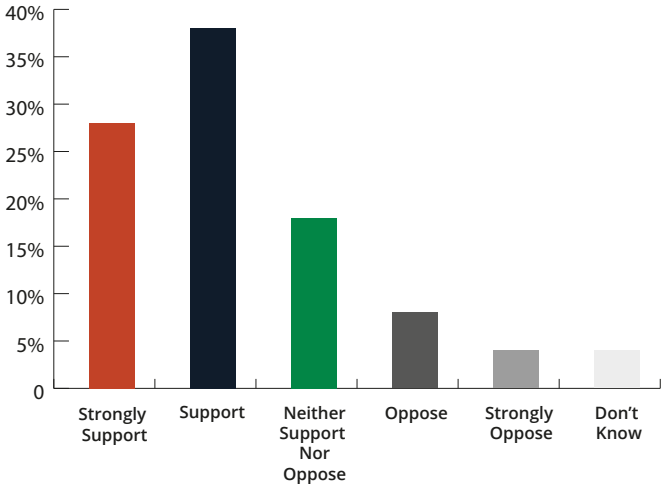
²¹ Office for Budget Responsibility (2020), Air Passenger Duty. Available [here](#).

²² Based on CCC reports of 36.5 Mt/CO₂. CCC (2019), *Net-zero and the approach to international aviation and shipping emissions*. Available [here](#).

²³ Fuel consumption is 12,318 tonnes and the fuel price used is £530 a metric tonne. Dukes (2019), *Digest of UK Energy Statistics*. Available [here](#).

people to take additional flights, not only with the company itself, but in total. Polling suggests significant support for an aviation regime that would charge higher rates for those who fly frequently. If APD charges are increased to better reflect carbon emissions, this may in itself have an equivalent dissuasive effect. However this change should be buttressed by action to discourage frequent flyer programs which create incentives for additional flights.

The Government raises taxes on Frequent and Business Class Fliers (making their tickets more expensive) because they cause more Air Pollution
Support or Oppose?



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

F. SURFACE TRANSPORT

Regulation to complement existing pricing



Our proposal: Existing pricing mechanisms and stronger regulation can have an equivalent effect to carbon pricing.



The charge: Maintain fuel duty and increase in line with inflation.



What we do with the money: General revenue.



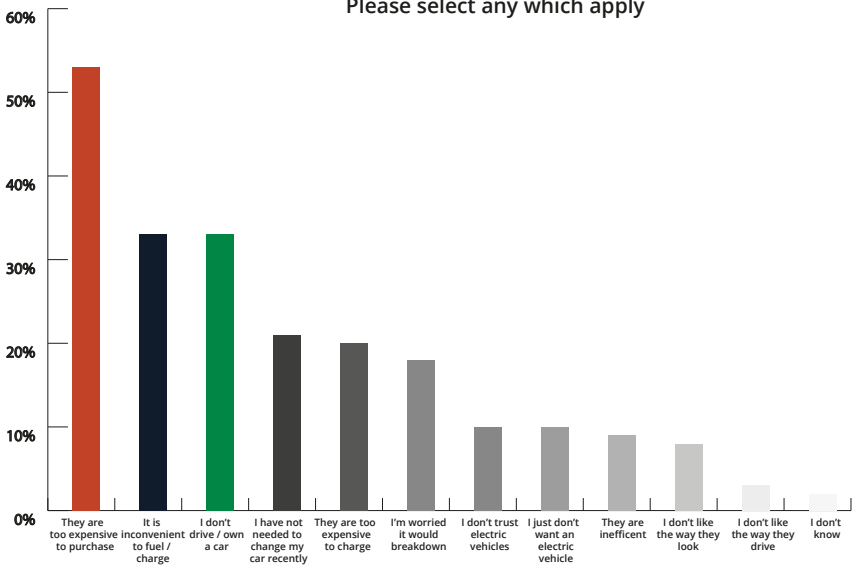
What else is needed: Charging infrastructure and competitive financing products for electric vehicles. Support for hydrogen development and refuelling infrastructure for long-distance heavy-goods vehicles. Piloting of net-zero aligned road pricing for when fuel duty disappears.

There is already a high tax on the use of cars. While it is not explicitly a 'carbon charge' it acts as a major disincentive to use petrol. But it has not been sufficient to drive people to electric vehicles at the pace required. That reflects (i) the fact that while they are already economically attractive on a "total cost of ownership" basis, the initial upfront cost of purchase EVs is still significantly higher than for an internal combustion engine (ICE) vehicle, (ii) car availability is still low with long wait times and an immature second hand market and (iii) the lack of sufficient charging infrastructure. Our polling points to these as important barriers which need to be overcome.

Our view then, is that this is where we should concentrate our efforts – more carbon pricing is unlikely to be of much use. In addition we support the CCC's proposal that the ban on the sale of new ICE passenger cars should be brought forward to 2032 at the latest.

For trains, there is a subsidy on the use of diesel. However, they are also an important substitution mechanism for more carbon-intensive forms of travel, and increases in ticket prices through higher fuel prices may disincentivise use. Instead, we recommend the Government puts a clear roadmap in place of phasing out diesel-only trains by 2040.

What has prevented you from buying an electric vehicle, if anything? Please select any which apply



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

G. SHIPPING

International agreements are required



Our proposal: The majority of shipping is international and must be managed through international mechanisms. If the IMO fails to introduce a pricing policy, then the UK should align with the EU on an introduction of a carbon price.



What else is needed: Include emissions from shipping in UK carbon budgets.

Almost all of UK shipping emissions arise from international shipping²⁴ and - like aviation - global shipping is subject to an international regulation regime, agreed and administered by the International Maritime Organisation (IMO). The IMO has already agreed an objective to achieve a 50% emissions reduction by 2050. It is implausible for the UK to drive change on a unilateral basis, and our policy should instead be to encourage further action via the IMO, including the introduction of a price on carbon intensive fuels and low-carbon investment support mechanisms.

Absent an internationally agreed price, the UK should track the EU ETS: the EU has said they will introduce a price if the IMO does not. Domestic GHG emissions from shipping are negligible, however they are also a source of local air pollution. We think it is reasonable to expect lifeline providers and other niche operators such as domestic ferries (where electrification is an option), government-owned and procured marine vessels, and off-shore service vessels to strengthen their zero emissions targets (currently 2050).

²⁴ BEIS (2018), *UK greenhouse gas emissions, final figures*. Available [here](#).

H. WASTE

Building on success of the current taxation approach



Our proposal: Maintain landfill tax and increase in line with inflation, while adding in incineration.



The charge: £91.35 per tonne of waste, rising with inflation



What we do with the money: General revenue.



What else is needed: Ban biodegradable waste going into landfill. A separate negative emissions payment scheme.

Between 1990 and 2018, emissions from waste (almost entirely methane) decreased by 69%.²⁵ Landfill and incineration emissions have reduced by 77% and 80% respectively (although we should note there is quite a lot of uncertainty in these measurements).²⁶

In other words, the waste sector is already doing an extremely good job of reducing emissions and it is not obvious that a new pricing regime is necessary. The current regime already includes a landfill tax at £91.35 per tonne of waste.²⁷ This is not entirely a carbon charge but if you were to take the revenue from a landfill tax in 2018, and make it relative to carbon emissions, it would be at £48/tCO₂e. This is higher than the charge we are proposing for other sectors in 2021.²⁸

²⁵ BEIS (2018), *UK greenhouse gas emissions, final figures*, p.20. Available [here](#).

²⁶ Data tables. BEIS (2018), *UK greenhouse gas emissions, final figures*. Available [here](#).

²⁷ HMRC (2018), *Landfill tax rates*. Available [here](#).

²⁸ Based on a landfill tax of £690 in 2018, and emissions of 14.4tMtCO₂e. HMRC (2019), *UK Landfill tax statistics*. Available [here](#).

Based on table 19. BEIS (2018), *UK greenhouse gas emissions, final figures*. Available [here](#).

We are therefore proposing that the landfill tax continues to rise with inflation; in addition, landfill taxes should apply to waste which is incinerated (unless CCUS is used) to increase incentives for recycling.

In addition, the transfer of biodegradable waste to landfill – which contributes to methane emissions – should be phased out via regulation. 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.

Our charging proposals at a glance					
Sector	2020	2025	2030	Key additional policies	What happens to the revenue from 2020?
Electricity (residential and commercial)	£40/tCO ₂ e	£55/tCO ₂ e	£75/tCO ₂ e	<ul style="list-style-type: none"> ✓ Move CfD and RO costs to general (or carbon) taxation, or even them out across gas and electricity 	Support energy efficiency in homes and compensation for vulnerable households.
Gas (residential and commercial) and heating oil				<ul style="list-style-type: none"> ✓ Energy efficiency finance for all ✓ Compensation for the poorest ✓ Ban on the installation of traditional gas boilers in homes from 2030 ✓ Legislation on landlords to implement Energy Efficiency upgrades to EPC band C by 2035 	
	For residential, delay the charge until 2022 (then introduce at £46/tCO ₂ e)				
Industry (gas, heating oil electricity, industry emissions)	Status quo: UK ETS (linked to EU ETS, as currently proposed) with gradual phase out of free allowances			<ul style="list-style-type: none"> ✓ BCA 	Some revenue used to support transformation (e.g. CCUS, Hydrogen)
Agriculture (gas, electricity, heating oil, methane, N ₂ S)	Align public subsidy with carbon goals Remove red diesel subsidy			<ul style="list-style-type: none"> ✓ Introduce methane and fertiliser charges with a BCA ✓ Negative emissions subsidies ✓ Investment in measurement systems 	Some revenue used to support negative emissions payments (via the ELM) and R&D into mitigation
Waste	Landfill tax rising in line with inflation and bringing in incineration taxes			<ul style="list-style-type: none"> ✓ Negative emissions subsidies ✓ Biodegradable waste ban 	Some revenue used to support negative emissions payments
Surface transport	Increasing fuel duty in line with inflation			<ul style="list-style-type: none"> ✓ Proper infrastructure and finance for electric vehicles ✓ Piloting of road pricing for when fuel duty disappears ✓ Support for hydrogen and development and refuelling infrastructure for long-distance heavy-goods vehicles 	General
Aviation	From 2022, slowly increasing the carbon charge on APD for economy and business class passengers to reach a trajectory of £75/tCO ₂ e. Introduce a new APD distance band. Differentiate APD to reflect the carbon content of fuel			<ul style="list-style-type: none"> ✓ Pursue international agreements for a tax on aviation fuel tax ✓ Include aviation in UK carbon budgets ✓ Reconsider provision of frequent flyer miles 	General
Shipping	International charging in place			<ul style="list-style-type: none"> ✓ Pursue international agreements ✓ Include shipping in UK Carbon Budgets 	N/A

4. HOW THESE PROPOSALS WOULD EVOLVE

By 2030, we would envisage much of this policy would converge, into:

1. A simple charge of £75/tCO₂e on all sectors of the economy except for surface transport, shipping, and waste. This price would increase steadily over time to reach the levels consistent with total decarbonisation of the economy by 2050.
2. A global carbon charging system in place for shipping and aviation.
3. For surface transport, for us to be well on the way to a wholesale switchover to electric vehicles for cars and rail; and hydrogen for heavier goods.

We should reiterate that, while it's out of the scope of this commission, a functioning system for incentivising, valuing and verifying negative emissions is crucial.

5. CREATING TRUST AND CERTAINTY

For a carbon price mechanism to have its intended consequence, it must be trusted to be fair, effective and long-term. Clearly, in a democratic system, all charges and taxes are susceptible to change. But a mechanism should give the most predictability and trust to businesses and citizens.

That is one reason why, in many cases, we have proposed using some of the revenue for a transitional period of time to support mechanisms for investment, including Contracts for Difference. There should also be transparency over how much revenue is used for general revenue, how much for investment in alternatives, and how much to cushion households from excessive costs.

The best way to achieve predictability, in our view, is by giving responsibility to a body whose job is to advise and monitor the government, acting as an accountability mechanism for the carbon charge. This body would not set the carbon charge nor the percentage of revenue that flows to the Treasury, but it would report on the price and how it is affecting emissions (including analysing the impact against UK Carbon Budgets); the use of revenues (including whether it is succeeding in crowding in private investment); and recommend alterations to the price trajectory to parliament every five years.

Given that the role and powers of this body would be analogous to that of the already existing CCC, and that its work would require many of the same skills, information sources and analysis, it might make sense to add this role to the responsibilities of the CCC.

NOTE: WHY WE HAVEN'T ADOPTED THE RECOMMENDATION OF A NEW UK ETS

The government has announced its intention to create a UK-ETS,²⁹ 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 (this 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.

The two main differences from the EU ETS are:

- The UK scheme will not allow international credits (this may change over time)
- The UK scheme has reduced by 5% the overarching emissions to be traded in the first year.

There will be an auction reserve price of £15 to safeguard the value of UK carbon allowances during the move to the new scheme. This is substantially lower than the traded price before COVID-19. There is a major risk that the cap proposed for the first year of the UK ETS, as proposed by BEIS, will far exceed expected emissions from involved sectors in 2021, and will therefore fail to provide a major price incentive for reduction.

There will be a review conducted in 2023 for implementation in 2026.

While the EU ETS was impressive in being a world leader for a region-wide carbon pricing system, it is not perfect. A UK-ETS linked to an EU-ETS may be a good backstop measure at a time of limited government bandwidth, but it is a major lost opportunity from Brexit to rethink our carbon pricing system and ensure it is strong - and wide reaching enough - to drive the emissions reductions required to achieve the 2050 net zero target.

If the UK is determined to forge ahead with a UK-ETS, many of our proposals still stand. The most directly affected sectors are electricity and heavy industry (since aviation pays very little under the EU ETS and we are focused on domestic taxation mechanisms already in place). In that scenario, we would still argue for an evening out of electricity and gas charges, and for linking to the EU's proposed BCA. We would also push for an emissions cap that is consistent with net zero, which we assume would result in price levels similar to the ones that we recommend here.

²⁹ UK Government and Devolved Administrations (2020), *The future of UK carbon pricing: consultation response*. Available [here](#).

ACKNOWLEDGMENTS

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