INSTITUTE FOR FREE TRADE

New Incentives for Freedom, Open Markets, and An Economically Sustainable

GLOBAL CLIMATE ACCORD

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PREFACE

Lord Hannan of Kingsclere

It's one of the oldest problems in economics, the problem of the freeloader. Why should a country, or a group of countries, undertake the hugely expensive transition to low or net zero carbon emissions when others are gaily building coal-fired power-stations and thereby wiping out any gain?

The question is far from academic. The UK Climate Change Act will, according to the government's own figures, cost more in up-front investments than it saves in climate mitigation. The cost of new technology, especially in housing, energy infrastructure, energy production, agriculture and transportation, is unlike anything we have undertaken before. Optimistic estimates put it at £1.4 trillion by 2050[1]. And that does not include the costs of economic opportunities forgone, nor of the significantly higher bills that result.

But suppose that the UK did all this. Suppose that, by some mighty effort equivalent to that which went into winning the two world wars, we succeeded in reaching net carbon neutrality. What would be the impact on global CO_2 levels? We all know the answer. They would fall by just one per cent.

Until now, policymakers have attempted to address this problem by building global bureaucracies. Countries are encouraged to agree to binding cuts, and some poorer nations are given handouts to incentivise them to comply. But the problem remains. Countries like the UK, which has already hugely reduced its CO_2 output since the 1990s, will struggle to sell further cuts to their voters when those voters see middle- and lower-income states generating vastly more carbon.

To make international action feasible, two conditions must pertain.

- Investments must be delivered at a massive scale, with new technology developing fast enough to enable the transition without a drop in living standards.

- The process must be effectively global, so that incentives to invest overseas are not distorted by arbitrary barriers.

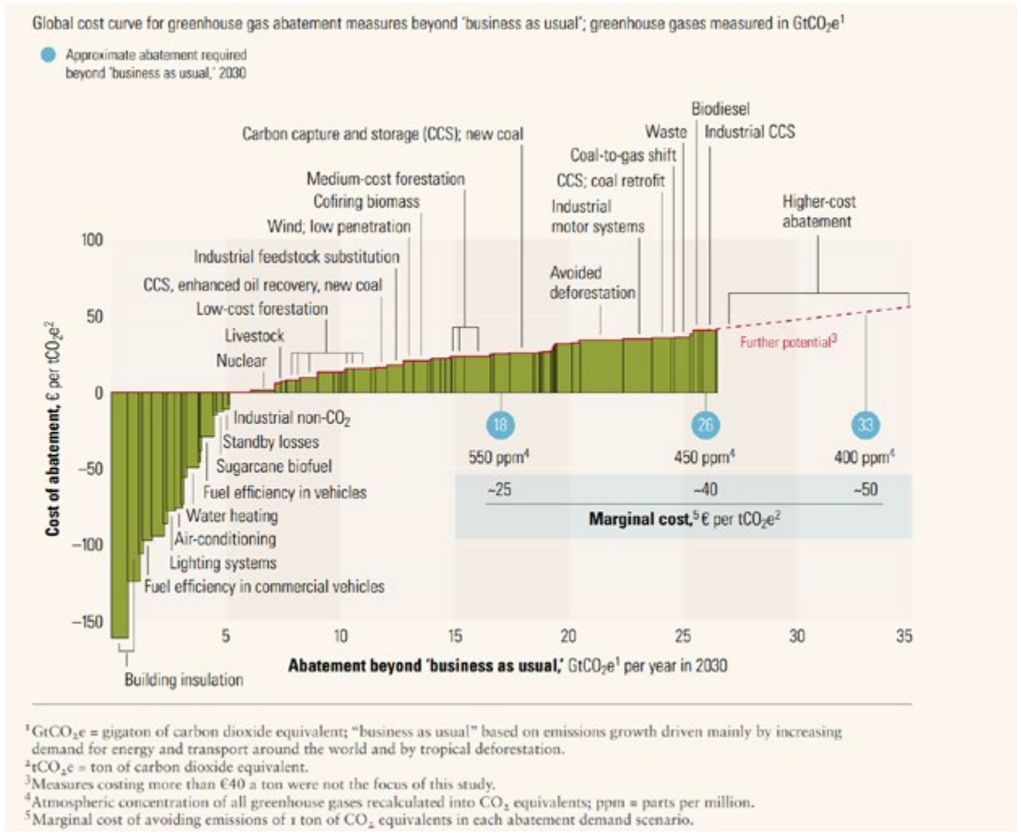
Stated like that, it might sound obvious, even banal. Indeed, on paper, everyone agrees. Rishi Sunak talks of a "pragmatic, proportionate and realistic path… particularly as the UK's share of global emissions is less than one per cent"[2]. Sir Keir Starmer talks in similar terms when proposing his "green prosperity plan".

1 https://www.ft.com/content/b02b9d51-3e0c-435c-9b53-774ee12ea277

2 https://www.gov.uk/government/news/pm-recommits-uk-to-net-zero-by-2050-and-pledges-a-fairer-path-to-achieving-target-to-ease-the-financial-burden-on-british-families

In theory, everyone is on board with the idea that the goal is to grow *and* to decarbonize, while also making sure the rest of the world does the same thing. These common-sense, mainstream and pragmatic goals implicitly underpin all serious climate proposals, from heavily interventionist carbon pricing and transfer payments[3] from rich to poor nations (Landis and Bernauer, 2012), all the way through to free market climate policy.

So far, though, those goals have emphatically not been met. As this paper demonstrates, current climate policy has failed in its own terms. Whether by taxes, subsidies, tariffs, or arcane rules, current policy discourages markets from clearing, and so causes deadweight welfare loss to consumers. It hinders the development of new technological innovations, makes investments more costly and encourages economic isolationism when it should be driving co-operation. More seriously, it has failed to get developing countries to take action on their own CO_2 output. The costs of continuing with these failed policies are high and rising. Whether measured economically or ecologically, current policies are a failure.



[1] $GtCO_2e$ = gigaton of carbon dioxide equivalent; "business as usual" based on emissions growth driven mainly by increasing demand for energy and transport around the world and by tropical deforestation.
[2] tCO_2e = ton of carbon dioxide equivalent.
[3] Measures costing more than €40 a ton were not the focus of this study.
[4] Atmospheric concentration of all greenhouse gases recalculated into CO_2 equivalents; ppm = parts per million.
[5] Marginal cost of avoiding emissions of 1 ton of CO_2 equivalents in each abatement demand scenario.

3 Landis, F., Bernauer, T. Transfer payments in global climate policy. *Nature Clim Change* **2**, 628–633 (2012). https://doi.org/10.1038/nclimate1548

Many excellent scholars are doing valuable research into which investments are the most viable, the most realistic and the likeliest to yield results. While this knowledge is crucial, it is not the primary focus of this research. *Au contraire*, our research is completely technology-agnostic. Our analysis and policy proposals are designed to maximise good green investment, whatever its nature. We leave the process of determining the best technologies up to those whose livelihood depends on knowing best, namely *investors.*

Our sole assumption on investments is that subsidies are not needed when it comes to developing technologies that save money. Investors don't need to be incentivised to seek out profitable inventions. Our aim in this paper is to remove obstacles from their path as they seek to do so globally.

A key goal of pragmatic climate policy must therefore be to reduce the real costs of abatement. This means:

- Reducing the financial costs by making supply-side tax cuts on investment and production, increasing the availability of finance and introducing tax-exempt debt for both capital and conservation investments.

- Increasing the financial payoffs of investment and research and development by lowering taxes on profits, offering reward-based carbon pricing as an incentive, and opening up new opportunities through deregulation and free trade.

This goal of reducing the costs of abatement may seem so obvious as to hardly warrant mentioning. Yet current climate policy does the *exact* opposite. We drive up costs with higher taxes on producers. These taxes create perverse incentives and ignore the principal constraints on the green energy market.

Most countries do not allow full capital expensing of investments. Private capital flows are taxed. Profits are taxed, as are workers at the highest levels since the Second World War. Investment and R&D are also stifled by stricter and stricter regulations at every stage from planning to operation, and tariffs and quotas inflate input costs.

Carbon tariffs will further drive up the costs of investment in the UK when they are introduced in 2027. We also routinely distort markets in an attempt to "drive investment", both through distortionary taxation and through subsidies that create mispricing and malinvestment.

Consider a concrete example: boilers. A new gas boiler can be more than 90 per cent efficient, whereas twenty years ago the best boilers on the market could achieve only 60 per cent efficiency. Yet the "boiler tax" – sold as, and genuinely believed to be, a green policy – stopped many such upgrades being made by passing on costs (some £300 per boiler), to consumers. The policy is also tied up with subsidies for new heat pumps for households, subsidies that not only fail to meet any reasonable cost-benefit analysis, and not only pick

winners, but also further distort the market by allocating scarce resources away from more efficient gas boilers and into the overconsumption of heat pumps.

In other words, the tax was not just useless; it was harmful. It meant that carbon abatement technologies were retarded. Eco-taxes continue to have that effect in several areas, both at the household and at the industrial level.

Our aims may, as I say, sound obvious. But achieving them would mean a very different approach to climate policy. Instead of taxes, bans, regulations and other sticks, we propose some useful and proportionate carrots. The only way in which the heating of the planet can be kept to a manageable level is with massive investment in new technologies, especially in carbon capture. And the only source of that investment is the private sector.

In this paper, we set out concrete ways to encourage that investment. We also set out an international framework which offers key economic wins, including trade access, the reciprocal removal of carbon tariff border adjustments (CBAM), reciprocal supply side tax cuts, international capital flows for investment, and the removal of punishing tariff and non-tariff barriers. A happy side-effect is that, as well as facilitating the cross-border flow of green technology, we would be facilitating free trade more widely.

Developing economies will play an important role

Abatement potential for greenhouse gases by region, $GtCO_2e$[1] per year by 2030 (costing up to €40 per ton)

100% = 26.7

		% of global emissions	
		'Business as usual,'[3] 2030	After abatement
Eastern Europe[2]	1.6	9	11
Western Europe[2]	2.5	8	7
North America	4.4	15	14
Other developed countries	2.5	11	13
China	4.6	18	18
Other developing countries	11.1	39	37

[1] $GtCO_2e$ = gigaton of carbon dioxide equivalent.
[2] Eastern Europe includes former Soviet Union and Balkans; Western Europe includes EU25 plus Iceland, Norway, Switzerland, Turkey, minus Baltic states.
[3] "Business as usual" based on emissions growth driven mainly by increasing demand for energy and transport around the world and by tropical deforestation.

The principles that underlie our work are not new. We know that lower taxes, lighter regulations and freer trade encourage investment. We have known it since at least the time of Ibn Khaldūn, the fourteenth-century Tunisian sage. We know, too, that, other things being equal, firms will invest in cleaner tech, not because they all have a great social conscience, but because cleaner technologies tend to be cheaper. The challenge is to make that investment a global phenomenon and, thereby, to encourage the countries that have so far been the most hesitant when it comes to climate change to come on board with the process. The paradigm shift is applying these ancient truths to climate change policy.

"Think global, act local," say the Greens. But their policies somehow seem always to involve cash transfers, supranational bureaucracies, the erosion of national sovereignty and, over time, less growth. Here is a way to act both globally *and* locally, by making tax investment vehicles international, and by giving every nation an incentive to participate.

EXECUTIVE SUMMARY

The key purpose of this paper is to evaluate the potential costs and benefits of an alternative market liberalization framework for climate change, which accelerates innovation by streamlining and expanding free markets fueled by broad-based, technologically neutral positive incentives. We have provided a comparative economic review of the advantages of this approach compared to the conventional tax-and-subsidise orthodoxy.

This approach has emerged from working groups convened by Grace Richardson Fund, Institute for Free Trade and other members of the Climate & Freedom International Coalition, a collaboration of international free market think tanks and scholars. The resulting Climate & Freedom Accord (or CFA) – a proposed international free market agreement on climate and sustainable development – has inspired studies, similar to this one, at ten research institutes across Europe, looking at its impact on different nations and regions.

Two key CFA incentives are tax exempt debt for capital investment, and the decarbonisation tax cut. The tax-exempt debt, referred to as Rapid Innovation Funds (RIFs) function like full expensing, accelerating all innovation by making new capital investment cheaper. Decarbonisation tax cuts, or equity DTCs, add a small "performance bonus" single-digit tax rate reduction for firms that achieve the greatest emissions reductions. This combination of positive incentives, one for capital and innovation acceleration, the other to accelerate decarbonizing innovation for abatement of an externality-linked market distortion, make both greater than the sum of their parts.

We find that these positive market incentives, proposed in the Climate and Freedom Accord and more comprehensively evaluated in this paper – in combination with broad market liberalization – can directly alleviate the technology constraints that currently impede the ability to reduce (or ideally eliminate) the emission of GHGs. Positive incentives can be created by implementing broad-based rate cuts to tax and tariff policies that apply to all technologies, driving decarbonizing innovation across the board, without picking winners and losers. Econometric modeling estimates that feasible GDP gains in the order of £1,000+ per capita are possible while accelerating decarbonisation.

It is first necessary to establish why high tax, subsidy and tariff policies are failing. This requires a working understanding of the shortcomings of currently available green energy solutions and the need for technology neutral positive incentives to innovate improvements. We can then cover why current policy makes us poorer, makes innovation harder, and harms our ability to cooperate internationally. We also need to understand the dynamics of the additional costs imposed by popular solutions including carbon taxes.

- Chapter 1 addresses international carbon pricing, with an econometric analysis modelling the impact on GDP per capita of a CBAM versus the CFA. The study finds that UK adoption of the CBAM could lead to GDP per capita losses of between roughly £150 and £650 for each person. The study also finds that far from lowering GDP per capita, the CFA has the capacity to increase GDP per capita by over £1,000.

- Chapter 2 summarizes the provisions and thinking behind the CFA.

- Chapter 3 analyzes the unintended consequences of carbon pricing – including economic drag, uncompetitiveness, and the offshoring of emissions – which result from the use of costly negative incentives, which may influence what people do not do, but does not determine what they do instead (e.g., close plants at home, invest overseas).

- Chapter 4 explores an alternative, the concept of a supply side tax cut linked to emissions reduction (a decarbonization tax cut or a "decarb detax") as a technology neutral positive incentive alternative designed to avoid the shortcomings of conventional negative incentive carbon pricing.

- Chapter 5 analyzes the combined impacts of CFA proposals, from market and trade liberalization, to various fiscal proposals, showing how these policies have greater impacts when combined, than they would have if applied alone, or piecemeal.

- The Conclusion explores the international and domestic opportunities the CFA unlocks for the UK, in terms of increased opportunities for international trade, opportunities for domestic investment and growth, and opportunities for the London financial center to the lead the world in sustainable finance by establishing the new international RIF capital market.

INTRODUCTION

Encouraging an energy transition is prudent given the risks from global climate change; but how that transition is encouraged matters. A transition that ignores the unintended consequences of government policies and the limitations of current technologies risks making things worse. We risk getting poor returns on investment and diminishing standards of living. Instead, the goal of reducing the risks from global climate change is best achieved by encouraging an economically sustainable energy transition.

An economically sustainable energy transition occurs when new energy technologies simultaneously promote two goals: (1) sufficiently reduce total lifecycle greenhouse gas (GHG) emissions; and (2) improve, at bare minimum maintain, the living standards for citizens by promoting economic growth. Put differently, an economically sustainable energy transition incorporates new technologies into the energy system that emits fewer/no emissions and produces energy more affordably and efficiently compared to our current fossil fuels-based system.

There have been great strides toward achieving this goal. Total GHG emissions per million pounds of U.K. economic activity in 2022 were 67 percent below the 1990 levels.[4] Supporting these reductions are valuable low emission energy resources that already produce cost-effective low-emission energy, such as nuclear generation. There have also been impressive gains in solar and wind generation resources. However, meaningful limitations remain.

If alternative technologies emitted fewer GHGs over their lifecycle and were as efficient and cost-effective as current fossil fuel-based technologies, then the transition to these resources would be seamless. Few public policy initiatives would be required and much of the energy transition would have already occurred as consumers would naturally gravitate towards these better products. The continual pressure on Parliament to implement additional global climate change policies demonstrates that, in practice, the current energy alternatives do not yet meet the criteria of an economically sustainable energy transition. These deficiencies arise because current alternative energy technologies suffer from operational deficiencies relative to fossil fuel technologies, which are exacerbated by growing shortages of key raw materials.

Achieving the goal of an economically sustainable energy transition requires more technological innovation because there are significant limitations to current reduced emission technologies and there are concerns regarding the net environmental and emission impacts from many current alternative technologies. Without continued innovation, the energy transition risks a more costly and less reliable energy system that reduces economic growth, imposes higher costs on families that disproportionately harms the poor, and (ironically) risks increasing overall pollution.

4 “Greenhouse gas emissions, UK: provisional estimates, 2022 Measuring the air emissions generated by UK economic activities” Office for National Statistics, https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/greenhousegasintensityprovisionalestimatesuk/provisionalestimates2022#:~:text=UK%20emissions%20stood%20at%20512,550%20Mt%20CO2e%20in%202019

Given that innovation is essential, a rethink of the current policy approach to global climate change is necessary. Current policies encourage the energy transition by either imposing negative incentives on the economy that include taxes, quotas, tariffs, and restrictions or by subsidizing current favoured technologies.

Due to the innovation deficit, imposing negative incentives on disfavoured energy sources is problematic. Negative incentives achieve their goal by increasing the relative price of emissions-intensive energy sources. The higher costs discourage their use thereby lowering emissions. The consequences from these higher costs are reduced economic growth, and large cost burdens passed on to consumers that disproportionately harm lower-income individuals. While the higher expenditures create incentives to use innovative technologies, the positive incentives are small.

Negative incentives, like carbon pricing, also run up against technical limitations of our currently available green technologies, as well as market barriers that remain impervious to a price mechanism. Faced with these barriers, the effective carbon price required to fully abate climate change is likely to be higher than the social cost of carbon. In other words, the cost of the negative incentive will be higher than the cost to society if we did nothing. Forcing a substitution to underdeveloped technologies before they reach price performance parity is likely to push emissions offshore and furthermore will make it harder to get developing countries to buy-in to measures and agreements to improve CO2 abatement. It also, as has been seen across the European Union, leads to a bias toward protectionism in an attempt to compensate for making their industries uncompetitive. Europe, in this view, seems to have shot itself in the foot with its climate industrial policy. Their solution, it seems, is to shoot everyone else in the foot with climate protectionism.

Providing direct subsidies is also problematic. Such expenditures tend to favour politically connected energy resources regardless of their merit. For example, while biofuels are often touted as an important low emission alternative fuel, there are sound reasons for scepticism. A 2022 study on the impacts of ethanol found that “the production of corn-based ethanol in the United States has failed to meet the policy’s own greenhouse gas emissions targets and negatively affected water quality, the area of land used for conservation, and other ecosystem processes. Our findings suggest that profound advances in technology and policy are still needed to achieve the intended environmental benefits of biofuel production and use.”[5] Despite these negative results, ethanol subsidies persist. Consequently, direct subsidies are likely to promote inefficient, politically favoured resource use, diverting funds for potentially more beneficial innovations.

These adverse consequences from the current policy approach raise serious questions regarding the efficacy of using negative incentives and other market-forcing policies to usher in the needed energy transition. We must ask serious questions about the route we are taking. The first port of call must be a full econometric analysis – to show the scale of the policy failure and the enormous potential for a pivot to positive, free market alternative.

5 Lark Tyler J., Hendricks Nathan P., Smith Aaron, Pates Nicholas, Spawn-Lee Seth A., Bougie Matthew, Booth Eric G., Kucharik Christopher J., and Gibbs Holly K. “Environmental outcomes of the US Renewable Fuel Standard” PNAS, February 14, 2022, 119 (9) e2101084119, https://doi.org/10.1073/pnas.2101084119

CHAPTER 1

THE IMPACT OF CARBON LEAKAGE MECHANISMS ON GROWTH

Shanker Singham

This paper evaluates the cost from a GDP per capita perspective of the UK following the European Carbon Border Adjustment Mechanism, as has been suggested by both the current and previous UK governments, and about which there has been a lengthy consultation. While the previous UK government did make an attempt to project the cost to the UK economy of adopting the CBAM, we believe it substantially underestimated the cost. Given the high costs that our modelling suggests, it is important to ask what alternatives exist, and to cost those. We make no assertions about the effectiveness of these different proposals in addressing carbon leakage issues, still less about their ability to meaningfully reduce carbon emissions and therefore impact climate change. It is for policymakers to decide how the regulatory purpose is best achieved.

We see our role as to provide a robust economic impact assessment which includes dynamic effects. We have also not considered in this analysis the impact of other climate change policies such as subsidies for particular sectors and tax credits as part of the EU Green New Deal which the UK may adopt as part of its overall climate change approach. We have also not considered the potential impact if the UK were to follow the European Emissions Trading Scheme (ETS) as opposed to retaining its own ETS.

We use the ACMD Model which the Growth Commission uses to evaluate the impact of trade and domestic regulatory policies by reference to their impact on the three core pillars that generate economic growth: open trade, competition and property rights protection. This ground-breaking econometric model correlates movement in these pillars with GDP per capita.

The study finds that UK adoption of the CBAM could lead to GDP per capita losses of between roughly £150 and £300 even if supply chains stay as they are. Implicit within the UK's independent trade policy is the possibility for supply chains to realign around the lowest cost producers, and so we have modelled the impact of CBAM if supply chains were able to realign. Given that low-cost producers tend to be developing countries, the economic impacts in this case are much higher, between £210 and £650 of losses for each UK person.

We have also modelled the impact of other ways of dealing with climate change which have been proposed. We model the UK government's Trade and Agriculture Commission proposal which we find to be considerably less costly in terms of GDP per capita impact. Finally, we model the impact of a new and very different approach to climate change and carbon leakage, the so-called Climate and Freedom Accord (CFA). We find that far from lowering GDP per capita, the CFA has the capacity to increase GDP per capita by over £1,000. At a time when GDP per capita has been sluggish in G7 countries, including the UK, the importance of an approach that generates GDP per capita growth should not be underestimated.

The impact on developing countries of a CBAM is potentially severe. Given the current geopolitical risks of a bifurcation of supply chains into G7 and BRICS markets, government must be alive to the threat that tariffs enacted primarily on the products of developing countries may not lead to improved carbon emissions positions but may drive them towards large

BRICS markets operating very differently from the G7. The resultant impact on global welfare should be a serious concern. It is beyond the scope of this paper to attempt to calculate the global welfare impacts of such an eventuality, but these would clearly dwarf the losses we do suggest.

Purpose of this Chapter

The purpose of this chapter is to evaluate the potential impact on GDP per capita of the UK adopting the European Carbon Border Tax Adjustment Mechanism (CBAM).

In order to do this we identify what problem adoption of the EU CBAM is trying to solve, and then we will evaluate its potential GDP per capita impact using the ACMD Model (see below) which is a new economic model we are using to correlate GDP per capita impacts as a result of changes to policy across the pillars of International Competition or Trade (IC), Domestic Competition (DC) and Property Rights protection (PR) which we know have strongly correlative effects on GDP per capita. We will then look at alternative methods of solving the problem EU CBAM is seeking to solve and evaluate their impacts, also using the ACMD Model.

The purpose of this paper is not to evaluate whether the UK adoption of EU CBAM will reduce carbon emissions globally or even whether it will lead to less "carbon leakage", but rather the economic impacts of its adoption. Policymakers can then decide whether the cost is justified by its stated purpose.

We will also apply the ACMD model to a range of alternatives to the CBAM, including a new proposal which takes a very different approach. Rather that raising trade barriers for high emission imports, the Climate & Freedom Accord (CFA), as it is called, removes barriers to trade and investment flows to drive accelerated decarbonising innovation.

Finally, we will look at the wider geostrategic and geopolitical impacts of the adoption of the EU CBAM in the UK which cannot be quantified in GDP per capita terms but will have profound effects on international economic policy and related national security.

Problem Statement

Many countries have adopted approaches to dealing with "carbon leakage".

The EU believes that carbon leakage occurs when companies relocate their production to countries with less strict climate policies, undermining the EU's efforts to reduce greenhouse gas emissions.

If countries have laws and policies that ban certain technologies on net zero grounds, then domestic producers are likely to complain if imports using these same technologies are able to enter the domestic market at lower cost.

The fear is that the attempts by some countries to deal with climate change could simply shift production to countries that do not take adequate steps to deal with climate change.

Many different methods to deal with this issue could be applied, but one has been adopted by the EU, and is now being actively considered by the UK and other countries. This is the Carbon Border Adjustment Mechanism ("CBAM").

UK industry in particular is concerned that production methods in other countries may be more carbon-intensive and less costly.

This could lead to increases in market share in the UK of these products not as a result of efficiency, but due to the reduced costs resulting from the higher emission production process which is banned in the UK or other import market.

Does EU CBAM solve the problem?

The **European Carbon Border Adjustment Mechanism (CBAM)** is a climate policy tool introduced by the European Union (EU) to prevent "carbon leakage". CBAM applies to imported goods like cement, steel, aluminium, fertilisers and electricity from countries outside the EU. The mechanism requires importers to buy carbon certificates reflecting the carbon price that would have been paid if the goods had been produced under the EU's Emissions Trading System (ETS). This ensures that foreign producers are subject to similar carbon costs as EU-based producers.

Key points of CBAM:

- **Start date**: Gradual implementation began in 2023, with full application set for 2026.
- **Objective**: Level the playing field for EU industries and incentivise non-EU countries to adopt stricter climate policies.
- **Scope**: Targets industries at risk of carbon leakage due to their high emissions intensity and exposure to international trade.

The EU CBAM is intended to cover all products currently covered by the ETS by 2030, and complete phase-out of free allowances is expected by 2034.

The UK is considering adopting the same approach to carbon leakage as the EU does. This means that the UK would have the same CBAM tariff applicable to carbon-intensive products in the areas in scope and the same approach to the evaluation and calculation of the tariff.

The UK's version of the CBAM would ultimately apply to all UK products covered by the ETS. The current UK approach is to lessen the burden on some UK producers by giving them free ETS allowances to produce carbon-intensive goods (and so be on the same competitive playing field as producers in other countries unburdened by restrictions), while maintaining the overall ETS mechanism for others. This will change over time, as these free allowances become gradually phased out during 2027.

In order to deal with this transition, the CBAM is intended to take away the benefit that foreign producers of the products in scope have as a result of being able to use carbon-intensive techniques for their production.

The EU's CBAM will lead to the imposition of a tariff on the imports of these competing products and in addition to ensuring UK products produced using lower emissions production processes are protected from foreign competition, this will also result in the blocking of foreign competition whose cost base may not be lower than UK competitors. Hence if other countries have a carbon price, then the CBAM tariff will be reduced accordingly. It should be noted that the projections of the UK's carbon price based on a range (low sensitivity assuming high fossil fuel prices and low economic growth versus high sensitivity with low fossil fuel prices and high economic growth) are estimated to be between £106 per tonne of CO_2 emitted and £171 per tonne of CO_2 emitted by 2039 (the UK's current carbon price is £80/tCO_2e)[6]. In order for countries to avoid UK CBAM tariffs at this time, they would have to match UK carbon prices.

International Trade Approach to Tariffs based on Process and Production Methods (PPMs)

It has been an axiomatic principle in international trade, and specifically in the GATT/WTO system, that countries should not discriminate on the basis of method of production, but only on the ultimate goods themselves. There is an important reason for this. Once you start to discriminate on the basis of production method, it opens the door for any efficient production method to be subject to challenge from incumbents who do not want to face competition. That said, WTO cases more recently have opened the door to discrimination based on production methods in areas like the application of the public morals defence under Article XX (b) of the GATT 1994 (see for example the EU-Seals case[7]).

Article XX(b) is a general defence that allows countries to enact policies that "are necessary to protect human, animal or plant life or health". Similarly, GATT Article XX(g) allows countries a defence in the case of measures that are designed to conserve exhaustible natural resources.[8] It will be difficult to make out this defence as long as free ETS allowances exist alongside the CBAM itself. That said, such mechanisms should be seen to be the exception and not the rule. However, accounting for PPMs cannot be applied extraterritorially, cannot discriminate between countries and cannot be protective of domestic industry (i.e. must also apply to domestic industry).

Since the issue is one of competition, it is relevant to ask whether the EU CBAM deals with the competition that arises from the production method cost reduction or whether it goes beyond this. A well-tailored solution would remove only that part of the cost reduction attributable to the difference in cost brought about by the emissions-intensive production method and the production method required of UK firms. It would seem that a general tariff which is based simply on a carbon pricing mechanism cannot differentiate between distortive practices and non-distortive ones and cannot assess whether the particular distortion actually has an effect on competition.

Cost of CBAM

We have used the Anti-Competitive Market Distortions ("ACMD") Singham-Rangan-Bradley ("SRB") -γ model to evaluate the impact of CBAM (referred to as the "ACMD Model"). We apply the ACMD Model by evaluating the potential impact on the UK's pillar scores in key areas, which enables us to evaluate GDP per capita impact. We can then apply an attenuation factor based on the degree of UK economy impacted, taking into account the forward effects, not only the specific areas impacted.

The ACMD Model looks at effects in country of policies adopted by that country. It does not take into account the potential impact of those policies on the country's external trade policy (except for the effects of that policies on a country's own trade openness). An example of this would be legal services access in India where the UK is currently negotiating a trade deal. The application of CBAM on Indian exports would make it less likely that their negotiators would concede to UK demands on legal and financial services. Thus, since 81% of the UK economy by gross value added (GVA) is services, the international trade effect on the UK will be significant.

In evaluating the total effect, we would need to consider how the services sector could be impacted because CBAM will make it less likely that the UK will get services liberalisation for UK services exporters in other markets. The markets in the Gulf Cooperation Council (GCC) and India could be examples, given that the UK is negotiating better market access for its services sector in these markets right now.

6 These projections are from the UK government's own projections, although they are not to be read as "forecasts". See DESNZ's Traded carbon values used for modelling purposes (2023) at https://www.gov.uk/government/publications/traded-carbon-values-used-for-modelling-purposes-2023

7 *European Communities – Measures Prohibiting the Importation and Marketing of Seal Products*, WT/DS400/AB/R and WT/DS401/AB/R (WTO, 22 May 2014) available at https://docs.wto.org/dol2fe/Pages/FE_Search/FE_S_S006.aspx?Query=(@Symbol=%20wt/ds400/ab/r*%20not%20rw*)&Language=ENGLISH&Context=FomerScriptedSearch&languageUIChanged=true#.

8 Article XX(g) requires the measure to be made effective in conjunction with restrictions on domestic production or consumption; and satisfy the requirement of the chapeau of Article XX to the effect that it is not applied as arbitrary or unjustifiable discrimination, or as a disguised restriction on trade.

Introduction to ACMD Model

Anti-Competitive Market Distortions, or ACMDs, refer to government-imposed restrictions on competition.

Singham has written extensively about market distortions for over twenty years.[9] Singham also dealt with the issue extensively in his 2007 book, *A General Theory of Trade and Competition: Trade Liberalisation and Competitive Markets* (CMP 2007). Formally, Abbott and Singham[10] have defined ACMDs as those that "involve government actions that empower certain private interests to obtain or retain artificial competitive advantages over their rivals be they foreign or domestic."

Singham also discussed market distortions in a working paper for the Council on Foreign Relations, *Freeing the Global Market by Curbing Regulatory Distortions*.[11] This paper included an inventory of distortions and explained why they have a pernicious impact on international trade.

Having identified that ACMDs present a pernicious problem in international trade, the lack of a quantum of the impact of these distortions made it very difficult to evaluate the scale of the problem. It was therefore necessary to research different ways of evaluating the harm posed by ACMDs. Singham and Rangan embarked on this exercise with a series of papers from 2014.[12] Singham and Rangan also published two papers introducing the economic analysis of ACMDs in 2016 for the Legatum Institute.[13] That work is the precursor to this paper and the modifications and adaptations to the model used.

It is only by fully understanding the metrics of anti-competitive market distortions that we can really evaluate their impact. ACMDs can damage international trade flows as well as distorting markets in ways that reduce competition and destroy wealth out of the economy. Hence ACMDs are just as relevant to the international trade agenda as they are to the domestic regulatory agenda.

9 See for example Shanker A. Singham, "Market Access and Market Contestability: Is the Difference purely semantics?", *Brooklyn Journal of International Law*, Volume 25, Issue 2 (1999): https://brooklynworks.brooklaw.edu/bjil/vol25/iss2/24; Shanker A. Singham, "Advancing the competition and trade policy agenda: Public Sector Restraints on Trade in the Free Trade Area of the Americas", *International Antitrust Bulletin*, 4,2 (Summer 2001); Shanker A. Singham and D. Daniel Sokol, "Public Sector Restraints: Behind the Border Trade Barriers", *Texas International Law Journal*, Vol. 39, 625 (2004)

10 Alden F. Abbott and Shanker A. Singham, "Enhancing welfare by attacking anticompetitive market distortions", *Concurrences*, No. 4 (December 2011): https://ssrn.com/abstract=1977517

11 See Shanker Singham, *Freeing the Global Market: How to Boost the Economy by Curbing Regulatory Distortions*, Council for Foreign Relations (October 2012): https://www.cfr.org/sites/default/files/pdf/2012/09/CFR_WorkingPaper15_Singham.pdf

12 See Shanker Singham, Robert Bradley and U. Srinivasa Rangan, "The effect of anticompetitive market distortions (ACMDs) on Global Markets", *Concurrences* (December 2014)

13 See Shanker A. Singham, U. Srinivasa Rangan, Robert Bradley and A. Molly Kiniry, *Anti-Competitive Market Distortions and their Impact: A case study of India*, Legatum Institute (May 2016): https://img1.wsimg.com/blobby/go/bf4d316c-4c0b-4e87-8edb-350f819ee031/downloads/1cstfqts9_122710.pdf?ver=1603533215968; see also Shanker A. Singham and A. Molly Kiniry, *An Introduction to Anti-Competitive Market Distortions*, Legatum Institute (September 2016): https://img1.wsimg.com/blobby/go/bf4d316c-4c0b-4e87-8edb-350f819ee031/downloads/1cste45av_640953.pdf?ver=1603533215968

Policymakers would greatly benefit from understanding the cost of ACMDs and how they relate to domestic regulatory promulgation. The OECD, in its regulatory toolkit and competition assessment, has advised policymakers to promulgate regulation in ways that are the least anti-competitive possible consistent with a publicly stated, legitimate regulatory goal. Many countries include this sort of competition assessment in the ways they promulgate regulations, including taking into account the views of competition agencies. However, absent a robust metric to measure distortion, it is difficult for governments to properly evaluate the harm caused by certain types of regulation, and it is also impossible for publics to fully understand the impact of regulation so that they can properly weigh the costs and benefits of regulation and determine if the harm is justified by the importance of the regulatory objectives.

ACMDs can be particularly harmful (as distinct from private anti-competitive behaviour) as they are imposed by the government. Therefore, they enjoy state-backed power, and the force of law. Consequently, they may be impervious to attenuation by ordinary market processes. One example of an ACMD is as follows:

Consider a market, where firms generate a certain level of pollution. Now suppose that the government orders all firms to cut down on pollution by the same amount. However, suppose there is no cap-and-trade system in place, whereby firms with high costs of reducing pollution can buy permits from other firms at a price lower than its cost of reducing pollution. In such a case, a high-cost firm may have access to low-cost pollution reduction technology and a low-cost firm may be handicapped by not having such access. In that case, a low-cost firm may likely exit and the resulting reduction in the competition may be even more detrimental to consumer welfare. In this less competitive market, the welfare benefit from reduced pollution could be offset by the welfare cost of reduced competition. This distortion can be termed as an ACMD.

Economists have long recognised the prevalence and pernicious consequences of ACMDs. The complexity and breadth of this issue, however, have made it an especially difficult one for policymakers to tackle. In this report, we attempt to break down the impact of ACMDs on productivity. We then attempt to examine the impact of reducing ACMDs in the United Kingdom, by trying to predict the impact on GDP per capita, over a fifteen-year period.

If we are able to develop metrics to measure ACMDs, there are a number of policy consequences that are of great value. These include allowing governments to tariffication market distortions in the markets of trading partners, which allows a nuanced approach to issues like the US-China trade dispute (as opposed to the imposition of a tariff regardless of evidence of ACMDs in China). Such a policy would have the advantage of actually incentivising the party which has the ACMDs to actually lower them (and thereby benefit from the lower tariff), as well as enabling countries to signal to their trading partners that they are open to imports which are efficiently produced because of the consumer welfare gains for their economies.

Policymakers can also improve the quality of their own regulatory promulgation processes. As stated above, under the OECD Regulatory Toolkit and Competition Assessment, governments should regulate in ways that are the least damaging to competition consistent with a publicly stated, legitimate regulatory goal. If policymakers had a sense of the effect of ACMDs in their own markets on their own economic output, this would be tremendously valuable in coming to better regulatory decisions. It would also be invaluable in ensuring that legislators can properly evaluate the regulatory goal and the cost of the ACMD and make informed decisions.

Such a metric would also inform the public debate and ensure that this is actually being carried out in a manner that balances the regulatory objectives that need to be properly and clearly stated, and the cost of the ACMDs to the economy. Too often in public debate, a knee-jerk response to a perceived market failure occurs without any attempt to present, much less understand, the economic evidence.

A metric will also tell us something about the scale of the economic impact of ACMDs. In the past, it has been assumed that reduction of trade barriers is where the largest economic gains are to be found, and reduction of distortions is important but not of the same order of magnitude. A metric will enable us to evaluate this impact. A sense of the scale of this impact was developed in preliminary fashion by Cebr in 2019.[14] According to the Cebr report, imposing a distortion inside the border as opposed to at the border in an agency-based model led to a 37% reduction in output, versus an 11% reduction of output for an equivalent border measure. This suggests that the impact of ACMDs might be much higher than previously supposed.

There are a number of ways of tackling the problem. We have developed both an econometric and an agency-based model for getting a sense of quantum.

There are three major impacts of ACMDs in global markets which need to be addressed differently:

1. ACMDs distort the domestic market. This purely domestic impact can be measured using a range of models we describe below.

2. ACMDs can artificially lower the costs of exporters and so damage import markets. A different set of metrics needs to be used here in order to support defensive trade tools and mechanisms.

3. ACMDs can be used as barriers to import, in effect negating market access concessions in trade agreements by making markets effectively incontestable.

14 See *An Agent Based model of Trade: Market Distortions and Output*, Cebr, February 2019: https://img1.wsimg.com/blobby/go/bf-4d316c-4c0b-4e87-8edb-350f819ee031/downloads/Cebr%20Market%20Distortions%20Trade%20Report.pdf?ver=1603533215968

In all three cases, ACMDs have a negative impact on global welfare which is why it is important that mechanisms can be found to deal with them. We will first look at ACMD distortion of the domestic market (and in the case of the agency-based model the global market), and then look at impacts on trade.

Analysing Other Studies

There have been a number of other studies that have sought to measure the impact on GDP or GDP per capita of anti-competitive regulation. In Australia, the impact of the national competition policy which included tariff reform as well as regulatory reform can be seen below. These studies are useful to consider as there is a danger that the CBAM will lock in existing supply chains, making it very difficult for new entrants to penetrate markets where the CBAM is present. If this occurs then, there will be powerful competition effects of the CBAM which our model only partially reaches, making the following an underestimate of the full impact of the CBAM.

Item	Description
Growth	
Real GDP	5.5%
Real consumption	$9 billion pa
Real wages	3% increase
Employment	30,000 more jobs
Revenue	
Commonwealth	$5.9 billion
States, Territories, local government	$3.0 billion

An ex-post analysis from the Australian Government Productivity Commission had also suggested a 2.5% gain in GDP had been achieved but this was spread over a much smaller group of sectors and therefore likely considerably underestimated the actual dynamic efficiency gains.[15] The sectors included were urban water, gas, electricity, telecommunications, urban transport, ports and rail freight.[16] The Australian study also considered distributional effects and found that the economic gains were well spread out across all income brackets. It also connected the improvement in trade openness with the improvement in competition in key sectors achieved not only through private competition law implementation, but by a pro-competitive approach to regulation: in other words, a reduction in ACMDs.

15 Address by Mr. Rod Sims, Making markets work for increased productivity and growth: the Australian experience address, available at https://www.accc.gov.au/about-us/news/speeches/making-markets-work-for-increased-productivity-and-growth-the-australian-experience-address

16 *Review of National Competition Policy Reforms*, Australian Government Productivity Commission (28 February 2005): https://www.pc.gov.au/inquiries/completed/national-competition-policy/report/ncp.pdf

A recent study by Singla of the University of Goethe reveals that 31-37% of market share gain for incumbents is attributable to U.S. federal regulation.[17] In other words, incumbents lobby for anti-competitive regulation to exclude rivals very successfully. A study of European regulation by ECIPE suggest that 3-4% of GDP gains are possible by reducing ACMDs.[18] CBAM can operate in a similar way to ensure market power for incumbent producers of CBMA products.

The Growth Commission in its papers 2 and 3 identified a range of different studies that examine the impact on GDP per capita of anti-competitive regulation.[19] Increasingly many researchers are finding that these impacts are significant – ranging between 3% and 7% of GDP per capita losses due to ACMDs. These metrics put the notion that ACMDs are primarily a developing world problem completely out of court. They also highlight the importance of policymakers addressing them seriously.

Introduction to the Specific Pillars of the ACMD Model

We have also developed an econometric model to analyse distortions. The model which we have developed is based on the notion that the three pillars of economic development are property rights protection, domestic competition and international competition.[20] Broadly, anti-competitive government policy affects the way the market functions through one of these three pillars.

The foundation of a productive economy is property rights protection. If property rights are left unprotected, the incentive to invest, compete and innovate is lost. If the returns from effort cannot be captured, can be taken away or cannot be regained if wrongly taken away, what incentive is there to exert effort? Furubotn and Pejovich[21] describe the nature of property rights in this way:

> "... property rights do not refer to relations between men and things but, rather, to the sanctioned behavioral relations among men that arise from the existence of things and pertain to their use... The prevailing system of property rights in the community, then, can be described as the set of economic and social relations defining the position of each individual with respect to the utilization of scarce resources."

17 Shikhar Singla, *Regulatory Costs and Market Power*, LawFin Working Paper No. 47 (23 February 2023): https://ssrn.com/abstract=4368609

18 Frederik Erixon, Oscar Guinea and Oscar du Roy, *If the EU was a State in the United States: Comparing Economic Growth between EU and US States*, ECIPE (July 2023): https://ecipe.org/publications/comparing-economic-growth-between-eu-and-us-states/

19 Growth Commission papers can be found at www.growth-commission.com

20 As proposed and argued in Shanker Singham, *A General Theory of Trade and Competition: Trade Liberalisation and Competitive Markets*, Cameron May (2007), and Shanker A. Singham and Alden F. Abbott, *Trade, Competition and Domestic Regulatory Policy* (Routledge, 2023); international competition is way of describing the openness of a country's trade regime.

21 Eirik G. Furubotn and Svetozar Pejovich, "Property Rights and Economic Theory: A Survey of the Recent Literature", *Journal of Economic Literature*, Vol. 10 No. 4 (December 1972): pp. 1137-1162

The authors add in a footnote that "Roman Law, Common Law, Marx and Engels, and current legal and economic studies basically agree on this definition of property rights." In other words, the very nature of an economic transaction is defined by the right to property and this definition is not disputed.

Property rights allow four things to occur:

1. investment to create the property (as in the case of intellectual property or IP and machinery);
2. investment to make the property more productive (as in the case of land, machinery and IP);
3. exploitation to get the maximum productivity out of it (as in the case of land, machinery, IP etc.); and
4. transfer of property to another who might be able to do a better job of the first three instead of the current owner of the property (as in the case of land, machinery and IP).

All these lead to increased productivity, higher incomes, and thus wealth and prosperity. So, a lack of property rights protection effectively undermines the ability of economic agents to operate effectively. It also undermines the process of competition, because property rights are what firms compete with. In developing countries in particular, establishing and enforcing property rights plays a significant role in creating the preconditions for growth[22][23]. Therefore, all other factors influencing economic outcomes depend on the level and quality of property rights protection. We account for the fact that the effect of domestic competition and international competition on other factors depends on the level of property rights in our model and will discuss how we capture this in the next section.

The Property Rights Protection indicator is constructed as follows: intellectual property rights are themselves a type of property rights and are a crucial aspect of economic development[24]. Including this measure as a part of a property rights protection indicator was obvious and necessary. The other six subcategories are each different ways in which policy can ensure that the effort of agents cannot be wrongfully expropriated, that when a person's rights are violated the process for righting that wrong is not prohibitively expensive[25], and that the

22 Timothy Besley, "Property Rights and Investment Incentives: Theory and Evidence from Ghana", *The Journal of Political Economy*, Vol. 103, Issue 5 (October 1995): pp. 903-937

23 A lack of property rights protection creates what De Soto calls" dead capital" – the poor cannot leverage the assets they do accumulate, which prevents entrepreneurialism. See Hernando De Soto, *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else* (Basic, 2000)

24 For a detailed treatment of the importance of intellectual property rights, see chapter 9 of Shanker Singham, *A General Theory of Trade and Competition: Trade Liberalisation and Competitive Markets*, Cameron May (2007)

25 Either financially or through time commitments

legal system itself has integrity. The subcategories of the Property Rights Protection indicator follow the Heritage Foundation Index of Economic Freedom's criteria for grading countries in terms of Property Rights Protection[26].

Domestic Competition

Domestic competition plays a significant role in the efficiency of both domestic and foreign firms. Competition among firms encourages innovation and upgrading of production processes, as well as positive externalities in local markets[27]. Each of these features of competition has a positive impact on welfare, which justifies its inclusion as part of this index.

Typically, the term "competition policy" refers to regulations – and the enforcement of regulations – concerning restraint on competition created by private parties. Our Domestic Competition indicator is, instead, meant to capture the extent to which government policy itself restricts competitive behaviour.[28]

Timothy Muris[29] highlights the importance of understanding and correcting restrictive government actions – not just private restrictions. He compares these two sources of competitive restrictions to the forks in a stream and states that "protecting competition by focusing solely on private restraints is like trying to stop the water flow... by blocking only one channel." Muris goes on to say that creating a system which prevents anti-competitive behaviour by firms but allows a government to dictate the same anti-competitive outcome that would have resulted from private action has not eliminated the problem; "it has simply dictated the form that the problem will take." Domestic competition here refers to the domestic policies affecting the way in which firms make decisions and interact with one another.

Any policy which limits profit-maximising firms' ability to make their own decisions will reduce the score for Domestic Competition for a country[30]. If a policy reduces the ability of some subset of firms to make their own decisions while not restricting others in the same way, then the Domestic Policy score will be reduced. However, this does not mean that a country with no regulations controlling the decisions of firms will receive the highest score. The goal of this index and the scores it generates is to allow comparisons between countries regarding the degree to which policy is welfare-maximising. If welfare is to be maximised, then some government regulation may be appropriate in many contexts. For example, if a market can be characterised as a natural monopoly, appropriately tailored government regulation may be crucial for welfare maximisation[31].

If there are true market failures that are not being handled adequately through purely private action (severe adverse health effects from pollution, a shortage of funds for post-secondary education, harmfully discriminatory practices etc.), then government regulation may be necessary[32]. These antitrust or industrial organisation types of regulations are part of the Domestic Competition score. No judgment is made as far as the exact specification of the regulation. Instead, the effectiveness of antitrust policy and the cost of adhering to different policies are the measures used.

The Domestic Competition score is higher when firms are able to make their own decisions because we are trying to evaluate how well domestic policies promote competitive behaviour. It is constructed as follows: competitive behaviour refers to the behaviour firms exhibit in a particular market which will maximise welfare within the market. Therefore, the Domestic Competition score is higher when policies respond to market failures and antitrust violations efficiently but otherwise do not interfere with or dictate firm behaviour. This is because the behaviour of profit-maximising firms – faced with demand from the market, the decisions of competitors, no market failures and no antitrust violations – will produce and charge a price which generates the welfare-maximising equilibrium. That is, once any market failures are corrected for, firms will behave in a way which maximises welfare.

Of course, in practice it is often very difficult or impossible to fully correct a market failure. However, some countries will do a better job than others in choosing and implementing policies that effectively respond to market failures. The closer a country is to actually eliminate a market failure, the closer it will be to moving a market toward its welfare-maximising equilibrium.[33]

26 That is, the Heritage Foundation describes why a country receives each level of score and this, in turn, provides a framework for the aspects of policy which we considered in building our indicator. See http://www.heritage.org/index/property-rights

27 Michael E. Porter, *The Competitive Advantage of Nations* (Free Press, 1990), as cited in Mariko Sakakibara and Michael E. Porter, "Competing at Home to Win Abroad: Evidence from Japanese Industry", *The Review of Economics and Statistics*, (May 2001), 83(2): 310-322. Positive externalities include, "... supplier availability, easier access to technology and market information, and specialized human resource development" (Sakakibara, et al. p. 310).

28 As part of our Domestic Competition indicator we include an indicator of the success of policy in limiting the ability of private entities to restrict competition through the" Effectiveness of Anti-Monopoly Policy" variable in the "Industrial Organisation Regulation" subcategory.

29 Timothy J. Muris, "Principles for a Successful Competition Agency", *University of Chicago Law Review*, Vol. 72, No. 1 (Winter 2005): pp. 165-187, George Mason Law & Economics Research Paper No. 06-24: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=901677

30 Similarly, the Washington Consensus includes privatisation as one of the ten key areas of development because of the belief that that "private industry is managed more e□ciently than state enterprises, because of the more direct incentives faced by a manager who either has a direct personal stake in the profits of an enterprise or else is accountable to those who do. At the very least, the threat of bankruptcy places a floor under the ine□ciency of private enterprises, whereas many state enterprises seem to have unlimited access to subsidies." This theory is the backbone of our Domestic Competition indicator. However, regulation of private markets is not discussed in the Washington Consensus. We correct this oversight by emphasising the importance of policies which allow firms to make their own decisions. Originally conceived in: John Williamson, "What Washington Means by Policy Reform", Chapter 2 from *Latin American Adjustment: How Much Has Happened?*, (April 1990) now available at http://iie.com/publications/papers/paper.cfm?ResearchID=486 See also: http://www.economicshelp.org/blog/7387/economics/washington-consensus-definition-and-criticism/ and http://www.piie.com/publications/chapters_preview/6628/02iie6628.pdf

31 When changing market characteristics, such as new technologies, eliminate natural monopoly conditions, however, maintaining government regulation may become counterproductive and welfare-inimical, and such regulation should be lifted.

32 Before the government acts, care should be taken to ensure that the private sector cannot adequately rectify the market failure at issue, and that the costs associated with government intervention are not likely to outweigh the benefits that flow from eliminating (or reducing) the market failure.

33 The welfare-maximising number and size of firms will depend on the market (type of good, substitutes, demand etc.)

The Domestic Competition indicator is defined by infrastructure[34] and the policies concerning how firms make decisions. Infrastructure and the efficiency with which it is built have serious implications for the competitiveness of a country. Reliable, well-maintained infrastructure is a crucial component of efficient markets. Here, infrastructure reflects each type of infrastructure in an economy.

Labour regulations are defined by how free firms are to hire and fire employees, as well as how firms are then allowed to utilise those workers. Restrictions on the hiring and firing process or deployment of labour decisions will reduce the score for Domestic Competition. The less flexible policy makes the labour force, the higher the cost of production will be, because firms will have to work around or suffer the restriction of each policy.

Regulatory promulgation process refers to how laws are created. If the government is allowed to make decisions based on favouritism and the process is not transparent, ACMDs can be created at will. There will be no need to disguise them as market failures, or if they are disguised, they will be very difficult to recognise.

Industrial organisation policies refer to the regulations to which firms must adhere in order to participate in a market and how antitrust deals with anti-competitive behaviour when it arises. All of these areas impact a firm's ability to make their own profit-maximising decisions.

International Competition

International Competition refers to the degree to which a country allows foreign firms to access its domestic market and the degree to which it allows domestic firms to access foreign markets. Any restriction on the free flow of trade which is not the correction to a market failure will reduce the score for International Competition. Greater access to a wider variety of goods benefits consumers and greater access to less expensive or higher quality inputs benefits firms. Also, exposing firms to potentially more efficient foreign firms promotes innovation. All of these forces combine to generate gains in welfare[35].

International Competition refers to how open a country is to interact with foreign markets (a measure of the openness of its trade policy). The policies which reduce the score here are those that make it more costly or burdensome to transact internationally.

34 The ideal infrastructure measures would be those that reflect the policy for awarding contracts for infrastructure projects (specifically, for building, managing or maintaining infrastructure). However, the primary data available is concerned with outcomes, with only a couple of exceptions in financial infrastructure.

35 For a description of the theory see: Claustre Bajona, Mark J. Gibson, Timothy J. Kehoe and Kim J. Ruhl, *Trade Liberalization, Growth, and Productivity*, prepared for the conference "New Directions in International Trade Theory" at the University of Nottingham in 2008: http://www.econ.umn.edu/~tkehoe/papers/BajonaGibsonKehoeRuhl.pdf
Note: These authors also highlight the fact that trade openness does not always lead to increased GDP and that the theory does not predict an increase in GDP from openness. The theory does predict greater welfare from openness, though. We will use GDP per capita as our proxy for welfare because we do not have a direct measure of welfare. There are many sources which do find a positive relationship between openness and GDP. A few examples include (as cited in Bajona et al. (2010)): J. A. Frankel and D. Romer, "Does Trade Cause Growth?", *American Economic Review*, 89 (1999):pp. 379-399; R. Hall and C. Jones, "Why do some countries produce so much more output per worker than others?", *Quarterly Journal of Economics* 114 (1999): pp. 83-116; Francisco Alcalá and Antonio Ciccone, "Trade and Productivity", *Quarterly Journal of Economics*, 119 (2004): pp. 613-46

The indicator is constructed as follows: tariffs and procedural burden directly affect the flow of goods; financial restrictions affect the flow of capital. The freedom of foreigners to visit is a measure reflecting the general openness of the economy to outsiders visiting. A policy which restricts visitation by foreigners would make it more difficult for foreign firms to have a presence in an economy.

If any of these categories is restrictive, it will be more difficult for trade to occur. The Washington Consensus[36] also noted the importance of eliminating distortionary trade policies applied differently in different areas.[37] Import liberalisation is seen as particularly important because it eliminates the export disadvantage created by restricted access to less expensive imported intermediate goods. This type of ACMD is exactly what we are trying to capture with our International Competition index.

Combined Effects

An important point to be made is that if one of these three areas is improved while the other two are left in a poor condition, the impact on productivity will be reduced or reversed. For example, if Domestic Competition is improved by making it faster and less costly for domestic firms to start a business but property rights are left unprotected and international competition is prevented, the impact on productivity will likely be zero because firms will still be uncertain about entering the market (because their property can be expropriated, for example) and will not need to compete as fiercely as they would in the face of foreign competition.

Each of the three categories has an impact on how an improvement in the other categories will be realised in terms of productivity. As stated previously, without property rights protection, agents cannot act in their own economic interests. This means that without property rights protection, improvements in the other two categories will have no effect on the determinants of productivity.

Domestic competition determines the structure of a domestic market which determines the equilibrium of each domestic market. If firms are not allowed to decide how they will behave. then imported foreign goods will enter an inefficient market and face inefficient constraints on their position in that market. It is possible that distorted domestic competition may help or hurt foreign firms. Similarly, international competition policies can prevent foreign firms from entering the domestic market or may prevent domestic firms from reaching foreign markets. In either case, the total effect in the long run will be a reduction of welfare[38]. Also, improving each of these three areas simultaneously will have a combined effect. If a country can correct the ACMDs in every area, it can move towards its optimal welfare level. Leaving ACMDs uncorrected in any area will negatively affect the benefits from correcting other ACMDs.

36 Williamson (1990) op. cit.

37 Though, again, no emphasis was given to the competitive environment within a country except for the stress on privatisation.

38 See Singham, Bradley and Rangan (2014) op. cit.

In the case of CBAM, there is clearly a potential feedback loop between the IC and DC pillars which have not been included in our estimates. For example, tariff barriers promote anti-competitive supply chains which increase the risk of monopoly and market power in a vicious cycle, with knock-on effects throughout the economy.

UK Economy and the EU CBAM

It is difficult to predict exactly how the CBAM will be applied, were the UK to adopt it. We have proposed two approaches that are based on current UK supply chains, and UK supply chains if they were able to use the changing trade and regulatory environment to shift to the most economically viable and cost-effective supply chains.

The first approach assumes that supply chains will orient to the most cost-effective and cheapest, and therefore assumes a UK trade and regulatory policy that delivers the context for such supply chain decisions. The second approach assume that historic supply chains, admittedly formed against the backdrop of UK membership of the EU, remain in place. The second approach is more aligned with the calculations which the UK Treasury has made with regard to potential adoption of an EU-style CBAM. The second approach also assumes that the CBAM will always be restricted to products that form the current supply chain. As noted, that supply chain developed while the UK was part of the EU so it is likely that many of the products which came into the UK tariff-free and without process would change origin in the event of having process (and potentially having CBAM tariffs).

Assuming Current Supply Chains Remain in Place[39]

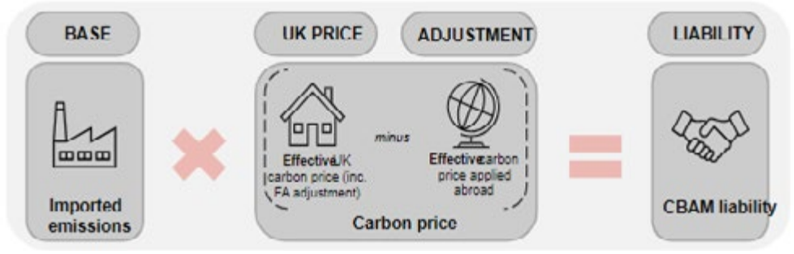
The UK CBAM is a targeted tariff which will apply to the following emission-intensive industrial goods imported to the UK:

- Aluminium
- Ceramics
- Cement
- Fertiliser
- Glass
- Hydrogen
- Iron and steel

To prevent leakage, the UK government will apply a liability through the CBAM on a country-by-country basis. This liability will depend on the carbon dioxide (CO_2) emissions intensity of the imported good, and the difference between the carbon price applied from the country of origin (if any) and the price if the good had been produced in the UK (see Figure 1).

39 This work was conducted by economics consultancy Cebr using the ACMD Model but applying it to current trade flows.

FIGURE 1:
The CBAM approach



Source: Department for Energy Security and Net Zero[40]

We aim to assess the impact of a UK CBAM on overall import tariffs, with the ultimate goal of estimating the scheme's potential effect on domestic GDP per capita. We will begin by outlining the data sources and their relevance, followed by a detailed explanation of the applied methodology and a discussion of the findings.

To create our modelling, we collected country-level data on the carbon emission intensity of exports for each specified industrial good, current carbon pricing and the proportion of UK imports by country to create a weighted average tariff for each good.

Data on Carbon Emissions Intensity

The data on carbon emission intensity was collected using the World Bank's methodology based on a dataset developed by Chepeliev and Corong (2022) and Chepeliev et al. (2022) which provides greenhouse gas emission intensity (measured by kilograms of CO_2 per U.S. dollar) embodied in exports by sector and by scope.[41] We use the emission intensity from both Scope 1 (direct emissions from production) and Scope 2 (indirect emissions produced from electricity generation) for cement and fertiliser and the emission intensity from Scope 1 for iron and steel and aluminium.

We are assuming that the UK CBAM would operate similarly to the EU CBAM legislation, whereby the CBAM covers both scopes from the outset for cement and fertilisers, but initially only direct emissions (Scope 1) for iron and steel and aluminium.

It should be noted that data is unavailable for ceramics, glass and hydrogen. In the cases of ceramics and glass, we have utilised the average carbon emission intensity of the available industrial goods. For hydrogen, we have employed the emission intensity data of electricity as a proxy, given their shared characteristic as energy carriers.

40 From DESNZ UK Carbon Border Adjustment Mechanism factsheet at https://www.gov.uk/government/consultations/addressing-carbon-leakage-risk-to-support-decarbonisation/outcome/factsheet-uk-carbon-border-adjustment-mechanism

41 See World Bank Group Technical Note for the CBAM exposure index at https://www.worldbank.org/en/topic/trade/brief/technical-note-for-the-cbam-exposure-index

The dataset aggregates sectors, which can lead to discrepancies in emission intensities due to variations in commodity composition. For sectors such as aluminium and cement, this issue has been addressed by separating the CBAM-specific products.

Data on Carbon Pricing Data

Measured in euros per tonne of CO_2 emitted, the carbon pricing data originates from a report published by PwC in 2023.[42] The report contains estimates of average carbon prices from across major trading partners, including the EU, China and the U.S. These estimates were based off the responses from over 180 members of the International Emissions Trading Association. As this data was denominated in euros, we converted these prices to current US$ prices (as of 19/08/24). Where there was no data available, we have assumed that there is no carbon pricing in place.

UK Import Data

To calculate the percentage of UK imports for each industrial good by country, we first gathered the commodity codes within scope of the UK CBAM from Annex A (page 57) of the UK government's consultation paper.[43] [44]

We then entered the associated product codes onto Trade Map to gather the monetary amount imported from each of the UK's partner countries in 2023. Where necessary, product codes under the same industrial good were aggregated before calculating the percentage.

To overcome the data limitations on cement imports (HS2523), where HMRC had suppressed country-specific import details (accounting for nearly 90% of the total), we utilised mirror data.

This approach involved examining the export data from other countries to the UK, enabling us to trace approximately 94% of the 4.6 million tonnes imported in 2023. By using this method, we were able to estimate the value-based distribution of UK cement imports by country with a higher degree of accuracy.

Application of ACMD Model

In addition to the data related to CBAM, we utilised the ACMD Model as described above to assess the impact of the scheme on GDP per capita. Within the model, the component subject to influence was the International Competition Index. The weightings of the index are as follows:

42 Details available at https://www.pwc.co.uk/services/sustainability-climate-change/insights/ieta-market-sentiment-survey.html

43 HM Treasury's *Introduction of a UK carbon border adjustment mechanism from January 2027 (Consultation)* is available at https://assets.publishing.service.gov.uk/media/65fc11fef1d3a0001132ac6f/Introduction_of_a_UK_carbon_border_adjustment_mechanism_from_January_2027.docx.pdf

44 It is worth noting that HS6810 (which includes articles of cement such as building blocks and bricks) is not included in the commodities within scope, while HS2523 is included (Portland, aluminous, slag, super sulphate and similar hydraulic cements)

SUB COMPONENT	SOURCE	WEIGHTS
LPI timeliness indicator	Logistics Performance Index	11%
LPI international shipment indicator	Logistics Performance Index	36%
LPI customs indicator	Logistics Performance Index	10%
Trade Freedom score	Index of Economic Freedom	29%
Freedom of foreigners to visit	Human Freedom Index	8%
Freedom to own foreign currency	Human Freedom Index	4%
Capital controls	Human Freedom Index	1%

The sub-component of interest here is the Trade Freedom score, a composite measure of the extent of tariff and non-tariff barriers that affect imports and exports of goods and services. The Trade Freedom score is based on two inputs, the trade-weighted average tariff rate and a qualitative evaluation of non-tariff barriers (NTBs).

Trade-Weighted Tariff Calculation

The weighted average tariffs are based on the formula from Figure 1.

With the data collected, we calculate the difference in carbon pricing between each exporting country and the UK and multiply this difference by the carbon emission intensity of the good exported from said country.

Within the carbon pricing, we created two scenarios.

The first scenario holds the UK carbon price at the average carbon price of **$87.43/kg$CO_2$e**, which is below the EU ETS of $93.14/kg$CO_2$e. This scenario is based on PwC's estimates for current UK pricing.

The second scenario assumes that all markets raise their carbon pricing, but the UK raises its carbon pricing proportionally higher than other markets, in the case that the UK reduces it free allowances more aggressively.

This second scenario uses the estimated market carbon values between 2026 and 2030 by the Department of Energy Security and Net Zero as proxy.[45] In Scenario 2, the UK carbon price is **of $119.73/kg$CO_2$e**, above the EU estimate of $110.36/kg$CO_2$e.

The formula from Figure 1 therefore produced the percentage tariff required to maintain carbon pricing parity between the UK and the exporting country for each good, for both scenarios. This percentage was divided by 1,000 to account for the difference in measurement between emission intensity data and carbon pricing.

45 DESNZ's *Traded carbon values used for modelling purposes (*2023) available at https://www.gov.uk/government/publications/traded-carbon-values-used-for-modelling-purposes-2023/traded-carbon-values-used-for-modelling-purposes-2023

These percentages were then weighted by the percentage of UK imports of the associated good originating from the exporting country.

Those countries with an increase in tariff were then aggregated (those which saw a decrease were discounted as it would instead be the case that the rise in tariff would be 0).

By including the trade weights, the effects of the CBAM depend significantly on the imported good. For example, the top five importers of cement to the UK are:

- Ireland
- Spain
- Portugal
- Germany
- Greece

These countries supplied 4.1 million tonnes to the UK in 2023, representing almost 90% of the total 4.6 million tonnes of cement (HS2523) imported. These countries are covered in the EU ETS and under the first scenario would not be levied any additional tariffs due to CBAM.

Meanwhile, the top five importers of ceramics to the UK are:

- China
- Spain
- Italy
- India
- Turkey

Here, three of the five importers come from outside the EU. Furthermore, China alone is responsible for 19% of UK ceramics imports. In this case, the CBAM will have a relatively stronger impact on imports, raising the ceramic tariff on China by 21 percentage points to 25.67%.

The industrial goods covered by CBAM make up approximately 4% of UK imports, similar to the finding in the UK government's consultation paper[46]. The weighted tariff of each good was then multiplied by its share of total UK imports to produce the total increase on UK import tariffs for both scenarios. The results were as follows:

46 HM Treasury's *Introduction of a UK carbon border adjustment mechanism from January 2027 (Consultation)* op. cit.

TRADE-WEIGHTED TARIFF	SCENARIO 1	SCENARIO 2
Aluminium	0.49%	0.71%
Cement	1.11%	7.10%
Fertiliser	2.81%	4.08%
Iron and steel	1.63%	2.30%
Ceramics	8.72%	12.47%
Glass	7.67%	11.00%
Hydrogen	0.62%	3.01%
Overall increase in UK import tariffs	0.095%	0.140%

As the tariffs were trade-weighted and only those countries with lower carbon pricing would be affected, the results are heavily influenced by China. Indeed, across both ceramics and glass, half of the increase in trade-weighted tariffs are driven by the rise in Chinese tariffs.

IC Pillar Score

With the percentage increase in import tariffs, we were able to input this into the Trade Freedom score. The equation is as follows:

$$TradeFreedom_i = \frac{100(Tariff_{max} - Tariff_i)}{Tariff_{max} - Tariff_{min}} - NTB_i$$

Where $Tariff_{max}$ is the maximum tariff applied to a partner country; $Tariff_{min}$ is the minimum applied; NTB_i is the qualitative assessment of non-trade barriers faced by country i.

Alongside the increase in tariff, we also estimate a rise in non-trade barriers associated with the implementation of a UK CBAM. According to the Trade Freedom score's methodology, non-tariff measures calculated by the WTO are also considered. Such measures include administration costs, as well as domestic charges incurred by purchasing imports which have an additional tariff levied. Both of these measures can be justified when considering the CBAM. As such, within Scenario 1 we have included a relatively smaller rise in the NTB, to about half of the increase in NTB for the UK between 2016 and 2021. For Scenario 2, we have added the full increase over that period.

With both the tariffs and NTBs determined, we obtained results for the new International Competition (IC) score for the UK across both scenarios. **The resulting decrease in the Trade Freedom score in Scenario 1 is 0.14 and 0.28 in Scenario 2.**

	Increase in overall tariff (percentage points)	NTB pre-CBAM	NTB post-CBAM	TF score pre-CBAM	TF score Index post-CBAM (1-7)
Scenario 1	0.095	9.1	11.3	6.2	6.0
Scenario 2	0.140	9.1	13.5	6.2	5.9

Within the ACMD model, the equation relating the International Competition Index and GDP per capita is follows:

$$ln\,(GDPpercapita)_{it} = \beta_0 + \beta_1 InternationalCompetition_{it} + \boldsymbol{X}'_{it}\boldsymbol{\gamma} + v_t + \lambda_i + \epsilon_{it}$$

Where a one-unit reduction in International Competition is associated with a 0.0758% decrease in GDP per capita.

Using this equation, we found the following results for the two scenarios:

	Effect on UK GDP per capita	Loss of GDP per capita (In nominal 2023 prices)
Scenario 1	-0.32%	£124.12
Scenario 2	-0.62%	£243.05

These results align with the conclusions of the aforementioned UK government consultation paper (p.43).[47] But this does not include other impacts that can be discovered from the ACMD Model.

Impact of DC Pillar Score

The Domestic Competition Index is made up of the following subcomponents:

Sub index	Source	Weights
Labour freedom score Minimum wage Associational right Paid annual leave Notice period for redundancy dismissal Severance pay for redundancy dismissal Labour productivity Labour force participation rate Restrictions on overtime work Redundancy dismissal permitted by law	Index of Economic Freedom	25.0%
Business freedom score Access to electricity Business environment risk Regulatory quality Women's economic inclusion	Index of Economic Freedom	25.0%
Financial freedom score The extent of government regulation of financial services The degree of state intervention in banks and other financial firms through direct and indirect ownership Government influence on the allocation of credit The extent of financial and capital market development Openness to foreign competition	Index of Economic Freedom	6.3%
Electricity cost	WB Doing Business	3.1%
Electricity time	WB Doing Business	3.1%
Quality of roads 1-7	Global Competitiveness Index	3.1%
Quality of ports 1-5	Logistics Performance Index	3.1%
Mobile telephone subscription	Global Competitiveness Index	3.1%
Individuals using internet %	Global Competitiveness Index	3.1%
Government Integrity Score Perceptions of corruption Bribery risk Control of corruption	Index of Economic Freedom	25.0%

One potential channel through which CBAM could impact the Domestic Competition Index is through electricity prices (as highlighted above). The introduction of the CBAM could lead to increased costs in electricity generation through several indirect channels. For example, if the prices of imported steel, aluminium and cement rise due to the CBAM, the cost of building and maintaining power plants — especially those that require substantial amounts of these materials — could increase.

Additionally, as hydrogen becomes more integrated into the energy mix, particularly for electricity generation, any rise in the price of imported hydrogen could translate into higher operational costs for power plants that rely on this fuel. These factors could cumulatively contribute to an increase in the overall cost of electricity generation in the UK, particularly if infrastructure upgrades are needed to meet the country's decarbonisation goals.

However, the extent of these cost increases is expected to be limited. The primary inputs for electricity generation, such as natural gas, nuclear fuel and renewables, are not directly affected by the CBAM, meaning the core fuel costs will remain largely unaffected. Moreover, any increase in capital expenditure due to higher material costs would be spread over the long lifespan of power plant infrastructure, diluting the impact on annual electricity generation costs. Therefore, while there may be some upward pressure on electricity generation costs due to the CBAM, the overall impact is expected to be modest. That said, it is likely that demand for energy as a result of AI, distributed ledger technology and the need to back up renewables with baseload will increase dramatically. Anything that raises the cost of electricity will therefore have a disproportionate impact.

To model the potential effects, we extend the analysis to two scenarios that reflect possible increases in electricity costs: a 2.9% rise in the first scenario and a 5.1% increase in the second. These figures represent a simple average of the tariff increases across the affected product categories calculated in the earlier section (Table on page 19). Accordingly, we assume

47 ibid.

that the Electricity Cost subcomponent of the Domestic Competition (DC) Index decreases in proportion to these price increases.

The ACMD Model suggests that a unit increase in the DC Index of the UK is associated with a 13.3% rise in GDP per capita. Based on this relationship, the projected impacts on GDP per capita from the changes in electricity costs under the two scenarios are as follows: Scenario 1, with a 2.9% increase in electricity prices, would result in a 0.006-point reduction in the DC Index and a corresponding 0.08% decrease in GDP per capita. Scenario 2, with a 5.1% increase in electricity prices, would lead to a 0.010-point drop in the DCI, translating to a 0.13% decline in GDP per capita.

The results for the two scenarios are given in the following table:

	SCENARIO 1	SCENARIO 2
Change in price of electricity	+2.9%	+5.1%
Change in DC index	-0.006	-0.011
Change in GDP per capita	-0.08%	-0.15%

The overall impact on GDP per capita resulting from the CBAM through the international and domestic competition channels will be approximately £301.24 (-0.77%) in Scenario 2. In Scenario 1, the impact of the CBAM will be a loss of £156.98 per person (-0.40%).

Impact if Supply Chain Re-Orientation is Considered

It should be noted that the above calculation is based on an assumption that supply chains stay the same. Clearly that will not be the case if the CBAM does not apply and locks in supply chains to their current EU model. Because the UK was in the EU with no tariffs or customs process inside the bloc, but tariffs and process for imports from outside the bloc, supply chains would have been drawn into the EU bloc while the UK maintained membership. The advantage of the UK being outside the EU is that supply chains can now reorient to the lowest cost and most efficient supply.

While supply chains take time to reorient, the ACMD model is a state-to-state model so we can compare the differences between a hypothetically different supply chain which takes advantage of the cheapest possible producers. This also takes into account the impact of the UK's independent trade policy where it is negotiating trade deals with a number of countries lowering tariffs for these products with them. Where these producers are from developing countries where carbon intensity of production is high, and there is no carbon pricing mechanism, the CBAM will prevent these benefits from being realised. Therefore, this second model considers what those benefits might be to the UK economy.

We therefore make the following critical assumptions: the countries to which supply chains will reorient are those cheaper suppliers from developing countries where no carbon pricing mechanism applies, and therefore the tariff applied under CBAM will be at the top end of the range. We have preserved a broad modelling approach on the basis that it is not possible to know precisely how these supply chains might reorient and which supplier countries might over time supplant the present high-cost suppliers, in the absence of CBAM We include elsewhere in this paper information about the differential costs of suppliers of CBAM in scope products and it can readily be seen that the differences between EU and non-EU suppliers is significant.

It is also to be noted that there will likely be significant potential other trade impacts of the CBAM with respect to those developing countries with which the UK is presently in trade negotiations (or has separate trade agreements) as tariff benefits given might be undercut by CBAM and because attempts to secure services liberalisation might be thwarted if defensive market access issues are made more difficult to resolve because of the presence and application of the CBAM. This could have a significant effect on UK services opportunities going forward (which is a substantial part of the overall UK economy). We take this into consideration when determining the attenuation factor (see below).

CBAM would impose an across-the-board tariff on six sectors (initially). Under the ACMD Model, tariff barriers constitute a weighted percentage of the overall International Competition pillar score. The tariff variables of the International Competition pillar is 29%. We will therefore assume that GDP per capita movements attributable to tariffs are 29% of the total change in pillar score.

Given that 10% of the UK economy is manufacturing, but that services will be affected as discussed above, we propose an attenuation factor of 30%. We think this figure is quite conservative given the potential for both knock-on effects and expansion of the CBAM in the future to other sectors as the European Commission is currently contemplating. We noted that it is on record that the EU intends all products covered by the ETS to be in scope for CBAM, and if the UK were to mirror the EU CBAM all of the UK ETS products would similarly be in scope.

We have also lowered the DC pillar score to reflect concerns about lack of competition resulting from enhanced market power if potential competitors are removed from the UK market. Although the PR pillar score could also be implicated, we have assumed that it is not for the purpose of this calculation. Thus, there is a risk that our evaluation underestimates the overall cost of the policy to the UK's GDP per capita. Since we do not know the exact tariff proposed, we have modelled a range of potential tariffs.

We have assumed a range where the tariff proposed is 10 and 25 percentage point levels, according to the following table. The reduction in IC scores is an assumption we have made based on a comparison of relatively open and relatively closed economies and their different scores in the IC pillar. For example, the highest scoring country during the 2010-2019 time period was Hong Kong at 6 and the lowest was Cameroon with 3. We have assumed that

the imposition of a 10% tariff is about half of this difference, whereas the imposition of a 25% tariff is close to this difference. The DC decline is much more limited, although we have increased it to take account of the risk that the CBAM will harden incumbent market power advantage.

Tariff Proposed	IC Score Change	DC Score Change	PR Score Change
10	-1.5	-0.5	0
25	-2.5	-1.0	0

We expect that as the tariff goes up, there will be a roughly exponential increase in the negative impact on IC scores. The DC score will only be affected significantly when the tariff proposed is sufficiently high to impact supply chains, leading to possible areas where enhanced market power or even monopoly power might be conferred. We see changes in DC pillar scores in the business freedom and electricity cost/time sub pillars amounting to 31.1%.

We know that a one-point reduction in IC scores equates of between 0% and 7.6% GDP per capita reduction, and a one-point reduction in DC scores equates to roughly between 11.1% and 13.3% reduction in GDP per capita scores for the UK. We have also applied the 29% weighting referred to above for the IC pillar.

Tariff Proposed	Negative GDP per capita impact/IC	Negative GDP per capita impact/DC	Total GDP per capita impact/state to state	Approximate cost per UK person (before attenuation)
10	1.653	0.462	2.115	£700
25	2.755	3.794	6.549	£2,177

This is on the basis that all of the UK economy is affected by CBAM. We now apply an attenuation factor to reflect what we believe to be the actual scale of the UK economy affected. As noted, the attenuation factor is 30%. **This means a cost of £210 - £653** depending on the level of the tariff per UK person per year. This attenuation factor recognises the significant second order effects because the immediate CBAM products affected are critical inputs for a number of other sectors. We have also taken into consideration the potential impact of many more products which are in the EU CBAM pipeline (42 products – ultimately everything to which the ETS may apply) which the UK will have to follow if it is following CBAM.

Summary of Both Scenarios

There is a significant cost to the UK citizen in either of these scenarios but the impact of CBAM in terms of locking in current supply chains that are heavily based on G7 (and predominantly EU) suppliers is perhaps the greatest impact. It will prevent the UK's supply chains from resetting to find the lowest cost suppliers. We have not considered the potential anti-competitive harm caused by suppliers raising prices, because they know UK consumers are now limited in their choices. The second scenario picks up some of these effects.

Unsurprisingly, the impact of the calculation assuming supply chains will reorient is larger (by a factor of between 2 and 3) than the calculation based on supply chains remaining as they are.

Sector Specific Outcomes[48]

We now turn to some sector specific effects based on the direct effects of CBAM on key sectors. There are significant potential costs increases in all these sectors as illustrated below. This is another way of looking at where the potential costs could apply across the supply chain and thus supports the approximations in the application of the ACMD model to a scenario where supply chains reorient.

EXAMPLE 1

Steel

The average UK ETS auction price in July 2024 was £41.78 per tonne of CO_2 equivalent and steel production emits 2.32 tonnes of CO_2e per tonne of steel produced using Basic Oxygen Furnace (BOF)[49], therefore the CBAM applied to a tonne of imported steel would be £96.93 less any ETS paid in the country of production. If the steel was produced from recycled steel using an Electric Arc Furnace (Scrap-EAF) then the CO_2e emissions per tonne would fall to 0.67 tonnes of CO_2e per tonne of steel.

In 2023, the UK imported 905,374 tonnes of HS7210 Flat-rolled products of iron or non-alloy steel > 600mm. The UK's largest import supplier was Vietnam, supplying 155,505 tonnes with an average price of £751 per tonne[50]. Vietnam does not yet have an ETS but plans to pilot a carbon trading exchange from 2025. If this steel was new steel made by BOF, then the UK's proposed CBAM would add 13% to the price, if it was recycled scrap EAF steel, the CBAM would add 4% to the price.

In 2023, steel imported from Turkey in HS7213 Bars and Rods of iron or non-alloy steel had an average landed price of £594 per tonne[51] and steel imported from Turkey in HS7216 Angles, shapes and sections of iron and non-alloy steel, had an average import price of £766 per tonne[52]. Both HS codes are covered by the UK's proposed CBAM. As Turkey has yet to implement its proposed Emissions Trading Scheme, the UK CBAM would add 16% and 13% to the average import price if the steel is made by BOF. If these imported steel products were made with scrap EAF, then the UK CBAM cost would be £27.99 per tonne, respectively 5% and 4% of the average import prices per tonne.

48 Sector Specific Outcomes have been developed by Catherine McBride

49 *Sustainability performance of the steel industry 2003-2021*, World Steel Association (December 2022): https://worldsteel.org/wp-content/uploads/Sustainability-Indicators-2022-report.pdf

50 Trade Map - List of supplying markets for a product imported by United Kingdom

51 Trade Map - List of supplying markets for a product imported by United Kingdom

52 Trade Map - List of supplying markets for a product imported by United Kingdom

EXAMPLE 2

Cement

Similarly, cement production emits 0.86 tonnes of CO_2e per tonne of cement[53]. At the UK average July 2024 ETS auction price of £41.78 per tonne of CO_2e, the CBAM charge on imported cement would be £35.93 per tonne less any ETS paid in the country of production. Algerian cement clinkers (HS252310) can be imported for an average cost of £65 per tonne[54] but adding the full CBAM would increase the price by 55%. Egyptian cement (HS252390) was imported in 2023 with an average price of £68 per tonne[55], the CBAM would add 53% to the price.

EXAMPLE 3

Glass

Glass emissions are 0.57 tonnes of CO_2e per tonne[56] and so the UK CBAM would be £23.81 per tonne. This would add 8% to the average imported cost of HS7005 float glass from Malaysia at £311 or 7% to imported float glass from Turkey at £355[57].

EXAMPLE 4

Ceramic products – Bricks, roofing and floor tiles

Brick production emits 0.48 tonnes of CO_2e per tonne of bricks[58] and the CBAM would add £20.05 per tonne to imported bricks, about 7% to the average price of bricks (HS6901) imported from Turkey at £293 per tonne or 7% to the imported price of bricks from India at £307 per tonne.[59]

Ceramic roof tiles (HS6905) produce 2.2 tonnes of CO_2e per tonne. The CBAM cost would add £96.93 per tonne to imported roof tiles. For tiles imported from Sri Lanka for £414 per tonne, the CBAM would have added 22.2% to the import price.[60]

53 MPA Fact Sheet 18 https://cement.mineralproducts.org/MPACement/media/Cement/Publications/Fact-Sheets/FS_18_Embodied_CO2e.pdf

54 Trade Map - List of supplying markets for a product imported by United Kingdom

55 Trade Map - List of supplying markets for a product imported by United Kingdom

56 Andreas Schmitz, Jacek Kamiński, Bianca Maria Scalet and Antonio Soria, "Energy consumption and CO_2 emissions of the European glass industry", *Energy Policy* Volume 39, Issue 1 (January 2011): pp 142-155, https://www.sciencedirect.com/science/article/abs/pii/S0301421510007081

57 Trade Map - List of supplying markets for a product imported by United Kingdom

58 Blaine Brownell, How Can We Reduce the Carbon Footprint of Bricks?, *Architect Magazine* (17 August 2023): https://www.architectmagazine.com/design/how-can-we-reduce-the-carbon-footprint-of-bricks_o

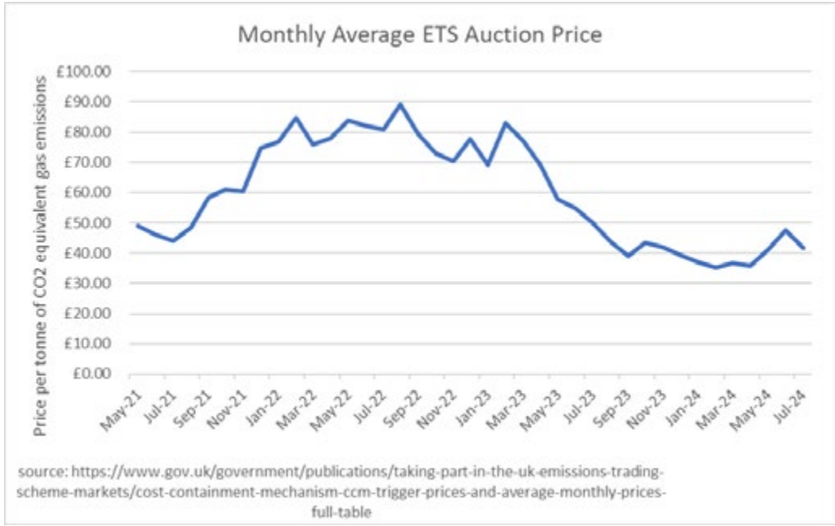
59 Trade Map - List of supplying markets for a product imported by United Kingdom

60 Trade Map - List of supplying markets for a product imported by United Kingdom

Ceramic flags, paving, hearth or wall tiles (HS6907) were imported from India for an average price of £266 per tonne[61]. Production of ceramic floor tiles produces 14.4 kg of CO_2 per square metre.[62] Every millimetre thickness of a ceramic tile weighs 1.75kg per square metre. Using an average thickness of 9mm, ceramic floor tiles would weigh 15.75kg per square metre and produce 0.9143 tonnes of CO_2e per tonne. This would add a CBAM of 14% to imported floor tiles from India.

Steel, glass, bricks and cement are the basic building blocks of houses and multi-storey buildings whether for residential or commercial use. It is unlikely that the proposed CBAM would be less than 1% on imports for the building industry. And these prices do not include the additional administration cost of recording the import supplier of all imported materials.

Additionally, the present average monthly ETS auction price of £41.78 is at close to its lowest level since inception. Using the highest monthly average auction price, £89.05, reached in August 2022, the CBAM costs would have been £206.60 per tonne of BOF steel and £59.66 per tonne of ARF steel, £76.58 per tonne for cement, £50.76 per tonne for glass and £48.74 per tonne for bricks. The volatility of the UK's ETS auction price can be seen in the graph below. This will add another problem for building material importers, as products imported when the ETS price was high could be undercut by goods imported by other companies when the ETS was lower.



source: https://www.gov.uk/government/publications/taking-part-in-the-uk-emissions-trading-scheme-markets/cost-containment-mechanism-ccm-trigger-prices-and-average-monthly-prices-full-table

Importantly, these costs are just the tax imposed on imports; the administrative costs to the importers would also be passed on to customers as well. Importers may try to escape the CBAM by exclusively importing goods from EU countries, but EU countries tend to be more

61 Trade Map - List of supplying markets for a product imported by United Kingdom

62 Ibtisam Abbasi, "Thorough Lifecycle Analysis of Ceramic Tiles", AZO Materials (14 March 2023): https://www.azom.com/article.aspx?ArticleID=22544

expensive producers, so any saving on CBAM would be paid in higher priced goods.[63] And either way, importers will still have to keep accurate records on import suppliers and manufacturers for six years in order to prove to the Treasury that the goods had indeed already paid for their carbon emissions in the country of origin.

Some importers might do this just to simplify their record keeping as the UK is proposing to apply a CBAM on both complex goods and on the precursor, goods used to make them.

How would these additional costs affect the construction industry?

The CBAM cost on the average new build UK free-standing, 3-bedroom house of 1,500 sq ft, if that house were made entirely of materials imported from countries without an ETS and assuming the UK has stopped free allowances and subsidies for domestic producers, would be at least £3,572 on the basic building material costs[64] without considering any appliances or heating equipment, floor coverings other than bathroom tiles, wall and floor insulation or plasterboard. And this would be a minimum cost as the government has also proposed adding an additional Carbon Price Support (CPS) tax on electricity used to produce the imported raw materials. The UK's CPS is presently £18 per tonne of CO_2 equivalent (CO_2e).

Obviously, there are many other dimensions and materials that could be used to build houses. But all of the materials used in this example will be subject to the proposed CBAM if they are produced in countries without an ETS or if their ETS has a lower carbon price than the UK. In the example above, the additional CBAM cost of £3,572 would add at least 1.16% to the average UK family home price of £307,000.

There will be a similar food cost increase as a result of CBAM being applied to fertiliser and second-order costs added to imported foods grown using fertilisers, diesel-powered farm machinery and transported in refrigerated vehicles or ships.

Other Impacts

We have thus far focused on the economic and productivity costs to the UK's GDP per capita of the CBAM. However, there are a number of other areas in geoeconomic policy and geopolitics where the introduction of things like the CBAM will have important effects. We review some of these below.

The impact of using the carbon intensity of electricity generated on the national electricity grid will push developing countries to move away from fossil fuels if they are to avoid paying large CBAM tariffs. The problem for developing countries is that 730 million of the world's people currently have no access to electricity and 1.13 billion people have access but cannot afford electricity because of high cost. This group is also adversely affected by electricity that is not reliable.[65] According to the UNDP data, while progress has been made for access (75% access in 2000, 90% by 2020), the number of people who are not using electricity (because of cost or intermittency/unreliability) is 60% greater than the number without access, and little progress seems to be being made to shift these numbers.

Anything which increases costs or decreases reliability will therefore be very damaging to this cohort who live primarily in developing countries. Already India is responding to the CBAM threat by seeking to reduce the dependence of its grid on coal-fired power stations. Supporters of CBAM policy might argue that this is exactly what is needed. However, the consequences to millions of Indian citizens will be severe.

As energy costs in developing countries go up, the pressure on people becomes more and more severe, and the threat of civil unrest becomes real. While it might be argued that the West can sustain higher energy costs without unduly burdening its citizens (although recent concerns expressed about the ten per cent increase in the UK's energy price cap suggest otherwise), this cannot be said of the billions of people living in the developing world. Their voice will pressure governments to do all in their power to reduce the cost of energy. If this means that CBAM-type costs cannot be avoided, industries in these countries will increasingly look to other BRICS markets to replace what they would be losing in the G7. Whether those exports can be absorbed by the BRICS markets will depend on their growth rates.

Implications for Tariff Policy

There are implications for UK tariff policy if it follows the EU CBAM system. For these six products initially and any others into the future (including the 42 which are in the pipeline), the UK would be ceding its ability to negotiate its own external tariff to the EU.

The UK has just completed the formal ratification process for its Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) accession (with Peru as the sixth of the CPTPP countries to formally ratify, which is the minimum needed for accession to be completed fully). Ultimately, all products subject to the UK ETS would have to be within scope of a UK CBAM that follows the EU version. This effectively removes a large range of products from the UK's tariff policy. The UK would be giving countries tariff concessions with one hand, and UK CBAM would be taking them away with the other (at least for products in scope). These countries would question the value of negotiating with the UK and would necessarily prioritise negotiations with the EU. Given that the UK is presently in negotiations with India and the GCC, these countries might focus their attention more on their EU negotiations.

63 See full table at https://www.growth-commission.com/wp-content/uploads/2024/09/Spreadsheet-for-inclusion-in-CBAM-paper.xlsx

64 Building material assumptions: 8 tonnes of cement for foundations and for brick work; 29 tonnes of steel for rebars, beams, internal wall frames, floor and roof joists, and beading, nails, screws and bolts; 255 square metres of bricks; 80 square metres of roof tiles; 28 square metres of double-glazed windows; 30 metres of ceramic drain pipes, 18.5 metres of aluminium guttering and hoppers; 28 metres of aluminium downpipes; and 70 square metres of bathroom tiles.

65 See Brian Min, Zachary O'Keefe, Babatunde Abidoye, Kwawu Mensan Gaba, Trevor Monroe, Benjamin Stewart, Kim Baugh, Bruno Sánchez-Andrade, Nuño and Riad Meddeb, "Beyond access: 1.18 billion in energy poverty despite rising electricity access", UNDP (12 June 2024): https://data.undp.org/blog/1-18-billion-around-the-world-in-energy-poverty

Impact on Developing Countries' Economies

It is important to evaluate the impact of CBAM on developing countries in wider economic development terms. We have discussed in the earlier section the impact of developing countries altering the way they produce electricity in order to avoid CBAM charges. We will now consider the impact of CBAM charges assuming they cannot make these changes.

As noted above, the CBAM will once fully operational be based on both direct carbon costs as well as indirect costs. This will have a significant impact on developing countries, since indirect cost evaluation allows the EU (or UK if it adopts the EU CBAM approach) to calculate the carbon impact of a particular product based on the manner in which the electricity used in its production was produced. So, if a developing country like Bangladesh which has started producing steel (since 2015) uses coal-fired power stations in its electricity mix, then that could be factored into the carbon cost of the steel produced.

In order to avoid these tariffs, countries will have to match the net zero ambition of the EU on their electricity grids. There is also a danger of distortion since the EU is committed to supporting the least-developed countries' (LDCs) transition to green energy, which means the vast majority of developing country producers will face pressure from LDC producers who will have lower costs of entry into the EU or UK market. This will operate like a reverse tariff erosion where market access between LDCs and other developing countries will be different as a result of the EU or UK CBAM. Since the majority of the world's poor live in larger developing countries as opposed to LDCs, this could have negative impacts on development and increase poverty around the world.

Are there alternatives to EU CBAM?

There are many alternatives to solve the problem above which have not been addressed by the UK government at all, still less have their costs to the overall economy been separately evaluated to inform policy choices.

Trade and Agriculture Commission ("TAC")

The TAC proposed a way of tackling the trade and competition effects of climate change on production methods.[66]

The TAC proposals are important as these were agreed by the TAC as a whole, comprising members of the farming community and environmental NGOs. The TAC has additional weight as a body established by the government to consider the impact of UK trade policy on the agricultural sector.

66 See Trade and Agriculture Commission reports at https://www.gov.uk/government/publications/trade-and-agriculture-commission-tac

Farmers had identified similar "carbon leakage" concerns as underpin the adoption of the CBAM. Solutions to that concern, as agreed by the farming community and environmental NGOs, therefore have potential application to the wider CBAM and carbon leakage debate.

In essence, the TAC proposal articulated a mechanism to deal with carbon leakage concerns expressed by the National Farmers Union and environmental NGOs by viewing deviations from agreed climate change agreements as market distortions which might (or might not) have anti-competitive effects.

If an affected firm or industry could show the deviation from an international agreement (the distortion), that it is anti-competitive in a relevant product and geographic market, and causation and damage, then a tariffication of that distortion can be granted. This would be administered by the UK Trade Remedy Authority. Since the tariff in this case would be specifically targeted at removing the cost advantage of the ACMD, then it would not have a negative effect on the ACMD Model International Competition Pillar Score.

Only Libya, Bolivia and Greenland have not agreed net zero targets, so if other countries are taking actions that are inconsistent with these targets, a case for distortion could be made out.

Given the limited impact of this on the UK economy, and the fact that any tariffication is dealing with a very specific distortion as opposed to the general approach of the CBAM, we think its impact on GDP per capita would be small. Importantly, smaller developing countries that have little effect on global trade would not be affected, enabling their economies to grow and thrive.

We have applied an attenuation coefficient of 0.05 as because the CBAM is a forensic tool, it will implicate much less of the UK economy than the CBAM. The tables for the TAC proposal are as follows:

Tariffication	IC Score Change	DC Score Change	PR Score Change
5	0.10	0	0
10	0.25	0.5	0
25	1.50	1.0	0

Tariffication	Negative GDP per capita impact/IC/%	Negative GDP per capita impact/DC/%	Total GDP per capita impact/ state to state/%	Negative GDP per capita impact/ annualised/%	Approximate cost per UK person/per year/Total
5	0.76	0	0.76	0.076	£24
10	1.90	6	7.90	0.790	£257
25	11.40	12	23.4	2.340	£762

The ACMD tariffication mechanism, however, works very differently from a generalised CBAM, and therefore the attenuation coefficient (reflecting the amount of the UK economy affected) is likely to be much lower than for the CBAM. We have assumed that the only defendant country against which the ACMD mechanism is likely to be used is China (otherwise anti-competitive effect will be hard to prove). We therefore assume an attenuation coefficient of 0.05, suggesting potential cost of £1 (negligible) for a 5% ACMD tariff through to £32 for a 25% tariffication.

Application of the TAC ACMD tariff is unlikely to implicate the smaller developing country producers (as anti-competitive effect would be harder to establish until their exports became much, much larger). This mechanism is also much less concerning to countries with which the UK is negotiating FTAs as it is more targeted and therefore would have less of a potential impact on UK services export opportunities.

The TAC recommendations are also critical to ensuring geopolitical stability. This approach can be defended on the basis that its mechanism is much more targeted than CBAM, and therefore will be more positively received by developing countries. The mechanism also enables adversely affected parties to raise issues themselves, which does not engage significant government time, is more immune to political influences and ensures through the adversarial process better empirical evidence to be adduced.

Climate and Freedom Accord

The Climate & Freedom Accord (CFA) – a collaboratively-designed straw proposal for an international free market agreement on climate and sustainable development – emerged out of a series of policy innovation workshops convened, since 2016, by members of what is now known as the Climate & Freedom International Coalition. This fellowship of think-tanks, scholars, journalists and policymakers developed a different approach to climate change, focusing more on the innovation needed to develop new technologies within a broadly free trade framework.

The CFA approach emphasises technology-neutral, positive incentive policies that expand freedom and remove the barriers, burdens and costs that governments impose on citizens, innovators and economies.

The Accord has two fundamental guiding principles. First, since technologies must improve to deliver both net zero and prosperity, innovation is the essential tool needed to solve climate change. Second, since freedom and competition have been the main driver of innovation acceleration in the last period of global economic growth (post-GATT system in 1947), then freedom and competition-based markets are the key policies needed to accelerate the innovation necessary to solve climate change.

It is well established that the most prosperous economies are the cleanest, and that core free market policies are not climate-neutral, but actually accelerate decarbonisation. For instance, a recent study comparing competitive versus monopoly U.S. power markets finds that competitive power markets are decarbonising 66% faster than uncompetitive power markets.[67] Competitive markets drive down costs, allow new innovators easier market access and allow consumers to demand newer, cleaner, cheaper, healthier and more reliable electricity. By contrast, monopolies have no economic reason to innovate or care about consumer desires or cut costs.

CFA tax proposals include both tax rate cuts on business and investor income, and well-understood income deductions for expenses with charitable, economic and environmental benefits.

The most innovative CFA tax proposals increase rates of return, both for all innovation and low-carbon innovation. They mostly include only supply-side tax rate cuts, because rate cuts uniquely accelerate all successful innovators by allowing them to keep more of their profit, while avoiding subsidy-related drawbacks. For instance, business income tax rate cuts will not lead to subsidy bubbles, because the underlying businesses must be profitable, without subsidies, to benefit from the tax rate cuts. Key elements include:

1. Improve domestic competition.

2. Increase GDP per capita by tax cuts, fiscal policy and pro-competitive regulation. Countries at more advanced stages of economic development can be shown to pollute less and have better environmental outcomes across the board.

3. The use of Rapid Innovation Funds (RIFs). These provide private, tax-exempt debt financing. RIFs reduce the cost of new investments, to accelerate capital flow to new investments. By reducing the cost of capital, RIFs accelerate the deployment of the newest, most efficient, lowest emission technologies, built to the latest specifications. They empower developers, entrepreneurs, funds and banks to raise tax-exempt debt in any participating country, using bonds, loans, savings accounts, mutual funds etc., and invest the funds in property, plant and equipment (PP&E) and conservation investments in any Accord country.[68]

4. The countries that subscribe to this approach could come together in the form of a coalition that would agree not to apply carbon taxes or tariffs on each other's trade. Such a coalition could also agree basic principles on reducing market distortions. This could be a group of countries such as proposed for the ACMD initiative – the U.S., UK, Australia and Japan, then broadening this to CPTPP countries.

67 Wayne Winegarden, *Affordable and Reliable: Creating competitive electricity markets to deliver consumers affordable, reliable, and low-emission electricity*, Pacific Research Institute (September 2021): https://www.pacificresearch.org/wp-content/uploads/2021/09/ERR_EnergyCompetition_F.pdf

68 Some believe that RIFs should also fund PP&E maintenance and payroll, because maintaining an asset reduces emissions, in general, and extending the RIFs to operating costs would also reduce the expected cost of new projects.

5. De-monopolisation tax cuts. One interesting element of the CFA is the concept of de-monopolisation tax cuts. These are tax cuts that would be given for the sale of shares of monopolies as part of an effort to introduce competition, either through a privatisation or other sale where no capital gains tax would be payable for a two-year period.

The key elements of CFA which have been proposed are as follows:

1. Commitment to growing the economy through open trade, and competition will lead to positive improvements on the IC and DC pillars of the ACMD Model.

2. Decarbonisation and clean tax cuts. These operate in the opposite way to conventional carbon pricing. Where a carbon price operates as a negative incentive that therefore risks offshoring of emissions, decarbonisation tax cuts create a positive incentive that accelerates capital flows and innovation, increasing competitiveness and attracting investment. The CFA also suggests an intriguing idea that companies that come up with profitable zero carbon technologies without subsidisation should be eligible for a "game changer tax cut". This supply side incentive could have significant impact on innovation and would set up the opposite scenario where often companies that invest heavily to create "game changer" technology are then subject to windfall profits taxes or antitrust enforcement.

3. A tax break on de-monopolisation is one way of countervailing the enormous power of incumbents.

4. Full expensing for environmental goods, production etc.

5. An agreement among CFA member countries that they would not raise barriers to each other, provided they were Accord members.

We have modelled several of these elements below. The summary of their impacts is in the box below.

The CFA assumes that countries will adopt zero tariffs between themselves on all goods and will commit to not raising tariffs through border adjustment mechanisms or otherwise.

The total impact of the CFA proposals on GDP per capita would be an increase of £980 (2.49%) in the lower bound scenario, rising to £1,024 (2.60%) in case of wider adoption:

- £548-£591 through an improvement in the Trade Freedom Score
- £97 through an improvements in electricity cost and time
- £196 through improvement in Financial Freedom

We note that the CFA approach raises per capita GDP, while the CBAM and TAC both reduce it.

Modelling the CFA

The implementation of the CFA is expected to have a significant positive impact on the UK's Trade Freedom score and its international competitiveness. This analysis evaluates the potential effects under two adoption scenarios.

Scenario 1: Adoption by key trading partners: the EU, EFTA, U.S. and Canada.

Scenario 2: An expanded adoption that includes the countries from Scenario 1, plus members of the CPTPP, the GCC and India.

The equation for the Trade Freedom score is as follows:

$$TradeFreedom_i = \frac{100(Tariff_{max} - Tariff_i)}{Tariff_{max} - Tariff_{min}} - NTB_i$$

Where $Tariff_{max}$ is the maximum tariff applied to a partner country; $Tariff_{min}$ is the minimum applied; NTB_i is the qualitative assessment of non-trade barriers faced by country i.

Under Scenario 1, the group of countries represents 62% of the UK's imports. The elimination of tariffs would reduce the UK's Most Favoured nation (MFN) average tariff rate from 3.45% to 1.05%.

Under Scenario 2, this would concern 68% of UK imports. Under this broader coalition, the abolition of tariffs would lower the UK's MFN average tariff rate from 3.45% to 0.87%.

Alongside tariff reductions, we also estimated a decrease in non-tariff barriers (NTBs) associated with the CFA. According to the methodology used in the Trade Freedom score, NTBs, as calculated by the WTO, include administrative costs and domestic charges imposed on imports subject to tariffs. These measures are relevant to the CFA and, as such, we projected a 62% reduction in NTBs in Scenario 1, reflecting the proportion of imports from the involved countries. In Scenario 2, we assumed a 68% reduction in NTBs, aligning with the larger share of imports under the extended group of countries. We are assuming that there is a proportional decrease and that NTBs are closely linked to the volume of imports, and that reductions in tariffs lead to corresponding declines in administrative and regulatory burdens.

With the reductions in tariffs and NTBs factored in, we calculated the new International Competition (IC) score for the UK in both scenarios. The Trade Freedom score would increase by 0.63 in Scenario 1 and by 0.68 in Scenario 2.

	Decrease in overall tariff (percentage points)	NTB pre-CFA	NTB Post-CFA	IC pre-CFA (1-7)	IC Index post-CFA (1-7)	Impact to GDP per capita 2023
Scenario 1	2.40	9.1	3.5	5.60	5.79	£547.59
Scenario 2	2.57	9.1	2.9	5.60	5.80	£591.05

Transport costs create frictions in international trading systems that can induce inefficient outcomes by mollifying market forces. The ACDM econometric model captures this through the LPI Customs Indicator that captures the efficiency of countries' customs and border agency processes. Adoption of a CFA proposal may considerably improve the efficiency of customs agents through the removal of administrative burdens induced by tariffs and through harmonised product regulation enabled by free trade agreements.

We have proxied the likely impact as a reversal of the decrease in the UK's score that occurred between the period of 2016-2018 from 5.47 to 5.16.

	UK score	UK score under CFA	Impact to IC index	Impact to GDP per capita
IC Index	5.16	5.47	0.033	£97.48 (0.25%)

Modelling Impact on Domestic Competition Pillar

The CFA focuses on implementing policies which aim to promote market efficiency by bolstering Domestic Competition, with many aspects being captured in the AMCD model. One way in which the CFA can impact Domestic Competition is lowering electricity prices by promoting more competitive domestic industries. The CFA sets out a guideline to effectively dissolve monopolies, by incentivising monopolies to sell their assets through tax cuts on capital gains. This policy can aid the electricity supply sector in the UK which suffers from regional monopolies. Once an incentive for monopolies to dissolve has been created, Domestic Competition should increase as these monopolies will separate into smaller firms. Research suggests that monopolies have historically charged 10% higher prices to consumers in areas with no other energy provider when compared to similar consumers in areas with more competition.[69] CFA policies promoting the dissolution of monopolies should lower the share of electricity consumers who are subject to these higher prices which arise from a lack of competition, resulting in lower average electricity costs in the UK.

In addition to energy cost savings, the dissolution of energy monopolies may result in a scenario where perfect competition between energy suppliers is offering more competitive timings for energy delivery. If the CFA leads to the dissolution of monopolies and fosters competition among electricity providers, this will result in inefficient firms being outcompeted by firms which are able to supply electricity in a shorter time period. If this situation of perfect competition were to arise, then we would expect the average time in working days required to install electricity to a new building to decrease. We model a scenario looking at the impact from an increase in the Time sub-score to the same level as the highest performer in this category (UAE). **This leads to an increase of 0.027 in the DC index, and a subsequent increase in GDP per capita by 0.35%, equivalent to £139.32.**

	UK score pre-CFA	UK score post CFA	Change to DC index	Impact to GDP per capita/2023
DC index	5.92	5.94	0.027	£139.32

Modelling Impact on Financial Freedom Subvariable

The CFA proposal may change Financial Freedom through openness to foreign competition. The ACMD econometric model captures distortions created by regulations in banking and finance sectors through the Heritage Foundation's Financial Freedom index. Adoption of the CFA provision would see streamlined bond market rules foster cross-border investment and capital freedom. Internationally reciprocal tax-exempt debt would remove asymmetries that distort international capital flows. This would lead to efficiency gains in capital allocation, realising dead weight losses induced by present distortions. We take a scenario-based approach to model this and consider the UK's adoption of a tax-streamlined approach to a best-in-class performer such as Australia which scores highly on the index.

	UK score	AUS score	Impact to DC index	Impact to GDP per capita / 2023
Financial Freedom score	5.8	6.4	0.0375	£196.08

The total impact of the CFA proposals on GDP per capita would be an increase of £980 (2.49%) in the lower bound scenario, rising to £1,024 (2.60%) in case of wider adoption.

Conclusion

As noted at the outset, the purpose of this paper is not to evaluate the likely success of various attempts to deal with carbon leakage and the climate change policy that leads to it.

We also do not comment on the likely ability of various schemes to impact climate change in a meaningful way. We are concerned in this chapter only with the costs, so policymakers have better ways of evaluating the toolkit of policies available to them.

We have shown in this chapter that the GDP per capita impacts of the UK following the EU CBAM are significant.

69 See *Energy Supply Probe - initial findings report, Ofgem (2008): https://www.ofgem.gov.uk/sites/default/files/docs/2008/10/energy-supply-probe---initial-findings-report.pdf*

At a time when the UK is struggling to grow economically, and both the ruling Labour government and the opposition Conservative Party have expressed the need for economic growth, adoption of EU CBAM would move the UK in the wrong growth direction. Fortunately, for the UK and for those who seek meaningful solutions to carbon leakage and the climate change that leads to it, other options exist.

We have evaluated some of these and shown that there are even proposals being floated that, far from limiting economic growth, actually increase it, such as the CFA.

We have also noted that there are significant impacts on global security and geopolitics that are outside the scope of a narrow economic study. These factors cannot be ignored.

CHAPTER 2

THE CLIMATE & FREEDOM ACCORD

STRATEGIES AND PROPOSALS

Rod Richardson

The Climate & Freedom Accord (CFA) – a collaboratively-designed straw proposal for an international free market agreement on climate and sustainable development[70] – emerged out of a series of policy innovation workshops convened, since 2016, by members of what is now known as the Climate & Freedom International Coalition. This fellowship of think tanks, scholars, journalists and policy makers share a common desire to think outside the box, to pioneer a new free market approach to climate, free from the market-impairing defects of conventional climate policy. Their highly original ideas deserve close study by scholars and policy makers alike.

A New Positive Alternative

The CFA proposes an utterly new – but classically liberal – approach to climate, based exclusively on technology neutral, positive incentive policies that expand freedom and remove the barriers, burdens and costs that governments impose on citizens, innovators and economies.[71] In other words, exactly the opposite approach from most conventional climate policies, which impose top-down controls and both intentional and unintentional negative incentives – taxes, bans, mandates, preferential subsidies, barriers, burdens and costs – on citizens, innovators and economies. Costs that contribute to unintended consequence such as political conflict, uncompetitiveness, deindustrialization and the offshoring of emissions.

Innovative Strategies: Lessons Learned from Past Free Market Policies

The Accord begins with two logical observations. First, since all our technologies must improve to deliver both net zero and prosperity, then innovation is the essential tool needed to solve climate change. Second, since freedom has been the main driver of innovation acceleration since the Enlightenment, then freedom and free markets are the key policy needed to accelerate the innovation necessary to solve climate change.

Studies by coalition members bear this out, showing not only that the free-est economies are the cleanest,[72] but that core free market policies are not climate neutral, but actually accelerate decarbonisation. For instance, a recent study comparing competitive versus monopoly US power markets finds that competitive power markets are decarbonizing 66% faster than uncompetitive power markets.[73] The reason is easy to understand: competitive markets drive down costs, allow new innovators easier market access, and allow consumers

70 https://cleantaxcuts.org/wp-content/uploads/climatefreedomaccord-straw-230202.pdf

71 Indeed, this is a policy design constraint. Every component of the CFA must lift, and not impose, burdens and barriers. This design constraint rules out both conventional carbon pricing and wealth transfer subsidies on account of the barriers and distortions they impose.

72 https://www.c3solutions.org/policy-paper/free-economies-are-clean-economies/

73 https://www.pacificresearch.org/wp-content/uploads/2021/09/ERR_EnergyCompetition_F.pdf

to demand newer, cleaner, cheaper, healthier, more reliable electricity. By contrast, monopolies have no economic reason to innovate or care about consumer desires or cut costs.

To better understand the impacts of different free market policies on climate, Coalition members studied past policies from the Reagan and Thatcher era, just before public awareness of climate change. They found that many free market reforms from that era had the surprising unintended consequence of reducing emissions, as a side effect of making new investment, and therefore all innovation, easier and cheaper.[74]

In 1980, President Ronald Reagan faced stagflation, the combination of high inflation and economic stagnation cause by years of tax-and-spend Keynesian stimulus policy. Reagan needed to find a pro-growth but anti-inflationary strategy to compliment Paul Volker's monetary tightening and high interest rates at the Fed. Reagan pursued a 2 prong macro-economic strategy: (1) deregulate and open up markets to competition, to drive new opportunities for innovation (which he did with the deregulation of natural gas, telecoms and transportation, and the defense and expansion of free trade); and (2) increase capital flows to fund and accelerate the pace of all the new innovation, by cutting supply-side investment taxes.

This combination of policies led to natural gas replacing coal to solve the acid rain problem, and then to the fracking revolution which drove down US emissions. It also triggered to the massive productivity gains of the cell phone, computer, internet and smart phone revolutions. It is no coincidence the many startup ventures like Apple, Microsoft, Oracle, Dell and Cisco were able to go public with great success in the wake of the Reagan tax cuts and the telecom demonopolization. Reagan's free trade policies allowed competition from Japanese and German auto makers to drive US auto makers to catch up in manufacturing and automobile efficiency. All of which decoupled energy use from growth, driving steady emissions reductions per unit of GDP, and large total emissions reductions after the fracking revolution scaled up in 2007.[75]

Another study – with big implications for effective climate related tax policy – considers how a Reagan era supply-side tax policy drove the energy efficiency revolution before climate change was even a public concern.[76] Accelerated capital expensing, adopted in 1981, was intended to reduce the cost of investment in new property plant and equipment (PP&E), and so spur new investment, jobs and growth, while driving down inflation by increasing supply. It succeeded. But unexpectedly, it also helped drive the energy efficiency revolution by making energy efficient investments cheaper, and more profitable. It turns out, when policies reduce the cost of new PP&E investment, that accelerates the adoption of the newest technologies — always cleaner and more efficient than older dirtier tech, which then gets more rapidly phased out. Accelerated capital expensing (or better yet, immediate full expensing) accelerates decarbonizing innovation. As a result, US emissions declined steeply per capita, and per unit of GDP in this period.

Reagan also encouraged private conservation by introducing a robust conservation easement tax deduction in 1987, which has led to the regrowth of some 19 million acres of forests on private land. That works out to about 1.362 billion metric tons of carbon unintentionally sequestered, thanks to the combination of private property rights and a positive incentive framework.[77]

Such studies reveal the free market drivers of innovation and decarbonisation. That offers clues for better policy design. For instance, learning from the above examples, we can articulate a few strategies and principles that have helped shape the Accord:

1. Reagan's two prong strategy (deregulate and open markets to spur new innovation; increase capital flows for new innovation with supply-side tax policies) offers a proven strategy for accelerating all innovation, and also decarbonizing innovation.

2. Innovation is serendipitous, part of an unknown future. It may be impossible to say, in advance, which future innovations will have the largest decarbonizing impact. Certainly, no one anticipated the significant decarbonizing impacts from telecom or natural gas deregulation or capital expensing. Therefore, while we may focus on accelerating decarbonizing innovation, the most effective policy – for decarbonisation – should also seek to accelerate ALL innovation, taking a balanced approach to avoid extreme policies that might block unanticipated innovation.

3. Policies that make new investment easier and cheaper will promote all innovation, but also tend to accelerate the pace of decarbonizing innovation as a side effect, without picking winners or losers.

4. Private property rights with respect to natural resources has played a huge role in empowering the private-led decarbonisation gains in both US forest conservation and the US fracking revolution and will likely play just as important a role in the future reforestation of rainforests, and environmentally prudent development of global mineral resources.

5. Supply-side tax policies offer proven, high-impact, purely positive incentive models with decarbonizing tendencies. They avoid the negative incentive drawbacks baked into carbon pricing, or preferential subsidies that pick winners and losers.

74 For Thatcher, the first world leader to call for global action on climate change, emissions reduction was an intended and highly successful consequence of ending the UK subsidy of the coal industry and introducing competitive energy markets.

75 https://www.statista.com/statistics/183943/us-carbon-dioxide-emissions-from-1999/

76 https://files.taxfoundation.org/20210112151505/How-Expensing-for-Capital-Investment-Can-Accelerate-the-Transition-to-a-Cleaner-Economy.pdf?_gl=1*16hbxv4*_ga*MTM1MTE4NzkzNi4xNjk0NjYxOTUx*_ga_FP7KWDV08V*MTY5NDY2MTk1MC4xLjAuMTY5NDY2MTk1MC42MC4wLjA

77 https://www2.nau.edu/~gaud/bio326/class/ecosyst/USFScarb.htm

CFA tax proposals include and take inspiration from classic Reagan-era broad-based supply-side tax policies. These include both tax rate cuts on business and investor income, and well-understood income deductions for expenses with charitable, economic and environmental benefits. Reagan's tax policies did not pick winners and losers or impose any barriers. Easy for investors to use, they clearly do drive increased investment. They also have a proven track record of accelerating innovation and prosperity.

The most innovative CFA tax proposals likewise increase rates of return, both for all innovation and low carbon innovation. They mostly include only supply-side tax rate cuts, because rate cuts uniquely accelerate all successful innovators by allowing them to keep more of their profit, while avoiding subsidy-related drawbacks. For instance, business income tax rate cuts will not lead to subsidy bubbles, because the underlying businesses must be profitable, without subsidies, to benefit from the tax rate cuts.[78]

Lessons Learned from Non-Free-Market Climate Policies

The most commonly endorsed non-free-market climate policy is carbon pricing. It is presented as a simple, effective solution to a real problem driving climate change: the full cost of the GHG externality is not accounted for in the price of fossil fuel energy, cement and many other products. Everyone producing or consuming any GHG emitting product enjoys a free ride, passing the cost of climate change on to everyone else. Unintended consequences abound, however, because the negative incentive structure of conventional carbon pricing, the idea of internalizing the cost of the externality, is flawed. Negative incentives lead to negative side effects, as we discuss throughout this study. The carbon price imposed on the economy does not eliminate the cost of the externality, it only adds to that cost without necessarily producing cost effective change. It leads to unhelpful side effects such as regressivity, inflation, economic drag, plant closures, deindustrialization and the offshoring of emissions.

As with the medieval practice of "leeching" or bleeding the patient, the companies and economies we most want to innovate zero and low carbon solutions, are drained of the capital they desperately need to invest in innovations. Finally, to fix some of these cost-imposed problems, carbon pricing must resort to a complex scheme of carbon tariffs like the EU CBAM to try to force carbon pricing on every nation, globally. What was presented as simple, cost-effective solution soon becomes horribly complicated and expensive. As the previous chapter showed, the CBAM itself will only intensify the increased expense and economic losses caused by attempting to force a change using negative incentives, inadequate technologies and blocked markets.

78 Another reason to prefer supply-side tax policy: As with full expensing, low investment taxes also have well understood innovation and environmental benefits, derived from making new investment cheaper, that we cannot currently claim for low consumption taxes. Although that could change subject to the emergence of new research.

Conventional subsidy schemes, while offering a positive incentive alternative, have the main drawbacks of promoting failure, and subsidy bubbles, picking winners and losers, greenwashing, entrenching emission-increasing technologies like ethanol, promoting cronyism by giving an outsized advantage to large, wealthy incumbents (including tax-equity and carbon offset trading banks, lawyers, NGOs and brokers) while blocking the rise of new innovators and entrepreneurs. Subsequent chapters discuss these schemes in more detail.

Studying the pitfalls of these various promising but problematic incentive frameworks also helped working groups articulate a few additional strategies and principles for better free market positive incentive policy design:

1. Negative incentives intended to drive technology substitution don't necessarily result in that shift when substitutes are not at price performance parity. Nor if market barriers prevent either the flow of capital or the deployment of new technology. Neither do they necessarily results in new innovation versus unwanted outcomes, like offshoring or bankruptcy.

2. Therefore, to overcome these drawbacks, positive incentives – designed to replace carbon pricing and the CBAM, but avoid conventional subsidy pitfalls – need to accomplish **four essential tasks**:

    - **Directly accelerate all innovation**, by broadly reducing the cost of new investment, with the anticipated side effect of accelerating all decarbonizing innovation as well, including serendipitous, unforeseeable breakthroughs.

    - **Directly accelerate all decarbonizing innovation, as well,** with broad tech neutrality, by taking the externality into account on the supply side via a higher rate of return for successful decarbonizing innovation.

    - **Accelerate capital flows in general, and international capital flows in particular,** by making the cost of new investment cheaper globally, to incentivize all innovation and free market decarbonisation globally, as an alternative to the CBAM

    - **Incentivize the adoption of free trade, competition and private property's rights globally, as essential components of free market decarbonisation**, both to remove market barriers that will otherwise make any incentives less effective, and also to help put in place open markets with inherently decarbonizing tendencies.

3. It is unrealistic to think that all four essential tasks will be accomplished by just one incentive. A set of positive incentives acting in concert will offer better results than any one incentive acting alone. For instance, a decarbonizing incentive, a capital flow accelerant, and a market liberalizing incentive, acting side by side, will improve on

the decarbonisation results of any one of those acting alone. Like a steering wheel, and engine and a good set of tires, these three elements work together to let us go were we need to go, at speed. The decarbonizing incentive directs the capital flows to greater decarbonisation. The capital flow accelerant increases the capital available for decarbonisation. And the market liberalization incentives help the decarbonizing capital flow to where it might not otherwise be able to go.[79]

The Four New Kinds of Clean Tax Cuts in the Accord

Over the course of eight years, working groups have refined dozens of viable, positive incentive alternatives to conventional green subsidies, carbon pricing and an international CBAM, supporting all four essential tasks fiscally, in cheaper and more effective ways. Clean Tax Cuts (CTCs) is the umbrella term covering all such proposals, including all tax proposals in the Accord.

CTCs can be broadly defined as tech neutral supply side tax rate cuts with environmental benefits. Classic supply side tax cuts to business and investor income tax rates, including full expensing for PP&E and R&D, could be considered examples of pre-existing clean tax cuts, because of their environmental benefits stemming from innovation and efficiency acceleration. CTCs, classic and new, can be used to reduce many different kinds of pollutants or externalities. One new class of CTCs discussed below, Decarbonisation Tax Cuts, is specifically designed to reward decarbonizing emissions that outperforms according to a clear metric.

In addition to classic supply-side tax policies, the Accord also incorporates the four best of these new "Clean Tax Cuts" (CTC) proposals. All together, these constitute a new class of purely positive, supply-side, tech neutral tax rate cut incentives, designed to reduce GHGs (or other kinds of pollution) by accelerating all innovation, all decarbonizing innovation, and the expansion of global free market led decarbonisation:

1. **Decarbonisation Tax Cuts** (DTCs, or **Equity DTCs, or informally, a "Decarb Detax")** reduce the tax rate on business income derived from core products of high-emission sectors, achieving outstanding decarbonisation performance as measured by a simple, well-understood, well-reported metric.

    - DTCs do not replace basic pro-growth tax rates, but merely add a small "performance bonus" tax rate reduction, say five percentage points, for firms that achieve the greatest emissions reductions.

    - For example, in the automobile industry, sustainability can be summarized in one number: the average vehicle fleet emissions. So, the lower that number, the lower the DTC tax rate on business and investor income. This provides a simple method of aligning corporate behaviour with a goal of emissions reduction. From the board room to the shop room floor, every investor and employee owns stock in the company, which gets more valuable as emissions and the tax rate is reduced.

    - The innovators, not the politicians, pick the technology they use.

    - Equity DTCs work well across the five economic sectors responsible for roughly 80% GHG emissions: energy, electric power generation, transportation, industry, real estate and industry.

    - These sectors have 2 essential characteristics needed for effective DTCs: 1) tax payers who can be influenced by a tax rate cut. 2) Simple well-understood, well-reported metrics regarding core products of high emission sectors. For instance, in addition to CAFE standards for automobiles, the US also has EnergyStar ratings for energy efficient appliances and industrial equipment, homes, commercial buildings and industrial plants – all of which can be used as the basis for a tax rate cut reward for outperformers.

    - Companies need to keep their focus on core product innovation. Using simple metrics of product emissions, waste or efficiency keep the company focus were it is most needed. Complex, hard-to-calculate metric frameworks like sustainability accounting and Scope 1, 2, 3 emissions both distract from core product innovation, and are simply unworkable as the basis of a tax rate cut, not only because there is great disagreement over methodology, but also since very few professionals are trained in any one system. The workforce does not exist to use such a method.

    - The decarb detax acts like a carbon tax cut, in that DTCs take the carbon externality into account, not by internalizing the price of emissions in products (something impossible to do accurately or efficiently) but by increasing the rate of returns on investment for successful low carbon product innovation.

    - DTCs function mainly as a strongly decarbonizing positive incentive, that will specifically drive decarbonizing tech neutral innovation. And without unwanted side effects that result from a carbon tax, such as economic drag, inflation, regressivity, deindustrialization or offshoring emissions. Quite the reverse. Negative incentives chase people away. Positive incentives draw people in.

79 Different kinds of CTCs do not "double dip" in subsidization. They work differently from each other and accomplish different essential but complementary tasks (incentivizing all innovations, vs capital acceleration, vs decarbonizing innovation, vs market liberalization). They act to balance each other in ways that helps avoid pitfalls. For instance, the use of both debt and equity CTCs helps avoid debt or equity bias. Also, CTCs don't subsidize conventionally at all, since they are not wealth transfers that potentially support unprofitable business models, just a lower tax rate of profits earned. They don't pick winers and losers. If there is no risk of subsidy bubbles or economic drag or other pitfalls using tax rate cuts on profits, and if tax expense can be offset with the elimination of conventional subsidies, then policymakers can use as much of several kinds of CTCs as that budget trade off will allow, with zero regrets, and low risk of an economic downside.

2. **Rapid Innovation Funds (RIFS, a.k.a. Debt CTCs)** work very differently. These are internationally reciprocal tax-exempt private debt of all kinds (no tax on interest income on bonds, loans and savings accounts) which may finance individual projects, or pooled investment funds (RIFs), used to finance PP&E and conservation investments at a lower cost of capital.[80]

    - Just like full expensing, they make new investment cheaper, with similar beneficial impacts regarding promoting all innovation and decarbonizing innovation.

    - The Accord makes RIF tax-exemption internationally reciprocal, so that the tax-exempt debt can be raised in any Accord nation and invested across borders in new PP&E in any Accord nation, either directly in each project, or through RIFs, as private investment funds.

    - Entrepreneurs, developers, bank, mutual funds, any kind of capitalist, would be able to raise any kind of tax-exempt debt: bonds, loans, even savings accounts. (Highly democratic, everyone can participate easily, as a borrower or lender, bond issuer or buyer, fund manager or investor.). The proceeds can either be directly invested in a single project or pooled in a RIF mutual fund that invests in many individual projects. Such Rapid Innovation Funds could be structured like any mutual fund or hedge fund, financed by taxable equity and tax exempt debt, and investing debt and equity in capital projects.

    - RIFs act as an incentive for all innovation, including all decarbonizing innovation, by making new investment cheaper, globally.

    - RIFs act as an international capital accelerant, mobilizing private external capital (in contrast to the internal capital liberated by full expensing.)

    - RIFs act as an incentive for free trade and open, competitive markets, encouraging nation to join the Accord, a framework for global free market led decarbonisation

    - They accomplish far more for decarbonisation when used in conjunction with equity DTCs than either policy could accomplish alone. The combination links strong capital and innovation acceleration to strong decarbonisation. The debt-based RIFs accelerate innovation upgrades in the means of production, while the equity DCT accelerate decarbonizing innovation in the products themselves. RIFs accelerate capital flows and help open up markets. The decarb detax steers those new capital flows towards decarbonizing innovation.

    - RIFs do not specifically account for the negative externality. Instead, they employ a strategy if reducing investment cost, to causes the acceleration of decarbonizing innovation as a positive externality of debt CTCs. And they also create an incentive for nations to commit to other policies in the Accord, like equity DTCs, that do account for the negative externality.

3. **Game Changer Tax Cuts** reward firms that achieve foreseeable but difficult breakthrough innovations that could eliminate a large share of GHG emissions, with 15 years of tax exemption on such profits for both firms and investors. (For instance, profitable zero-emission fuels could eliminate 75% of GHG emissions.). Essentially this is the equity DTC concept, with a 15 year 0% tax rate for particularly high value innovations, if commercialized with profits.

    - A variation for difficult innovation in the power sector, **First Five Tax Cuts** offers five years of tax exemption to the first five of any new kind of zero emission power plants (for example, advanced nuclear, enhanced geothermal, or fusion).

4. **Demonopolization Tax Cuts** overcomes political opposition to competition-driven decarbonisation from entrenched monopolies by eliminating gains taxes for investors who break up and sell monopoly and government-owned assets and companies into a purely private, competitive framework. The proposal itself, even before passage, creates an incentive for activist investors to buy monopoly shares, and lobby for the proposal in the hope of realizing a quick gain.

Bringing it All Together: The Structure of the Accord

In the design of the Accord, all the past classic free market policies come together (i.e., free trade, open competitive markets, classic human and economic rights, low tax rates, the elimination of artificially imposed barriers and costs – all of which policies help make Decarbonisation easier and cheaper). They are joined together and advanced globally by several new kinds of Clean Tax Cuts that simultaneously:

- reduce the cost of new capital investment and all innovation.

- accelerate capital flows to all innovation, and across borders.

- increase the returns on decarbonizing innovation, to steer new capital flows towards decarbonization.

- encourage nations to join and expand a framework of free-market-led decarbonisation.

80 Australian economist Jeff Bennett has suggested, in conversation, that debt CTCs tax exemption should apply to all commercial debt, particularly to financing payroll costs associated with maintenance, if needed. He suggests that maintaining an asset may be more emissions efficient than replacing it. Also, reducing payroll costs helps reduce overall project costs, and will boost employment.

- Provide a free market, positive incentive, pro-growth alternative to the negative incentive, anti-growth CBAM and the tax-and-spend climate orthodoxy.

All without picking winners and losers, or promoting economic failures, inflation, regressivity, offshoring of emissions, deindustrialization, or economic drag.

The basic structure of the Accord can be understood as a global agreement version of the Reagan two prong strategy: (1) deregulate and open markets to spur new innovation; (2) increase capital flows for new innovation with supply-side tax policies.

The Basic Deal: Agree to Free-Market-Led Decarbonisation. Get large capital flows.

The basic deal on offer in the Accord is easy to understand. Nations agree to a framework of open markets and free-market-led decarbonisation. By doing so, they gain access to the potentially large tax advantaged capital flows from other Accord nations – in the form of Rapid Innovations Funds (RIFs), tax exempt debt, used to finance capital investment, development and conservation.

This rest of this chapter summarizes both the two core provisions of the Accord, but also, all the other provisions, some quite innovative, which rest on the same free market principles. While all provisions and original proposals deserve study and analysis, that is beyond our scope. The purpose of this paper is to analyse the two core provisions of the Accord, not necessarily all provisions. So, the focus will be on the overall strategy, the two core provisions, and the equity and debt CTCs (the decarb detax and the RIFs) because these are the twin workhorses of the Climate & Freedom Accord, and essential to its core structure and strategy.

The Two Core Provisions of the Accord:

Building on lessons learned, the simple deal proposed by the Climate & Freedom Accord can be summarized by two core provisions, expressed as the basic changes that Nations would agree upon. By signing on to the Accord, nations would agree to:

1. Replace politically directed industrial policy, monopoly markets and protectionism with deregulated, open competitive markets and free trade among Accord nations, to create new opportunities for innovation, and deliver faster cheaper decarbonisation, with greater prosperity.

2. Replace conventional climate subsidies, carbon pricing and the CBAM with the combination of debt and equity CTCs, to replace negative with positive incentives, in order to

- reduce the cost of new capital investment and all innovation.
- increase the returns on decarbonizing innovation, to account for the externality.
- encourage nations to join and expand a framework of free-market-led Decarbonisation.
- accelerate capital flows to all innovation, and across borders.
- Avoid the pitfalls of conventional subsidies and carbon pricing

Summary of All Accord Provisions:

A more detailed list of provisions Accord nations would agree upon can be summarized as follows.

WHEREAS innovation is the key climate solution, and free markets produce the fastest rate of innovation at scale, the Accord would obligate a country to implement the following policies:

- Guarantee classic human, economic and property rights for all, and effective rule of law
- Phase in competitive markets. Simplify permitting. Deregulate restricted markets. Electricity markets should resemble the fully competitive Texas model, plus robust interconnections with electricity trading between adjacent Accord markets. Empower private partnerships to self-power, to build their own power plants with few permissions required from governments or existing utilities.
- Phase out state owned enterprises and government appointed private monopolies in the **five high GHG sectors** that account for nearly 80% of human-caused emissions: **transportation, energy, electricity, industry, real estate**.
- Phase in free trade. No tariffs/quotas among CFA nations. (Strategic exceptions TBD)
- Phase out of all conventional wealth transfer subsidies that pick winners and losers for the above listed high GHG sectors and agriculture.
- End carbon pricing, carbon taxes, emissions trading systems, except where voluntary.
- Set all tax rates at, or below, OECD average as of an agreed upon date.
- Full expensing for all capital investments and R&D

- Allow **Rapid Innovation Funds (RIFs)**: private tax exempt debt (no tax on interest) financing PP&E and conservation expenses, across borders. A big carrot for freedom.
- RIFs and full expensing reduce the cost of new investment, which speeds the adoption of new technology, and so accelerates both capital investment and innovation.
- Phase in the use of **Decarbonization Tax Cuts (DTCs)** in the five high GHG sectors. Nations can determine for themselves where and how equity DTCs (or equity Clean Tax Cuts (CTCs) for other pollution) are applied, but they must follow basic equity CTC design rules: only use tax rate cuts on business and/or investor income that reward a clear technology neutral metric of emissions, pollution or waste reduction; don't pick winners and losers; don't target qualified technologies; don't transfer wealth.
- e.g., the lower the fleet emissions, the lower the auto company tax rate, down to X%
- DTCs act as a reverse carbon tax: a **decarb detax**.
- DTCs drive RIF-accelerated capital flows towards decarbonizing innovation.
- Phase in the use of US style charitable tax deductions, including for conservation and public access easements, and allow direct international tax-exempt donations, across borders, to charities approved by any Accord nation.
- The majority of land and natural resources shall be privately owned or managed for purposes of conservation, responsible development, and public enjoyment of nature.
- Where a constitution gives ownership of natural resources to a jurisdiction, Accord nations agree that true ownership vests in the citizens of that jurisdiction, who shall have a right to enjoy those natural resources, including collecting royalties, as in Alaska, from the competitive private development of those resources, under rules determined by a democratic assembly, elected by those citizens.
- Accord nations shall exempt each other's citizens and firms from environmental trade restrictions, CBAMs, carbon tariffs, or CFA-related Global Minimum Tax penalties, and agree to collectively oppose such impositions by any other nation.
- Accord nations can also implement a number of CTC variations at their own discretion:
    - **Demonopolization Tax Cuts** – to encourage the shift to competitive markets
    - **Game Changer Tax Cuts** – to increase the rewards for breakthrough innovation
    - **First Five Tax Cuts** – to increase rewards for new zero emission plant designs
    - **Equity CTCs** – to reduce other waste, pollution, mining externalities, etc.

The common purpose behind all these provisions is technology neutral innovation acceleration, which is the overall goal and decarbonizing strategy of the Accord. Specifically, every Accord provision empowers all citizens to pioneer or adopt innovative solutions, by eliminating all unreasonable barriers slowing this natural process.

Why are Equity Decarbonisation Tax Cuts so different from Debt Clean Tax Cuts (RIFs)?

Equity DTCs and debt CTCs work differently. They promote innovation and decarbonisation very differently from each other because the requirements of debt and equity market participants are very different.

In general, equity investors take larger risk than in debt investors, in the hope of larger returns based on firm performance. So, a simple, clear performance-based incentive, based on a well reported metric, matches the market expectation that returns be tied to performance. That allows equity DTCs to take negative externalities directly into account by rewarding measurable product emissions reductions with lower tax rates and higher investment returns.

By contrast, performance-based returns don't work well in debt markets. Debt markets generally accept a lower return in exchange for regular, predictable, low risk, secured returns, regardless of the borrowing firm's performance. Both borrowers and lenders require that payment responsibilities be predictable, and issuance and ongoing administration as simple as possible. So, in debt markets, trading high volumes of securities, neither lenders nor borrowers would buy or issue securities that might have unpredictable, performance-based returns… for instance, based on the borrowers emissions performance. If the tax exemption where suddenly lost because of poor emissions performance, either the borrower or lender would face a large tax liability, depending on the terms of the security. Nor would bond issuers want the complication of the IRS examining their emissions performance on an annual basis. That kind of security would never see widespread acceptance.

Past working groups have proposed the use of tax-exempt bonds used to finance qualified technologies known to deliver low emissions. That mechanism would take into account the externality. However, this structure (know as Clean Asset Bonds, or Emission Reduction Bonds) has been heavily criticized by members of the Climate & Freedom International Coalition for picking winners and losers, and so blocking potential low carbon technology innovation not on the approved list. The mechanism was felt to be an invitation to politically directed cronyism designed to secure special privileges and block competitors. Some coalition members have argued that the policy could include a provision that would make it very

easy for new technologies to be included on the approved list if they can prove their emission reduction claims. But that argument has not prevailed or overcome the cronyism and regulatory capture concerns.

Ultimately, coalition members felt that the debt CTCs that do not pick winner and losers but provide tax exempt debt for all capital expenditures, offer a superior design.

1. It is a stronger incentive for nations to join the Accord if their citizens can use the Rapid Innovation Funds more flexibly, for all PP&E, rather than just a restrictive list.

2. That is important, because part of the decarbonizing impact of RIFs comes from convincing nations to adopt the use of equity DTCs – which do take the externality into account – in a free-market framework which makes them more effective by reducing market barriers. So, it appear more important for debt CTCs (RIFs) to be good at capital acceleration and expanding free markets, than at directly driving decarbonisation.

3. Since RIFs, like full expensing, make new capital investment cheaper, it is likely they will have the same effect of accelerating decarbonizing innovation without directly accounting for the externality.

4. Expensing liberates internal capital. RIFs mobilize external capital. So, these are complementary, additive and not duplicative, tax policies.

5. The overall proposal is stronger and more balanced if it accelerates both all innovation and decarbonizing innovation, side by side, to accelerate serendipitous, unforeseeable, breakthrough decarbonizing innovation. The combination of equity DTCs and debt CTCs (RIFs), together, accomplishes that.

6. There is no need for the CFA to specify qualified technologies for RIFs, because nations can do so, or not, individually, if they really want to, by specifying what kinds of technologies may be built or not, to what standards, and which jurisdictions can make those decisions.

7. The CFA RIFs design prevents any picking of winners and losers at the international level.

8. Debt-based RIFs and equity DTCs, acting together, should have quite a strong decarbonizing impact, more than either alone, by combining a strong incentive for accelerating capital flows, all innovation and market liberalization, along side a strong decarbonisation incentive. Restricting RIFs to a narrow list of qualified technologies would certainly reduce capital flows, which might reduce the combined impact of debt CTCs and equity DTCs – especially if less nations sign up for the Accord because of that restriction.

The Accord proposes tax-exempt debt DTCs only to finance PP&E and conservation-related investments because we have some evidence that reducing debt tax rates for those categories would have a significant decarbonizing impact. We do not have any evidence that tax-exemption for other categories of debt (e.g. commercial or consumer debt) would have a cost-effective decarbonizing impact. Further study could change that.

Another difference. Rapid Innovation Funds would likely prove more cost-effective, per dollar invested, than any equity-side tax incentive, because as a debt-side incentive, they take advantage of financial leverage. Businesses typically use debt to finance capital expenses (PP&E) because the average cost of debt is normally less than the average return on equity. In the last decade, in the US, the average cost of debt was about 4%, and the average return on equity around 13.6%. So, by way of illustration, if we use those numbers, and consider an energy development project financed half with tax exempt debt, half with taxable equity, and assume the same tax rate on taxable debt and equity income, then governments would take in about 350% more revenue on the equity side than they give up in tax expense on the debt side. A good deal.

Or to put it another way, per dollar invested, every percentage point of tax rate reduction is 350% more expensive on the equity side than on the debt side, given the above assumptions.

Debt markets have other peculiarities which should be considered as well. One concern which is sometimes raised is the potential impact of tax-exempt debt on corporate capital structures. Will it cause debt-bias? Will firms over-leverage? Several studies conclude that interest rates do NOT have a significant effect on corporate capital structure, perhaps because most financial officers are conservative and more concerned about risk exposure.[81],[82] However, if it remains a concern, the Accord abates it by providing a balanced menu of both debt and equity tax reduction and limiting the kinds of debt to be made exempt. In addition, the Accord allows nations to take various actions to address that concern. For instance, a nation could limit the use of tax-exempt debt to X% of a firm's total capital. Or a nation could also offset debt bias by using an Allowance for Corporate Equity (ACE) – aka a Notional Interest Deduction (NID), as discussed here and here.

How to Avoid the Pitfalls of the US Municipal Bond Market

The tax-exempt Rapid Innovation Fund debt market should be one, big, liquid, global market, where every security has a similar value for every investor, so that the market is very liquid, and trades are easy and transparent. Like the corporate bond market.

81 https://www.sciencedirect.com/science/article/abs/pii/S0929119917303061

82 https://www.morganstanley.com/im/publication/insights/articles/article_costofcapitalandcapitalallocation.pdf

The US tax-exempt municipal bond market is not like that at all. The US Muni market is not one big liquid market, but more like 50,000 markets, because each of the roughly 50,000 US tax-exempt bond issuers are locally tax exempt only to investors residing in that one tax jurisdiction, making most Muni bonds thinly traded and highly illiquid because of that limited local appeal.

The progressive tax code makes the illiquidity problem worse. Tax exempt debt has more value for taxpayers in a high income tax bracket, paying higher tax rates. So, the Muni bonds don't even appeal to all potential investors in one jurisdiction, only the high tax bracket tax payers.[83]

Compounding that problem is the sad fact that the Muni market dealers are politically appointed, and so, like many political cronies, have found ways to extract rents. Muni markets are not transparent. Unlike the corporate bond market, one cannot get a market price quote. Muni dealers will only tell you their price, not a market price. This allows them to impose hidden fees and mark ups. These practices not only directly increase the interest rates borrowers pay, but they also further add to the illiquidity of the market.

Illiquidity itself raises interest rates significantly, imposing a high "illiquidity risk premium as a result". As a result of all these factors, US cities and states now pay up to 1.12 percentage points higher interest on tax exempt debt than they should because of this, according to one study. [84]

Finally, some of the largest investors, the US pension funds and college endowment funds, are tax-exempt. They pay no taxes on interest anyway, so buy only taxable bonds with higher interest rates. This further compound the illiquidity problem for tax exempt debt.

There are several ways to minimize these problems for the Rapid Innovation debt market:

Most importantly, a single flat tax on taxable interest, payable by all investors, would mean that investors large and small, and across all jurisdictions, would be equally treated and equally attracted to taxable debt, or tax-exempt debt of equal risk, and subsidy leakage of this sort would be eliminated. Tax exempt interest rates would be lower, and the market would be more inclusive, broader, and extremely liquid, with no significant illiquidity risk premium. The following provisions would make Rapid Innovation Funds, and the entire global debt market, far more efficient and inclusive:

83 The tax benefit, and also the government tax expense, is greatest for the highest income taxpayers. Some economists see this as a form of subsidy leakage, with high income taxpayers capturing more of the tax benefit than the municipalities issuing the tax exempt debt. However, the fault here is not the use of tax exempt debt. It is due to the use of a progressive tax code applied to debt income. A flat tax on debt would entirely avoid the leakage and illiquidity problems produced by progressive tax rates.

84 Andrew Ang and Richard C. Green, Lowering Borrowing Costs for States and Municipalities Through CommonMuni, The Hamilton Project Discussion Paper 2011-01, 7 (Feb. 2011), available at http://www.brookings.edu/~/media/Research/Files/Papers/2011/2/municipal%20bond%20ang%20green/02_municipal_bond_ang_green_paper.PDF.

- Accord nations should together adopt a standard flat tax rate on taxable interest for all investors, without exceptions, to avoid large distortions. For instance, a 20% combined rate for all national and sub-national jurisdictions, would be near the OECD average.

- Rapid Innovation Funds should be tax exempt in all sub-jurisdictions, to prevent the balkanization that afflicts the Muni-bond market.

- Rapid Innovation Funds, packaged as securities, should trade on the corporate bond market, with market price quotes, to avoid the non-transparency and hidden fees in the muni-market.

- To protect pensioners, in this scenario where pensions pay a 20% standard tax on taxable debt like every other investor, the adjustment would be that the pensioner is NOT taxed on the income from the taxable debt or the tax-exempt Rapid Innovation debt, after the pension pays any taxes due. The required pension payout is reduced both by the taxes paid OR exempted on any debt. Doing so reduces pension liabilities while pensioners get the same after-tax income, as always. In this way, the pensioner is not affected by the pension paying a tax on taxable interest, and the pension does not have a bias for taxable debt vs. tax-exempt Rapid Innovation debt. Therefore, it opens up the huge lower and middle income pension fund market for Rapid Innovation Funds, and possibly other tax-exempt debt. There is no tax cost, as it saves on the tax expense that tax exempt pension funds currently generate with respect to the taxable securities that they hold (for which income pension funds are not taxed). It also makes the overall market for tax exempt bonds more universal with respect to investor appeal, and so stronger, more liquid and robustly traded.

- The 20% flat tax on debt, payable by all investors, could raise taxes paid by tax-exempt charitable organization on taxable debt. However, that proposal would also decrease the interest rate they pay on any tax-exempt debt they issue by about a full percentage point, by streamlining the tax-exempt debt market. And the Accord proposes other provisions that would likely increase charitable donations overall. So, in the interest of a cheaper, more efficient tax exempt bond market, lower borrowing costs and higher donations, the proposal treats non-profits more than fairly.

- These measures would create a large, liquid market for Rapid Innovation Funds (and other tax-exempt bonds), with fairly uniform pricing, and even fixes some of the distortions that balkanize the current Muni-bond market. It would reduce interest rates current lenders pay by reducing current muni-market illiquidity risk.

CHAPTER 3

WHY CURRENT POLICY FAILS ON ITS OWN TERMS

Wayne Winegarden

The Promises and Pitfalls of Current Energy Technologies

Despite impressive technological improvements, limitations to current low emission technologies remain – including solar panels, wind generation, battery storage, and electric vehicles, the supposed workhorses of the energy transition. There are also concerns regarding how these technologies will impact the reliability and sustainability of the current electric grid. Making matters worse, there is growing evidence that the environmental and emission profiles of these technologies are much worse than currently understood, particularly due to issues of dispatchability.

Based on the levelized cost of electricity (LCOE), wind and solar generation resources are often positioned as viable substitutes for fossil fuel and nuclear generation, even considering the increases in LCOE following the Covid-19 pandemic.[85] In a typical prediction, the *Centre for American Progress*, notes that

> While the LCOE for electricity generated in offshore wind farms is currently slightly higher than that of gas—$66–$100 per MWh versus $45–$74 per MWh, respectively—the increasingly rapid deployment of wind turbines on the OCS is expected to bring costs down significantly. By 2030, wind energy is estimated to be nearly 28 percent cheaper to produce over a project lifetime than the current LCOE for gas, which is projected to increase over the next decade.[86]

However, even if these predictions prove to be accurate, they do not account for the crucial attribute of reliability. Dispatchable energy generation (such as nuclear power and natural gas) can be used (or dispatched) upon request. Non-dispatchable technologies cannot be used upon request – wind technologies only produce power when the wind is blowing; solar technologies only produce power when the sun is shining. The differences in dispatchability change the quality of the energy services these technologies provide. As the U.S. Energy Information Administration (EIA) notes:

> Because load must be balanced on a continuous basis, generating units with the capability to vary output to follow demand (dispatchable technologies) generally have more value to a system than less flexible units (non-dispatchable technologies), or than units using intermittent resource to operate. The LCOE values for dispatchable and non-dispatchable technologies are listed separately in the tables, because comparing them must be done carefully.
>
> The direct comparison of LCOE across technologies is, therefore, often problematic and can be misleading as a method to assess the economic competitiveness of various

85 “Will solar PV and wind costs finally begin to fall again in 2023 and 2024?” IEA Renewable Energy Market Update - June 2023, https://www.iea.org/reports/renewable-energy-market-update-june-2023/will-solar-pv-and-wind-costs-finally-begin-to-fall-again-in-2023-and-2024.

86 “Offshore Wind Can Lower Energy Prices and Beat Out Oil and Gas” Centre for American Progress, September 23, 2022, https://www.americanprogress.org/article/offshore-wind-can-lower-energy-prices-and-beat-out-oil-and-gas/#:~:text=While%20the%20LCOE%20for%20electricity,to%20bring%20costs%20down%20significantly..

generation alternatives because projected utilization rates, the existing resource mix, and capacity values can all vary dramatically across regions where new generation capacity may be needed.[87]

This issue was analysed extensively by Joskow (2011).[88] Joskow raised several important concerns about the LCOE measure based on

> a very simple point regarding the proper methods for comparing the economic value of intermittent generating technologies (e.g. wind and solar) with the economic value of traditional dispatchable generating technologies (e.g. CCGT, coal, nuclear). [Joskow shows] that **the prevailing approach that relies on comparisons of the "levelized cost" per MWh supplied by different generating technologies, or any other measure of total life-cycle production costs per MWh supplied, is seriously flawed.** It is flawed because it effectively treats all MWhs supplied as a homogeneous product governed by the law of one price. Specifically, traditional levelized cost comparisons fail to take account of the fact that the value (wholesale market price) of electricity supplied varies widely over the course of a typical year. The difference between the high and the low hourly prices over the course of a typical year, including capacity payments for generating capacity available to supply power during critical peak hours, can be up to four orders of magnitude (Joskow 2008). We observe such a large variation in wholesale electricity prices because the demand for electricity varies widely over the hours of the year, electricity cannot be stored economically for most uses, and electricity demand and supply must be balanced continuously to maintain the reliability of the network.[89]

Put more simply, many products do not compete based on price alone. They also compete based on quality, and the quality of the product is often just as important as its price. While the LCOE for renewable energy sources may be similar to the LCOE for fossil fuels, there are important quality differences that are not conveyed by comparing the LCOE between alternative energy sources and traditional energy sources. Further, the quality provided by the traditional energy sources cannot yet be replicated by alternative energy sources.

The lower quality renewable energy generation also raises overall costs that are not incorporated into the LCOE figures. Due to the unreliability of non-dispatchable sources, additional capital must be deployed to build duplicative energy capacity to operate when the mandated non-dispatchable generation cannot meet power demand. While these additional costs are not incorporated into the LCOE for the renewable energy sources, these higher costs are incurred because non-dispatchable generation that was not technologically appropriate was mandated.

Alternative (non-dispatchable) energy sources suffer from another quality limitation that the LCOE values do not capture. Unlike dispatchable technologies that can be located where the energy is needed, non-dispatchable technologies must be located where they can generate energy. This location may, or may not, be close to where the electricity is needed. When the non-dispatchable technologies are located far from where the energy is demanded, new transmission and substation infrastructure is required to move the power from the generation point to the populated regions. These costs can be expensive, and raise the costs of these energy sources, but are not included in the LCOE values.

Consequently, the LCOE data does not illustrate that the prices for alternative energy are competitive with traditional energy sources. Instead, continued innovation is necessary to overcome the emissions, costs, and reliability shortcomings of current low-emission technologies. Understanding such shortcomings of the technologies which are unquestioningly subsidized under current policy is crucial to understanding why it is so drastically failing on its own terms.

Indeed, a variation of this fallacy has made its way into government and parliamentary publications. One such paper published in the Commons Library last year was entitled "why is cheap renewable energy so expensive?". It was later adjusted to add "in the wholesale market" to the end of the title.[90] Such papers routinely do not mention grid balancing and improvements required to bring intermittent sources of power to market, which in the UK are estimated at £100bn, over 4% of GDP. They make the mistake of comparing marginal costs rather than these full system costs. This misleads parliamentarians about the substitutability of current green technology for fossil fuels and downplays the overwhelming need for more innovation.

Get the incentives right: does negative incentive carbon pricing work as advertised?

It is widely held that constraining externalities to an efficient level is an important function of government. The traditional policy solution to achieve this goal attempts to internalise the externality's full costs into the transaction (e.g. ensure that consumer prices reflect the cost of the externality in addition to all market-related costs). If this condition is met, then the economically efficient level of the externality is produced; if it is not met, then the market-determined level of consumption is deemed to be creating either an excessive level of the externality in question or imposing excessive economic costs on the economy relative

87 (2018) "Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook, 2018" *U.S. Energy Information Administration*, March.

88 Joskow PL (2011) "Comparing the Costs of Intermittent and Dispatchable Electricity Generating Technologies" *American Economic Review* 101(3) May; https://www.researchgate.net/publication/227357598_Comparing_the_Costs_of_Intermittent_and_Dispatchable_Electricity_Generating_Technologies.

89 Joskow PL (2011) "Comparing the Costs of Intermittent and Dispatchable Electricity Generating Technologies" *American Economic Review* 101(3) May; https://www.researchgate.net/publication/227357598_Comparing_the_Costs_of_Intermittent_and_Dispatchable_Electricity_Generating_Technologies (emphasis added).

90 https://commonslibrary.parliament.uk/why-is-cheap-renewable-electricity-so-expensive/#:~:text=Why%20is%20cheap%20renewable%20electricity%20so%20expensive%20on%20the%20wholesale%20market%3F,-Insight&text=Under%20the%20'marginal%20cost%20pricing,demand%20(usually%20burning%20gas).

to the amount of the externality reduced. As established by Pigou (1920) and Coase (1960), the cost of externalities can be internalized by imposing a tax (e.g. a Pigouvian tax) or by clearly specifying relevant property rights to enable interested parties to negotiate the efficient outcome.[91]

With respect to climate change, the externalities at issue are GHG emissions and the policies suggested to reduce the GHG externality are typically either a carbon tax or cap-and-trade regulations. The carbon tax is a clear manifestation of a Pigouvian tax, which can also be viewed as a price-based approach. Cap-and-trade systems, by contrast, are an application of Coase's solution, with the government restricting the use of the resource (i.e. the government imposes a quantity constraint on allowable emissions). With profit-maximizing producers, perfect information and minimal transaction costs it can be shown that a pareto-optimal quantity of CO_2 will be produced, regardless of the initial allocation of permits. While the starting point for a cap-and-trade policy is a quantity limitation, supply and demand for tradable emission permits will also reveal a price. For this reason, both approaches are often referred to as "carbon pricing". Whether a price-based or quantity-based policy is used, both policies internalize the cost of the GHG externality by putting a price on the emissions, which in turn is a disincentive to emit GHGs.

These policy approaches use negative incentives – taxes and mandates – to reduce the GHG externality. Negative incentives discourage the undesired activity, in this case emitting GHGs, by either increasing the costs of GHG emitting activities or simply mandating specified reductions in these activities. How the disincentive to emit GHGs manifests itself depends upon the market dynamics and technology constraints.

Taxes on GHG emissions are economically justified (in theory) because the costs from global warming are not priced into economic activities (such as electricity or gasoline use) that emit GHGs. Since consumers do not bear the costs of global warming when they use electricity or gasoline, they consume an economically inefficient amount of both goods. Imposing the economically correct carbon tax rectifies this problem by pricing the costs of global warming into the price of energy. Facing prices that fully reflect the costs of global warming will change consumers' behaviour and, ultimately, the economically efficient amount of GHG emissions will result.

That, at least, is the theory. In practice, there are several concerns regarding a carbon tax policy.

91 Pigou, A. C. (1920) *The Economics of Welfare* Macmillan. Coase, Ronald (1960) "The Problem of Social Cost" *Journal of Law and Economics* Vol. 3 (October 1960): 1–44.

Carbon taxes impose large economic costs relative to benefits

In a hypothetical market where demand for a product is insensitive to price changes and there are no technological alternatives, the imposition of a tax would impose large economic costs without meaningfully reducing the externality. As a secondary impact, the higher cost of the product will encourage the development of alternative technologies; but large economic costs are necessary to create these incentives. Notably in this hypothetical, the meaningful reduction in emissions is only enabled when an economically feasible alternative technology is developed.

These considerations apply to the energy market because demand is price insensitive (e.g., higher prices do not appreciably reduce energy demand) and energy use is pervasive throughout the economy.[92] Further, while there have been impressive technological improvements with regards to alternative energy sources, currently global energy needs cannot be met with low- or zero-emission alternative technologies. The state of the current technology is, consequently, a binding constraint on the market. Sufficiently reducing GHG emissions through the use of carbon pricing will require the imposition of large economic costs, consequently. Notably, the market dynamics indicate that an economically sustainable reduction in emissions only occurs when economically feasible alternative technologies are developed.

Given these conditions there are limits to policies designed to impose negative incentives on GHG emissions. Between the two of the oft-used policies to impose negative incentives – cap and trade policies and carbon taxes – carbon taxes are the oft-recommended approach by economists to reduce the amount of GHGs emitted. For ease of exposition, carbon tax policies are used as a proxy for these policies in the remainder of this chapter. The impact from cap-and-trade policies, while not directly examined, will be similar.

Policies that use negative incentives to reduce the GHG externality discourage otherwise profitable economic activities – they impose deadweight losses on the economy because beneficial transactions that would have occurred had the tax not been imposed are lost. Since the demand for energy is inelastic, most of the burden from the deadweight losses are likely to be borne by consumers of energy. Consumers of energy include commercial and residential users.

With respect to commercial consumers of energy, energy is an input into production for most goods and services. Under realistic product elasticities, raising the cost structure for businesses will cause prices to increase throughout the economy. Energy is also directly used by residential consumers, indicating that the carbon tax will directly increase costs on consumers and raise households' overall cost of living. Higher costs of production and tighter budget constraints for consumers (e.g. consumer purchasing power net of energy costs will be lower) diminish the macroeconomy's growth rate.

92 These considerations are also relevant to other sectors and technologies. For instance, electric vehicles still face technological constraints compared to internal combustion engine vehicles, which impacts their value to consumers. More severe constraints hold back Decarbonisation for trucking, shipping, aviation, and industrial equipment. This chapter focusses on energy, but these constraints impact many sectors using machinery, economy-wide

The higher product and energy costs are particularly burdensome on lower income households, which is why carbon taxes must be considered a regressive policy. A report by the Grantham research Institute on Climate Change and the Environment, Vivid Economics, and the Centre for Climate Change Economics and Policy concurs that carbon taxes disproportionately harm lower-income families.[93] While making the case for raising the carbon tax, the report notes that "without mitigation measures, a carbon tax on energy fuels is regressive, hitting low-income households disproportionately."[94]

Negative economic consequences also occur because, despite remarkable advancements, low emission technologies are less reliable than fossil fuel-generated and nuclear-generated energy, particularly once issues of dispatchability are considered. Due to the existence of technological constraints, carbon taxes also encourage producers and consumers to choose economically inferior technologies that increase production costs. The result is that the carbon tax meaningfully reduces the production capability of the economy, not just visibly through input costs but throughout entire value chains.

The existence of technology constraints (i.e. the lack of low-cost, non-intermittent/dispatchable, alternative technologies) also means that, in the short-term, consumers' and producers' ability to make dynamic behavioural changes that would otherwise lessen the economic costs created by the imposition of a carbon tax are limited. When coupled with the energy's price insensitivity,[95] the limited behavioural responses increase the economic costs of the policy while minimizing the amount of GHG emission reductions achieved. Therefore, under these conditions, the imposition of carbon taxes imposes large economic costs relative to the benefit from reducing the GHG externality.

Concerns that carbon taxes cannot meet the goal of reducing GHG emissions without imposing significant economic costs have been widely established in the literature. Poterba (1991) provides an early analysis of these impacts, finding that carbon taxes are regressive, and that a carbon tax high enough to achieve meaningful reductions in emissions will also be high enough to impose significant costs on consumers.[96] In a more recent survey of these studies, Ramseur and Leggett (2018) summarize the economic impact of carbon taxes, stating that most, but not all, studies confirm that "carbon prices could reduce GDP growth rates, depending on the price, and that using revenues to reduce existing distortionary tax[es] decreases the economy-wide costs but may not eliminate them entirely."[97]

93 Burke J, Fankhauser S, Kazaglis A, Kessler L, Khandelwal N, Bolk J, and O'Boyle P "Distributional impacts of a carbon tax in the UK Report 1: Analysis by household type" The Grantham Research Institute on Climate Change and the Environment, Vivid Economics and The Centre for Climate Change Economics and Policy (CCCEP) March 2020, https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2020/03/Distributional-impacts-of-a-UK-carbon-tax_Report-1_analysis-by-household-type.pdf.

94 Ibid.

95 Labandeira X, Labeaga JM, López-Otero X "A meta-analysis on the price elasticity of energy demand" *Energy Policy* Volume 102, 2017, Pages 549-568, ISSN 0301-4215, https://doi.org/10.1016/j.enpol.2017.01.002.

96 Poterba, J. Poterba, J.M. (Ed.) *Tax policy to combat global warming: On designing a carbon tax* MIT Press 1991.

97 Ramseur, JL and Leggett, J "Attaching a Price to Greenhouse Gas Emissions with a Carbon Tax or Emissions Fee" CRS Insight, 2018, July 17.

Economic evaluations of cap-and-trade programs have found similar negative consequences. In an evaluation of the economic impacts from both carbon taxes and cap-and-trade programs, Ramseur and Parker (2009) concluded that these policies "increase the price of fossil fuels, which would ultimately be borne by consumers, particularly households."[98] Lesser (2015) examined California's cap-and-trade and renewable mandate program concluding that "California households' electricity prices have risen as a result of the state's renewable-energy mandates and carbon cap-and-trade program – and will likely continue to rise at an even faster rate in coming years."[99] In an examination of the Regional Greenhouse Gas Initiative (RGGI) or Northeastern and Eastern states in the United States, Stevenson (2018) concluded that "RGGI allowance costs added to already high regional electric bills. The combined pricing impact resulted in a 12 percent drop in goods production and a 34 percent drop in the production of energy-intensive goods. Comparison states increased goods production by 20 percent and lost only 5 percent of energy-intensive manufacturing. Power imports from other states increased from 8 percent to 17 percent."[100] Beyond the higher electricity prices, Stevenson also found that "there were no added emissions reductions or associated health benefits from the RGGI program" and that "spending of RGGI revenue on energy efficiency, wind, solar power, and low-income fuel assistance had minimal impact."[101]

The social cost of carbon vs the economic cost of a carbon tax

One fundamental reason carbon pricing policies come with a high economic cost is because they are designed to reduce emissions by penalizing the activities that produce the GHG externality. To meet current GHG emission targets, it would be necessary to impose a tax priced higher, likely far higher, than the social cost of carbon. In other words, the costs imposed by a carbon tax will need to exceed the value of the benefit created by the tax.

In the theoretical ideal, the economic losses the tax imposes are less than the environmental benefits gained, resulting in a net welfare benefit for society. But this outcome assumes that policy makers have a great deal of knowledge that is likely beyond their grasp. This assumption of perfect information is required either for the Coase theorem to hold through bargaining or for the government setting a carbon price or quantity from above.

Implementing an economically efficient carbon tax requires policymakers to accurately determine the present value of all future costs imposed by GHGs (e.g. the social cost of

98 Ramseur J and Parker L (2009) "Carbon Tax and Greenhouse Gas Control: Options and Considerations for Congress" Congressional Research Service, March 10; https://fas.org/sgp/crs/misc/R40242.pdf.

99 Lesser JA (2015) "Less Carbon, Higher Prices: How California's climate policies affect lower-income residents" Center for Energy Policy and the Environment, No. 17, July; https://media4.manhattan-institute.org/sites/default/files/eper_17.pdf.

100 Stevenson DT (2018) "A Review of the Regional Greenhouse Gas Initiative" Cato Journal Winter; https://www.cato.org/cato-journal/winter-2018/review-regional-greenhouse-gas-initiative.

101 Ibid.

carbon, SCC). The social cost of carbon estimates the additional costs and damages incurred from an extra ton of CO_2 emissions. From a theoretical perspective, the carbon tax should be set equal to the estimated social cost of carbon. When set at this level, the social costs from emitting GHGs are incorporated into the price of energy. Consumers and producers will then consider these costs when making their decisions and appropriately economize on their energy use. Several problems arise in practice, however.

To start, there is considerable uncertainty regarding the estimated SCC. Accurately estimating the SCC is fraught with difficulties, and the estimates vary widely, see Pindyck (2016).[102] Nordhaus (2017) similarly noted that "there is extremely large structural uncertainty about the SCC even in a single model."[103]

These problems arise because SCC estimates must value inherently subjective and uncertain impacts that will occur decades into the future. For instance, most SCC estimates include a monetary cost estimate from the impact on people's health from global climate change. Not only is the impact from global climate change on people's health fraught with uncertainties, how those impacts should be valued is also inherently subjective. Further, the monetary value of the health impacts is often based on surveys, which then raise additional accuracy and applicability issues.

Since levying the optimal carbon tax requires an accurate assessment of the SCC, it logically follows that the uncertainty surrounding the SCC estimates leads to uncertainty surrounding the estimates for the optimal carbon tax. Without an accurate estimate of the optimal level, it is difficult to know whether a specific carbon tax creates a net cost or a net benefit for society. A carbon tax set below the SCC will result in too many GHG emissions while a tax set above the SCC will impose excessive economic costs. Only when the tax is set at the accurately estimated SCC will the economically efficient level of GHG emissions result. Since the actual SCC is uncertain, whether the carbon tax is economically harmful or environmentally beneficial is unknown.

Ignoring the uncertainty problems, there is a difference between the optimal carbon tax and the desired reduction in GHG emissions. As Murphy (2009) illustrated, there is a large gap between the optimal carbon tax as estimated by Nordhaus (2007, 2017) and the carbon tax required to reach the emission mitigation targets recommended by organizations such as the Intergovernmental Panel on Climate Change (IPCC).[104] Taking Nordhaus (2017) as an example, the estimated SCC he identified was $31 per ton of CO_2 as of 2015, which he estimated to increase to $44 per ton as of 2025.

102 Pindyck, Robert S. (2016) "The Social cost of Carbon Revisited" *National Bureau of Economic Research Working Paper 22807;* http://www.nber.org/papers/w22807.

103 Nordhaus, William D. (2017) "Revisiting the social cost of carbon" *Proceedings of the National Academy of Sciences* February 14 114 (7) 1518-1523.

104 Murphy, Robert P. (2009) "Rolling the DICE: William Nordhaus's Dubious Case for a Carbon Tax" *The Independent Review*, v. 14, n. 2, Fall. Nordhaus, William D. (2007) *The Stern Review on the Economics of Climate Change*; http://nordhaus.econ.yale.edu/stern_050307.pdf.

Carbon taxes around these levels are the equivalent of petrol taxes of around £0.08 per litre ($0.40 per gallon), based on the online model of Hafstead and Picciano (2017).[105] Given that the U.K. fuel duty alone, which has been frozen at 52.95 pence per litre,[106] it seems implausible that the optimal carbon tax will be sufficient to incent the desired reductions in GHG emissions (such as the 1.5-degree Celsius goal of the IPCC). Since the tax rate sufficient to reach targeted emission levels exceeds the optimal carbon tax, the net impact from the carbon taxes necessary to reach emission goals will, by definition, impose a net-cost on society.

The uncertain dynamics and unintended consequences of negative incentives

Beyond the problems of implementing an accurate, and effective, optimal tax on carbon, there are market dynamics that further compound the concerns regarding this policy option. As a negative incentive, the carbon tax incentivizes uncertain behavioural changes in the longer-term that will simultaneously diminish the realized amount of GHG reductions and increase the adverse economic impacts on the taxing jurisdiction.

Using negative incentives, like a carbon tax, to discourage externalities is problematic because whenever a negative incentive is applied, all that is known for sure is what people will not do – they will not increase, and will likely reduce, their demand for the higher-taxed, dis-incented, activity. What is unknown is what people will do instead. In other words, how people respond to the negative incentives, and whether these responses will counteract the intended impact, can never be known with certainty – particularly in the long-run when people's ability to adjust is greater.

For example, the expected economic impact from imposing a carbon tax on production (given a binding technology constraint) is lower overall production in the jurisdiction that levied the tax - that much can be said with certainty. Carbon taxes increase the cost of doing business in locations that impose these taxes relative to the locations that impose lower carbon taxes or no carbon tax at all. The ultimate impact on the businesses with the now higher cost structure will vary.

Accounting for the globalized competitive markets, the higher cost structure from implementing a carbon tax will put domestic businesses at a competitive disadvantage vis-à-vis competitors in other countries who now benefit from a relatively less expensive cost structure. These problems are amplified further when carbon taxes are imposed at the local level, see Chen (2009) who discusses these problems.[107] Whether the businesses subject to the carbon tax

105 Hafstead M and Picciano P "Calculating Various Fuel Prices under a Carbon Tax" Resources, November 28, 2017, https://www.resources.org/common-resources/calculating-various-fuel-prices-under-a-carbon-tax/.

106 Cassey D "Autumn Budget 2023: What does it mean for motorists? Carwow, https://www.carwow.co.uk/news/7326/autumn-budget-2023-what-it-means-for-motorists#gref.

107 Chen, Y. "Does a Regional Greenhouse Gas Policy Make Sense? A Case Study of Carbon Leakage and Emissions Spillover", Energy Economics, 2009, 31/5: 667-675

eventually relocate production to the lower carbon tax environments or consumers favour the now relatively cheaper products produced in regions with lower/no carbon tax, a carbon tax creates a strong incentive for production to move to the regions with lower/no carbon taxes. When these incentives are acted upon, the purpose of imposing the carbon tax is circumvented, leading to less declines in GHG emissions than static estimates would indicate.

Proposals that change the relative inter-temporal costs of production, such as the proposal by physicist Professor Myles Allen to phase in increases in petrol taxes over decades,[108] create a perverse inter-temporal incentive to increase the use of petrol in the near-term to avoid the higher costs in the out-years. Thus, an unintended consequence of a negative incentive could be to increase emissions in the near-term.

Then there is the issue that carbon intensities will differ across regions and countries. The countries, provinces, states, or regions that are more likely to impose a higher carbon tax are also those areas more likely to have cleaner energy infrastructures. Discouraging production in areas with less GHG intensive energy supplies and encouraging production in areas with more GHG intensive energy supplies will cause GHG emissions per product produced to increase. While the net impact on GHG emissions is unknowable, these offsetting impacts decrease the effectiveness of the carbon tax policy.

It is not simply the production side of the economy that faces these economizing incentives. Relatively higher carbon taxes also increase the cost of living for consumers. The higher cost of living encourages consumers to seek out more affordable locations. Current population trends in the U.S. state of California exemplify these incentives. Currently, "4 in 10 Californians is considering moving out of state, with the majority saying it's too expensive to live there".[109] High energy costs are an important contributor to California's cost of living problem, and climate policies – including California's cap-and-trade system – are one contributor to California's high energy costs. This implies that people's proclivity to move to areas with lower costs of living, which are often places that do not impose a carbon price (or impose a lower carbon price), is due at least in part to California's global climate change policies. By relocating to the areas with lower- or no carbon pricing, the expected amount of GHG emission reductions that the carbon tax was supposed to incentivize are dampened.

In other words, negative incentive carbon pricing reduces domestic competitiveness, which leads to the emigration of industry, citizenry and emissions to jurisdictions with lower standards, which can even cause a net increase in emissions. It fails to reduce emissions as intended, maintain prosperity, and adds large costs on top of the cost of climate change, without necessarily abating climate change.

108 Allen M "It's perfectly possible to remove CO2 from the atmosphere - Professor Myles Allen, the physicist behind net zero" https://www.ox.ac.uk/news-and-events/oxford-people/Myles-Allen.

109 Luna I "Nearly half of California residents are considering leaving the state, a poll finds. Many cite the cost of living as the main reason why." USA Today, June 29, 2023, https://www.usatoday.com/story/news/nation/2023/06/28/california-population-decline-costs-of-living-state/70363036007/.

Tech-targeted subsidies harm investment, jobs, innovation and climate abatement

A quick note about subsidies is necessary because, in addition to using the negative incentives of taxes and cap-and-trade systems, most countries subsidize preferred low-emission sources to reduce emissions. Unlike taxes and mandates, government subsidies do not impose negative incentives to change behaviour. Subsidies create positive incentives, but these incentives are narrowly targeted toward specific technologies and companies. It is important to note that the subsidies here discussed do not refer to government-funded basic scientific research – such expenditures are an essential government service. Rather, these are subsidies that target specific commercialized technologies. Such income transfers raise concerns due to the adverse impacts they have by politicizing the innovative process.[110]

One important flaw of the subsidies that many countries currently use arises because the government is picking winners and losers. Under this system, favoured low-emission technologies and companies receive generous subsidies while other potential low-emission solutions are left out. The problem is that many of the subsidies ultimately harm economic growth or support companies that ultimately go out of business. The experiences of subsidies in the U.K. and the U.S. support these concerns.

For instance, the *Fraser Institute* notes that wind power subsidies have been a significant economic drag on the U.K. economy citing, "a report by Verso Economics [that] used the Scottish government's own macroeconomic model to show that, despite receiving net transfers of about £330-million ($521-million) from the rest of the U.K. for its renewables sector, Scotland still experienced a net job loss from wind power, and for the U.K. as a whole, 3.7 jobs were lost for every job created in renewable energy."[111]

In the U.S., *Open the Books,* documented nearly $3 billion (£2.34 billion) in wasted green energy subsidies that supported companies that ultimately went bust. These include:

- $570 million (£445 million) in government subsidies given to solar panel company Solyndra that went bankrupt in August 2011
- $401 million (£313 million) in government subsidies that solar company Abound Solar received, which filed for bankruptcy in June 2012
- $280 million (£219 million) in federal subsidies given to solar start-up Calisolar that went bankrupt in early 2012

110 Ying Q, Yang S, and He S "Government R&D subsidies and the manipulative innovation strategy of Chinese renewable energy firms" Economic Research 2023, Vol. 36, No. 2, https://www.tandfonline.com/doi/epdf/10.1080/1331677X.2022.2142823?needAccess=true.

111 McKitrick R "Green Energy Failure" (appeared in the Financial Post), https://www.fraserinstitute.org/article/green-energy-failure.

- $193 million (£151 million) in loan guarantees that were never repaid by electric vehicle maker Fisker Automotive after it went bankrupt in November 2013, and

- $132 million (£103 million) in loan guarantees that were never repaid by battery maker A123 Systems, which went bankrupt in 2013.[112]

Subsidies also create the risk of political favouritism that biases the innovation process. As Sugar (2022) notes,

> directing procurement towards social and environmental outcomes entails significant risk. Defining the most advantageous tender with regards to non-economic objectives can lend itself to the **misallocation of funds at best, and corruption, cronyism and self-enrichment,** something many governments were accused of following panic purchases at the height of the SARS-Cov-2 pandemic, at its worst. (emphasis added)[113]

The United Nations Development Programme (UNDP), also concerned about the cronyism problem, warns that "state capture and abuse of discretion in the process of adaptation planning, resulting in prioritisation of projects and programmes favouring vested interests rather than areas of greatest vulnerability".[114]

Beyond the well-noted inefficiency risks created by the political allocation of capital, there are also deeper concerns. Innovation requires people to learn from failures as well as successes. With the government's backing, failure is recognized late, if at all, and lessons are never fully learned. The ability to learn – both evolutionarily and revolutionarily – only occurs when individuals are empowered to suffer the consequences of failure and the rewards from success.

Beyond the learning disadvantages inherent to government supported innovations, the freedom to implement iconoclastic ideas is an essential part of the invention process. In a clear demonstration of the value gained from free thinking pursuits, back in 1880, Henry Morton (president of the Stevens Institute of Technology, which he turned into one of the leading technology schools)

complain[ed] that recent articles in the daily press on Edison's electric light, trumpeting as a wonderful success what anyone acquainted with the subject recognizes as a conspicuous failure, has the melancholy result of placing the inventor and his work in the same category with Keeley and his "water motor" (Note: Keeley and his water motor is an infamous fraud).[115]

112 Open the Books, https://www.openthebooks.com/assets/1/6/Federal_Transfer_Report_Addendum_Green_Energy.pdf.

113 Sugar, K, Mose, TM, Nolden, C, Davis, M, Eyre, N, Sanchez-graells, A & Van Der Horst, D "Local decarbonisation opportunities and barriers: UK public procurement legislation", Buildings and Cities, 2022, vol. 3, no. 1, pp. 895-911. https://doi.org/10.5334/bc.267.

114 "Staying on Track: Tackling corruption Risks in Climate Change" UNDP, https://www.un-redd.org/sites/default/files/2021-10/Staying%20on%20Track%20corruption%20risk%20in%20CC-%20UNDP%20-%20November%202010-%20Low%20res..pdf.

115 New-York tribute, January 01, 1880, Image 4, https://chroniclingamerica.loc.gov/lccn/sn83030214/1880-01-01/ed-1/seq-4/.

The setbacks to innovation that would have occurred had Professor Morton been empowered to allocate all research funds, and presumably defund Edison's *fraudulent* electric light research, exemplify the potential dangers from government directed subsidies. Often, innovations stem from iconoclastic pursuits. Government subsidies distort such efforts to the potential detriment of revolutionary findings.

Some subsidy designs can create further barriers to innovation. Only the highest income taxpayers and very large companies have the capacity to absorb the full value of subsidies such as US production and investment tax credits. Smaller companies must give up subsidy value to bankers, lawyers and tax equity traders – who typically do not work with small entrepreneurs. The most innovative mavericks and small competitors may be entirely frozen out of the politically created tax equity market, consequently, to the benefit of the wealthy and well connected.

Lastly, wealth transfer subsidies that support inferior business models run a high risk of creating dangerous economic bubbles. These can burst with devastating economic consequences. Spain for instance, over-subsidized renewables prior to the financial crisis of 2008. When budget shortfalls forced an end to subsidies, a huge artificially inflated industry collapsed. Spain's unemployment rate skyrocketed, peaking at 26% in 2013, while remaining above 14% until 2022.[116]

Conclusion: We need better incentives

The economic consequences from the typical policies used to address global climate change argue for a reframing of the issue. The typical framing of the problem as the need for government to either internalize the cost of the externality or directly subsidize low carbon technologies with income transfers is unhelpful due to two realities with respect to GHG emissions. First, it is not feasible for policymakers to set a carbon tax equal to the optimal carbon tax that would efficiently internalize the GHG externality because of the imprecision of estimating the SCC. Second, the binding constraint preventing the desired amount of GHG emissions is inadequate technology. Subsidizing inadequate technology will predictably cause large economic costs, and stifle innovation.

Taking these conditions to be true, then empowering market participants to alleviate the technological constraint would appear to be the most effective means to address the externality problem. Achieving this goal requires global warming policies to incentivize broad-based market-driven technological advancement, without picking winers and losers. This requires new kinds of technologically neutral, broad-based positive incentives that do not transfer income, but rather reward success.

116 https://www.macrotrends.net/global-metrics/countries/ESP/spain/unemployment-rate#:~:text=Spain unemployment rate for 2022,a 1.15% decline from 2018.

CHAPTER 4

WHAT SHOULD GOOD POLICY DO?

Wayne Winegarden

The costs associated with carbon taxes and green technology subsidies, coupled with the need for continued alternative technology innovations to sustainably reduce the GHG externality, argue for an alternative policy approach. The goal of this policy approach should be incentivizing broad-based market-driven innovation.

Defining the goal as incentivizing an activity (e.g., encourage the development of low- or zero-emission technologies) instead of discouraging an activity (e.g., internalize the GHG externality to reduce consumption) clearly illustrates that imposing negative incentives (e.g. costs) on the economy is a less efficient approach. Instead, policies should focus on directly creating positive incentives that encourage the development of lower-emission energy sources, production methods, and products.[117]

Unlike negative incentives, positive incentives encourage specific behaviours. When provided positive incentives, the actions of people are known with greater certainty – more people will be driven to undertake the now incented activity. For instance, lowering the costs from current fiscal, regulatory, or trade policies encourages producers and investors to make more investments, faster, which accelerates the deployment of more efficient, lower emission technologies.

How positive incentive policies are implemented matters. Policies that create positive incentives to develop innovative alternative energy solutions already exist. In the United States, these positive incentives can take the form of tax credits (either the investment tax credit (ITC) or the production tax credit (PTC)) that create positive incentives to innovate within the specified solar or wind energy resources. As discussed in the previous chapter, such targeted positive incentives often fail to realize their lofty aims. By favouring specific energy sources, targeted credits amount to wealth transfer subsidies that marshal resources toward politically favoured technologies rather than toward broader technological innovation and deployment.

They distort markets, bestow the greatest benefit on the largest firms, and are inaccessible to smaller, more innovative entrepreneurs. And even worse than that, they make otherwise inadequate and uneconomic technologies artificially cheaper to superior technologies, blocking their further innovation and potentially driving them out of the market. For instance, the PTC for wind is so generous that wind producers can sell power to the grid at negative prices and still earn a profit due to the subsidy. This disincentive has driven numerous nuclear power plants across the US into bankruptcy. The counterproductive consequence is that the wind PTC has destroyed part of the US zero-emission baseload capacity.

117 The Grace Richardson Fund (GRF) has pioneered the concepts of Clean Tax Cuts (CTCs) and the sub-category of Decarbonisation Tax cuts (DTCs). Several policy institutes are currently incorporating the concepts examined in this paper into specific policy proposals that are intended to incent innovations in low- or zero-emission technologies, including the Climate and Freedom Accord (CFA) discussed in Chapters 3 and 4. The concept for this paper comes from attending GRF policy design charrettes and discussions on the CTC concept. The economic evaluation of these concepts are the authors, and do not necessarily reflect the views of GRF or any other policy institutes developing CTC proposals. Briefs on such proposals can be found here: https://cleancapitalistleadershipcouncil.org/proposals/.

Ultimately, the best solution for lower- or zero-emission technologies is not known with certainty. Explicitly subsidizing favoured technologies risks misallocating capital away from other potential low emission sources, which might be more effective solutions than the subsidized technologies. The opportunity cost from this policy could be high if these more effective solutions are either delayed, or not developed at all, due to the misallocation of capital away from these potential solutions toward the favoured technology.

Instead of favouring specific technologies, the appropriate positive incentive incentivizes the end goal (e.g. lower- or zero- GHG emissions) rather than the means for attaining this goal (e.g. specified power sources such as wind or solar, or specified technologies such as electric cars). Such an outcome is best promoted via broad-based fiscal policy or regulatory policy changes.

The overarching concept is to alter the fiscal, trade, or regulatory environment to reduce or eliminate government created costs and barriers such as taxes, subsidies and regulations that block market access. Toward this goal, it is imperative that the positive incentives be technology-neutral to encourage the development of the most economically efficient alternatives possible, including those unknown to policy makers; and, the cost reductions should be applied across broad sectors including transportation, electricity, real estate, oil & gas to overcome the problems created when governments subsidize politically favoured solutions.

While the cost reductions can be achieved through tax policy changes, regulatory policy changes, or trade policy changes, the economic value from these positive incentive policies are presented in this chapter using changes in tax rates for tractability purposes. Although presented from a tax perspective, there are many other potential policies that would also establish technologically neutral positive incentives, and a similar economic logic holds with respect to how these other policy changes would incentivize beneficial innovations.

Using broad-based marginal tax rate reductions (or the ability to earn income tax-free) creates a positive incentive to overcome the binding technology constraints.[118] Put more precisely, reducing the marginal tax rate on companies developing low- or zero-emission resources reduces the cost of capital for a broad number of potential low emission technologies.[119] The lower cost of capital increases the relative profitability from developing low-or zero-emission technologies, positively incentivizing technological innovations. The greater availability of economically viable low- or zero-emission resources would, consequently, enable a significant decrease in the amount of the GHG externality.[120]

118 Acemoglu, D., Aghion, P., Bursztyn, L. & Hemous, D. (2012) "The environment and directed technical change" *American Economic Review* 102, 131–166.

119 The lower tax rates will reduce federal tax revenues if the tax reductions are successful in incenting the low emission technologies. The economic impact from the tax preferences will depend upon the fiscal response of the government. Policies, such as 100% capital expensing in the year new equipment was purchased can lower the average tax rate for companies who would deploy the lower- or zero-emission resources and could incentivize the demand for economically viable lower- or zero-emission technologies.

120 It should be noted that the reduction of GHG emissions may reduce other pollutants as well. These reductions are appropriately viewed as a positive externality of a policy that alleviates the currently technology constraints regarding low-emission technologies.

Creating a positive incentive directly encourages innovation and creates subsequent benefits as the learnings gained will build upon one another fostering a more robust research ecosystem. Marginal tax rate reductions that reduce the tax costs for innovators who introduce profitable new low-emission technologies focus policy on overcoming the technology constraints rather than punishing the economic activity that created the emissions. The increased incentive to develop the desired technologies would lead to an increase in economically viable low-emission technologies.

There are several knock-on benefits from such a broad-based positive incentive approach toward addressing the risks associated with global climate change. Due to the interconnectedness of emissions, the reduction of GHG emissions may reduce other pollutants as well.

Beyond the additional environmental benefits, policies that focus on relieving the technology constraints may also have political benefits. Likely connected to the economic costs associated with carbon taxes and cap-and-trade regulations, there has been widespread political resistance to implementing carbon tax policies in practice. Policies geared toward eliminating the technology constraint (which create positive incentives for the economy rather than imposing negative incentives on the economy) may be more politically viable than either the carbon tax or cap-and-trade policies. Therefore, the political viability of policies geared toward alleviating the technology constraints may be easier to implement.

Finally, by avoiding the need to impose additional costs on production and consumption, positive incentive policies have the potential to address the risks associated with climate change without imposing the large economic burdens associated with policies designed to dis-incentivize, or punish, GHG emitting technologies.[38]

A comparison of marginal tax cuts to carbon taxes and cap-and-trade programs

Compared to negative incentives, marginal tax rate reductions (either on equity or debt) have a fundamentally different economic impact. Leveraging the arguments presented in Chapter 1, consider the economic impact imposed by a carbon tax. A carbon tax imposes a deadweight loss on the economy, like any tax. In this case, the deadweight loss leads to some combination of less energy output from fossil fuels, higher costs to energy customers, and less revenues to energy producers. Offsetting this reduced energy output from fossil fuels, the demand for energy from alternative sources will increase. However, the technological constraints discussed above will limit the increase in the supply of these sources, indicating that the higher demand will put additional pressure on energy prices to rise. While the particulars will differ slightly, a cap-and-trade program has the same economic impacts.

These economic costs, in turn, can lead to political constraints that reduce the effectiveness of using negative incentives in practice. Ball (2018) documents that of all the carbon taxes

implemented, only one percent reach the prescribed tax levels, and most fall well short of the tax levels that the High-Level Commission on Carbon Prices has recommend as necessary to achieve the Decarbonisation goals of the Paris Agreement.[121] As argued above, there is also great uncertainty whether this recommended price is the "correct" price for carbon as well.

Furthermore, experience with the passage of different climate policy instruments suggests that the political economy of positive incentive policies is vastly more favourable than that of carbon taxes and cap-and-trade systems. Extensive research has sought to explain these differences, for instance by looking at the distribution and scale of winners and losers under alternative policies, and how that affects lobbying and voter preferences (e.g. Meckling et al., 2015).[122]

Since carbon taxes and cap-and-trade programs raise revenues for the government, the use of these funds also needs to be considered. One option often proposed is to spend these revenues on clean technologies, but such an option is not guaranteed and, more importantly, since revenues from taxes and other public policies are fungible, the revenues from a carbon tax effectively accrue to the general budgets and simply represent a tax increase on the economy. Further, spending the higher tax revenues means that the negative economic impacts from the carbon tax are not offset, meaning the full deadweight losses of the policy will be felt. The other option is to offset the carbon tax increase with tax cuts elsewhere. However, offsetting the carbon tax increase with other tax decreases is unlikely to fully offset the economic costs. Either way, applying negative incentives imposes costs on the economy.

Contrast now these negative economic impacts with the economic impacts from the marginal tax rate reduction policy. There are several benefits associated with a policy of marginal tax rate reductions. Paramount among these benefits, the policy creates a positive incentive for individual entrepreneurs and businesses to discover the low- or zero-emission technological solutions that incant economic growth rather than detract from economic growth. Further, the policy achieves this while avoiding the unknown impacts created by a negative incentive.

In the broadest sense, marginal tax reductions can be implemented as a tax cut on equity and/or a tax cut on debt. If implemented as a tax-preferred equity income, then one way to do this might be as a performance-based reward. Through innovation, companies in high emission sectors might earn reduced tax rates on income associated with the sale of new, lower emission products that achieve substantial reductions. The preferential corporate income tax rate – below the 25 percent "main rate of corporation tax" rate[123] – increases companies' expected returns from investing in lower- or zero-emission technologies.

121 Ball J (2018) "Why Carbon Pricing Isn't Working" *Foreign Affairs*, July/August.

122 Meckling, Jonas, Nina Kelsey, Eric Biber, and John Zysman (2015) "Winning Coalitions for Climate Policy." *Science* 349, no. 6253 (September): 1170-1171. https://doi.org/10.1126/science.aab1336.

123 "United Kingdom: Corporate – Taxes on corporate income" PWC, https://taxsummaries.pwc.com/united-kingdom/corporate/taxes-on-corporate-income#:~:text=General%20corporation%20tax%20rates,in%20excess%20of%20GBP%20250.000.

Reducing corporate income taxes increases the returns companies can pay equity investors. In the limit, applying the tax benefits completely to the company, a full tax exemption on profits expands net income by 33%. In response to these higher profits, it is likely that the demand for investment capital will increase, attracting more capital and more businesses into the industry. The higher demand will put downward pressure on returns and, at the most, drive the profitability of the companies back toward their pre-benefit levels. While the new profitability rate is unknown, the amount of capital devoted toward the low-emission technologies will be higher. In this way, the tax benefit will have served its purpose of incanting more investment into creating or deploying energy technologies that emit lower- or zero-GHG emissions. In other words, equity DTCs would have important "additionality" impacts.

From a government revenue perspective, the reduced tax revenues (on a static basis) from the preferred tax rates on profits only occur if the technology is successfully developed and profitably sold. Put differently, the cost to the government in terms of reduced tax revenues only occurs if the equity tax reduction has successfully encouraged the desired behaviour.

If implemented as a tax cut on debt income, then investors holding these tax-free bonds (or tax-free interest income on loans, depending upon how the incentive is structured) would not owe any taxes on the interest the investors earned. Due to the tax deductibility for bond holders (or lenders), companies could issue bonds at below market rates and still attract lenders. In the limit, the interest rate offered bond holders could fully reflect the value of the zero (or lower) tax burden compared to the income tax rates of 20% (basic rate), 40% (higher rate) or 45% (additional rate) depending on the investors' income thresholds.[124] In this case, bond holders would then earn the same after-tax return as the typical bond holders, however the costs of borrowing for the companies will be significantly lower. The reduced cost of capital increases the expected profitability from potential low-emission technology investments. Similar to the reduced equity cost, the reduction in the cost of debt would attract more capital toward low- or zero-emission projects, which is the purpose of the incentive.

Unlike the corporate income tax reductions, the government forgoes tax revenues when the debt is issued. At this stage of the development process, it is unknown whether the potential innovation will be successful; therefore, the tax benefit occurs regardless of whether the technology is successful. Some firms will receive the benefit, but not successfully create technologies that reduce emissions. In the case of project failure, the borrower will likely default, the debt will be settled as far as possible, and the tax expense will cease when interest payments end. The benefit to the firms and the investors ends at that point.

Therefore, relative to the tax preferences for equity, tax-free debt imposes a more certain revenue loss on the government since investors receive the preference regardless of success. Alternatively, tax-free debt provides a more certain benefit for investors. Offsetting

124 "United Kingdom: Individual – Taxes on personal income" PWC, https://taxsummaries.pwc.com/united-kingdom/individual/taxes-on-personal-income.

these impacts, debt instruments are typically available to larger firms that are pursuing less risky ventures. Consequently, although the tax benefits will be paid regardless of the project's success, the projects financed by issuing debt may be (everything else equal) less risky.

Policy Implementation of Decarbonisation Tax Cuts (DTCs)

There are many important implementation considerations and complexities to consider before implementing policies that create broad-based positive incentives. How the tax reductions are implemented – on profits or to debt holders – matters. While reducing, or eliminating, the taxes on either tax base will increase the expected after-tax rate of return from producing and investing in these lower emission resources, equity tax cuts have different advantages compared to tax cuts for holders of debt. Therefore, the value of the specific tax preferences will vary depending upon the policy goal.

Theoretically, tax-free debt should raise fewer industry specific issues (e.g. it is easier to apply the incentives to a wider scope of industries). As with the current capital markets, the best interest rates will be secured by larger firms with the best credit rating pursuing low risk incremental innovations. Equity preferences should be more valuable for smaller firms / start-ups who will typically have less access to debt markets and who may be pursuing more transformative innovations.

Offering tax reductions on corporate profits increases the expected after-tax income from innovative low-emission projects. The higher expected after-tax profits will make it easier for firms attempting to raise capital to invest in these potential projects, regardless of outcomes. Through this process, corporate income tax reductions will also create more potential experiments. However, the incentive for greater experiments is generated by raising the expected profit from sales of a successful product rather than lowering the cost of experimentation. An important advantage of tax reductions on profits is the lower cost to the government because tax revenues are only impacted when successful innovations are brought to market.

Due to the profit criteria, tax cuts on corporate profit only reward technologies that are both technologically and economically viable. Companies will only earn a profit if consumers purchase the product. If consumers are voluntarily purchasing a company's lower-emission energy resource, then the product is providing them with clear value. If the technology also meets the emissions and dispatchability qualifications, then the energy source can be viewed as an economically sustainable lower-emission source. In other words, the tax reduction has incentivized the desired policy goal.

It is also easier to scale the tax benefits on profits based on the observed emission performance or indeed other environmental or efficiency performance metrics, say, for water pollution or dispatchability, for instance). Taxing profits, consequently, allows the policy to set different reductions in tax rates to predetermined emissions benchmarks. The actual corporate profits tax paid will then reflect the technology's ability to meet the intended policy goal – the better the technology is able to meet these goals, the lower the tax burden on the company.

The equity Decarbonisation Tax cut proposal in the Climate & Freedom Accord follows this performance-based qualification for the tax rate cut. The proposal suggests a 5-percentage points tax rate reduction (a performance bonus) for the highest performing firms in a sector, and a sliding scale for lower performance. For example, tying the automobile industry's tax rate rewards to the reduction in the average vehicle fleet emissions provides a simple method of rewarding those manufacturers able to meet outperforming emissions reduction goals.[125]

Debt works differently. Performance-based options are not possible with debt because the actual emissions performance is unobservable when the tax reductions are offered. As already highlighted, offering tax reductions on debt provides very different incentives compared to the incentives created by offering tax reductions on profits. By rewarding effort rather than outcomes, tax reductions on debt make it easier for entrepreneurs and companies to experiment with new technologies, because the tax reduction policy directly lowers the costs for trying. These tax benefits will likely encourage more experimentation by making new technology cheaper.

Another advantage of applying lower-emission tax reductions to debt is the relative ease of implementation, economy-wide. Almost all sectors use debt. Many of the sector specific questions that need to be addressed on the profit side do not arise, although a mechanism for ensuring that the debt proceeds are directed toward low-emission projects is necessary.[126] Compounding these benefits, the lower cost of debt increases the return to capital, which will then encourage greater equity investments as well. In other words, companies and entrepreneurs can leverage the tax benefits on issued debt to expand the total amount of resources they can devote toward low-emission innovations. The costs from this approach, however, are higher revenue losses for the government and unsuccessful ideas will benefit to the same extent as successful ones.

While the discussion above has used marginal tax rate reductions on debt and equity to exemplify the policy approach, there are many other ways to use fiscal, regulatory, and trade policies to create positive incentives for innovation. While far from exhaustive, these policies include changes to depreciation allowances and changes to trade policy. Indeed, perhaps the largest component of the Accord, the Rapid Innovation Bonds and Loans – which may be pooled in Rapid Innovation Funds (RIFs) for cross-border investment – are also designed to replace subsidies by making debt for property, plants, and equipment (PP&E) and conservation expenses tax exempt. These will be discussed at greater length in the next Chapters.

125 https://cleantaxcuts.org/wp-content/uploads/char-art-transp-cafectc-adams-170301-170414.pdf

126 Since debt cannot be used to reward performance, the CFA proposes tax exempt debt (RIFs) be used instead to mobilize and accelerate the flow of external capital, and to lower the overall cost of new investment, without picking winners and losers. This will tend to accelerate the adoption of new innovations, including decarbonizing innovations, but without specifically targeting metrics of emissions reduction, or specific qualified technologies. In addition, if accompanied by equity DTCs, the DTCs will tend to direct the accelerated capital flows stimulated by RIFs to investments in decarbonizing product innovations.

CHAPTER 5

IMPACTS FROM COMBINED FREE MARKET CLIMATE POLICIES

Diego Sanchez de la Cruz
Prof Santiago Calvo
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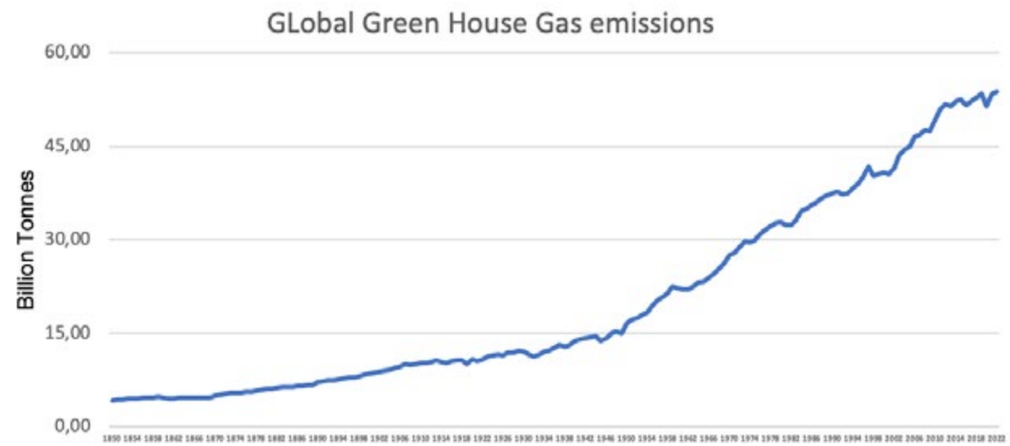
This chapter examines the economic and environmental impact of combining a full spectrum of free market climate policies. We consider first the evidence that specific free market policies have decarbonizing impacts, and second, how free trade, full competition, classic economic and property rights, and low supply side taxes work best when combined together to accelerate decarbonizing innovation. In particular, we focus on the core proposals of the Climate & Freedom Accord (CFA), examining how decarbonizing tax cuts for debt versus equity investments must work differently from each other, but together, deliver a greater impact than either alone. Developed along with the Instituto Juan de Mariana, it offers Spanish context and learning experiences that may have escaped readers in the West.

More Freedom, Better Conservation.

Global greenhouse gas (GHG) emissions have increased significantly over the past decades. As shown in the following figure, this rise barely slowed down due to the coronavirus pandemic in 2020. Greenhouse gas emissions now exceed 50,000 million tons, which represents an increase of more than a quarter in just the last decade.

FIGURE 1

Global greenhouse gas emissions since 1850, in billions of tons.



Source: Our world in Data

In recent years, numerous movements have emerged promoting different strategies for reducing GHG emissions. One formila gaining popularity is the thesis of degrowth. This is a socioeconomic theory mainly defended by left-wing authors and activists who advocate for the controlled and planned reduction of production and consumption. Degrowth proponents argue that perpetual economic growth is unsustainable, a claim they justify by speaking of the planet's ecological limits. They believe that the overexploitation of natural resources and greenhouse gas emissions derived from mass consumption are leading us to an environmental crisis, proposing a reorientation of the economy towards less dependence

on the consumption of material goods, thus reducing environmental impact and promoting more sustainable ways of life.

Degrowth promoters can test the practical application of their ideas by reviewing the results of the recent COVID-19 pandemic. As already indicated, emissions slowed down in 2020 at the cost of halting production and manufacturing supply chains on a global scale. The result was indeed a reduction in global emissions of around 4%. It is the largest reduction in history. However, the costs associated with this correction were immense.

According to available data from the World Bank, between 2019 and 2020, the number of people living in extreme poverty increased by 72 million, that is, an increase of 11.3%[127]. In 2023, 691 million people live in extreme poverty worldwide (8.6% of the total). This is just below the level recorded before the pandemic. In other words, due to a social experiment similar to that advocated by degrowth activists, the world has lost three years in the fight against poverty.[128]

Furthermore, this recovery has been uneven, as while middle-income countries have returned to normal, lower-income countries, more affected by fragility and instability, are poorer than before COVID-19.

To achieve the Paris Climate Agreement goals through degrowth, it would be necessary to implement measures similar to those of the pandemic every year for a decade. "This demonstrates that the solution was never to stop flying or settle for less." points out author John Norberg. "Large emissions are integrated into our social infrastructure and energy systems, so solutions must be technological rather than restrictive."[129]

Similarly, a report by the Spanish research institute, the Foundation of Applied Economic Studies, (Fedea) has estimated the cost of following a degrowth agenda in Spain. Degrowth emphatically means worse economic outcomes. Between 2019 and 2050, the proposal to replace consumption with leisure reduces family consumption capacity by 17% and GDP by 24%, while curbing total factor productivity impoverishes households by 42% and collapses GDP. Penalizing fossil fuels, although less drastic, also impoverishes families (-3.5%) and reduces GDP (-1.5%). Such theories should be discarded.

As Diana Furchtgott-Roth, adjunct professor of economics at George Washington University, highlights:[130]

127 Pandemic, prices, and poverty (worldbank.org)

128 For more information, please refer to the following World Bank information note: <https://blogs.worldbank.org/en/opendata/poverty-back-pre-covid-levels-globally-not-low-income-countries>.

129 Johan Norberg, *El manifiesto capitalista. Por qué el libre mercado global salvará al mundo*, 2024, Ediciones Deusto.

130 Furchtgott-Roth, D., "Developing Countries Need Modern Energy, Not Climate Reparations", *The Heritage Foundation*, 2022. Disponible en: <https://www.heritage.org/energy-economics/commentary/developing-countries-need-modern-energy-not-climate-reparations>.

> Indeed, having a reliable, secure, and relatively affordable energy supply is crucial for economic growth, which is, in turn, an essential pillar for improving people's lives. Insisting that developing countries refrain from using conventional fuels such as natural gas, coal, and nuclear energy limits the ability of these emerging economies to consolidate industrialization processes and raise their citizens' living standards. Energy has been essential in providing a supply that enables the continuous and regular operation of factories, businesses, hospitals, homes... Therefore, the adoption of new solutions with lower environmental impact, such as renewable energies, must be done gradually and with a market-driven approach. Otherwise, Western economies risk stagnation, and developing countries may end up permanently trapped in a spiral of mediocrity that blocks their escape from misery.

Industrial development and upward economic mobility in developing countries depend on access to a competitive energy mix. Only on this basis can productive structures be consolidated that are sophisticated enough to progressively reduce the environmental footprint of production.

Successive UK governments have imposed energy solutions *based on existing technologies* that are unable to produce dispatchable electricity, that is electricity that can be supplied on demand and adjusted to meet the economy's needs. Innovation could produce better energy solutions, but any new solution must presently compete with subsided, but inadequate, technology. This has produced a situation where Britain faces the highest electricity costs in the world, for both consumers and producers.

Economic Freedom, Productive Efficiency, and the Environment

The common denominator of most climate strategies proposed by national governments and international organizations revolves around the general adoption of emission reduction targets enforced by carbon taxes and allowances. The challenge is to align these targets with development and well-being by adopting measures that facilitate technological innovations resulting in lower GHG emissions. These innovations should minimize the environmental impact by making the production of goods and services more efficient.

Countries with higher levels of economic freedom show higher levels of environmental performance. This is demonstrated by Figure 2, which shows a strong positive correlation between the Economic Freedom Index developed by the Fraser Institute[131] and the Environmental Performance Index of Yale University[132]. The former rates the degree to which a country's policies and institutions encourage voluntary exchanges, the freedom to participate and compete in markets, uphold the rule of law and private property rights. For its

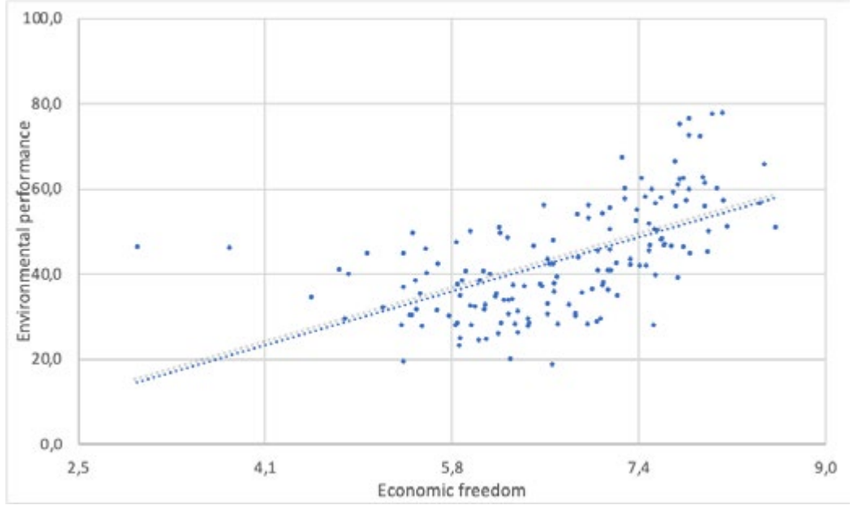
131 Gwartney, J., Lawson, R., Murphy, R, et al., "Economic Freedom of the World", *Fraser Institute,* 2023.

132 Block, S., Emerson, J. W., Esty, D. C., de Sherbinin, A., Wendling, Z.A., et al., "2024 Environmental Performance Index", *Yale Center for Environmental Law & Policy*, 2024.

part, the Environmental Performance Index presents a very comprehensive sustainability measurement, based on 58 indicators and presented in ratings ranging from 0 to 100 points.

FIGURE 2

Relationship between economic freedom and environmental performance in the world, 2021.



Source: The author's calculation based on Fraser Institute and Yale University.

From the cross-referencing of the Economic Freedom Index and Yale University's studies, we can conclude that countries that opt for a more intense capitalism model also achieve more satisfactory results in metrics such as improved air quality, drinking water, waste management, and many other metrics related to environmental preservation and climate impact mitigation.

This strong correlation between greater economic freedom and better environmental performance is explained by four major factors:

- **Private Property and Its Incentives for Conservation**: Private property and market system incentives make people take better care of their environment. When individuals own and directly manage resources, they have a much stronger motivation to preserve and improve them, while avoiding overexploitation and the inefficient conflicts typical of communal ownership and management.

- **Open and Competitive Markets Foster Innovation and Efficiency**: Competition drives investors and producers to develop cleaner technologies and more efficient processes. They do so because this improves productivity (leads to lower cost per unit), and has as its unintended consequence the mitigation of the carrbon footprint on natural environments. Hence, the fact that more liberalized economies present higher levels of investment in research and development, facilitating the creation of greener and more sustainable technologies.

- **Greater Wealth Facilitates the Financing of Mitigation and Adaptation Tools**: Economic growth, derived from economic freedom, provides the resources necessary to continuously invest in better environmental protection. Mitigation and adaptation are as necessary as they are costly. Therefore, richer countries can afford to implement some environmental regulations whose implementation costs would be unaffordable in less prosperous economies. They also have the capacity to fund ecological initiatives that favour conservation, such as the modern water treatment and waste management systems we see in the developed world. Additionally, there are social preferences, as people from richer and more prosperous societies tend to prioritize environmental protection when their basic needs are adequately met. Richer countries are also able to export these emission-intensive industries to less developed countries. However, this is not a cynical comment, the developing country benefits from employment and export income while the developed country benefits from cheaper imported goods and less local pollution. However, from a global perspective, improving technology would benefit both developed and developing countries.

- **Free market policies (trade, competition, low taxes) make investments cheaper:** When new investments become cheaper, and face fewer government-imposed barriers, the latest, cleanest, most efficient technologies are deployed faster and in greater numbers. Freedom accelerates the pace of innovation, Decarbonisation and technology transition, simply by reducing costs and burdens. Many developed countries have ignored this factor by mandating existing technology such as electric lithium battery vehicles, when more efficient combustion engine e-fuels, hydrogen fuel cell vehicles, hybrids or improved battery technology could be better long-term solutions. If for no other reason than because they do not rely on limited rare earth minerals.

As seen in Figure 3, differences in economic freedom can lead to very different environmental outcomes among different countries. Under market models, there is a greater capacity for environmental management and adaptation to natural disasters, in contrast to what happens in less free economies, which tend to face worse indicators in this field. This contrast highlights the importance of economic freedom as a variable capable of underpinning both economic prosperity and long-term environmental sustainability.

The Role of Growth.

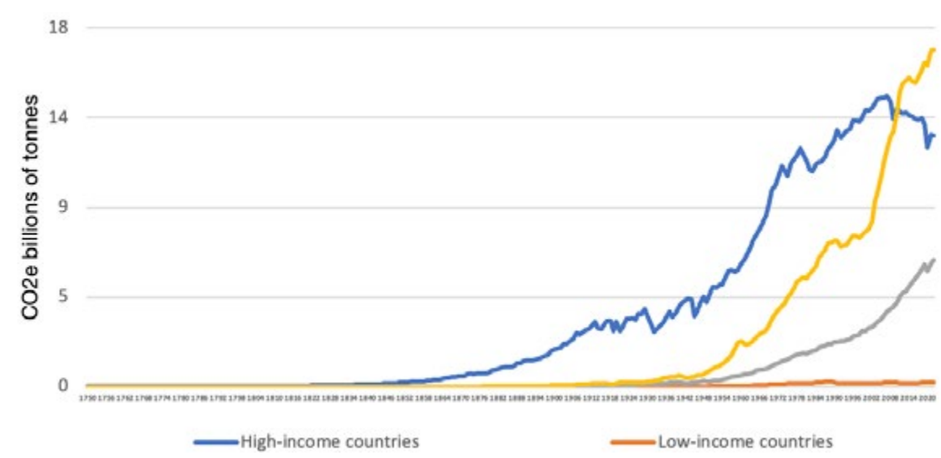
As outlined in the previous pages, having formal and informal institutions that favour the development of freer and more competitive markets is not incompatible with promoting environmental care policies. The evidence shows that freer markets bring both prosperity and better environmental performance.

In Figure 1, we saw the global evolution of emissions. The trend was clearly upward. However, this exercise ignored country differences. This is not a minor issue, as higher-income economies have been reducing their contribution to greenhouse gas emissions, especially carbon dioxide (CO2), for two decades.

Specifically, in the last fifteen years, these countries have reduced their CO2 emissions by 14%. Therefore, the growing trend of recent years is not due to richer countries but to middle-income countries increasing their production without yet achieving a lower volume of greenhouse gas emissions. This is reflected in Figure 4.

FIGURE 4

CO_2 emissions by country income, in billions of tons

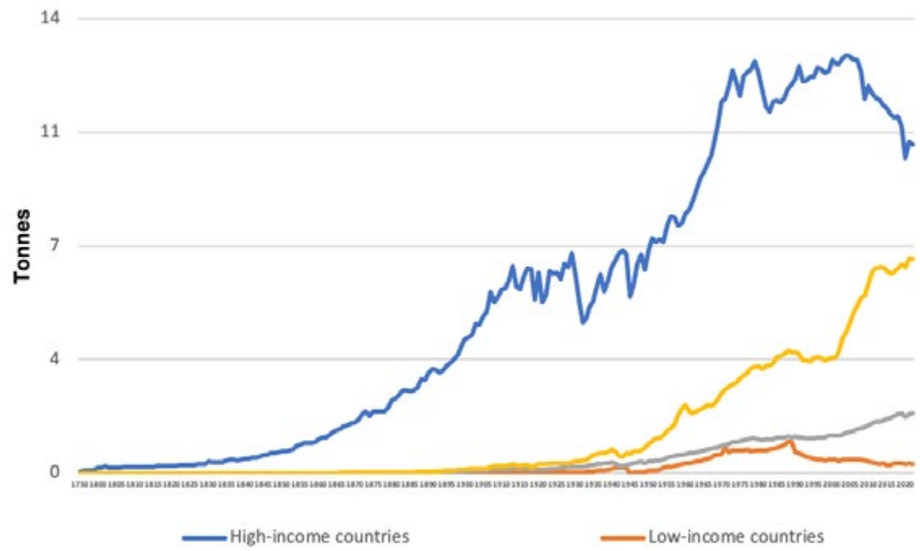


Source: Our world in Data

The key to the positive evolution of developed countries lies in innovation and efficiency as well as trade. Developed economies have been able to leverage their economic and technological resources and drive a production model capable of bringing about very significant advances leading to greater sustainability. Since 2006, shown in Figure 5, developed countries have reduced their per capita emissions by almost 20%. This reflects their commitment to environmental protection as well as the conversion of their economies towards greater service provision and high-value, less energy-intensity manufacturing. They also use their wealth to import their emission-intensive base materials from middle-income countries.

FIGURE 5

Evolution of CO2 emissions per capita, by type of country, in tons.



Source: Our world in Data

That is, as countries with deeper market economies reach a higher level of income, they not only increase their capacity to invest in infrastructure and services but also facilitate the introduction and deployment of innovative new technologies, ranging from renewable energies to advanced energy efficiency systems. Growth and decarbonisation go together. R&D research also pays off by crowding in more investment. Tech hubs like Silicon Valley, Cambridge and Shenzen demonstrate the point, as technology and workers are as mobile as possible.

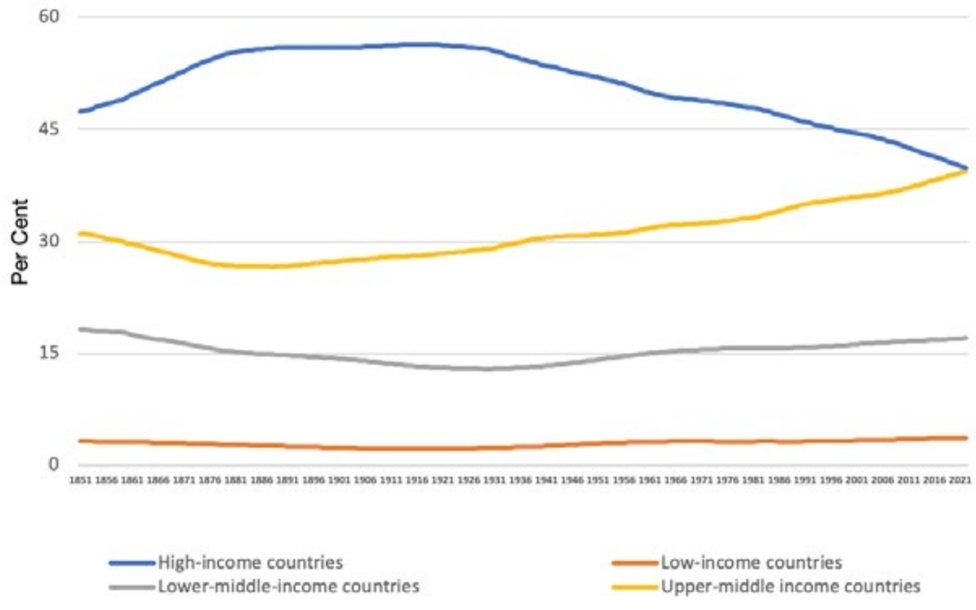
This trend shows that, while developed countries have managed to reduce their contribution thanks to free markets, trade and the innovation they produce, middle income country emissions continue to increase as these countries develop and build infrastructure. Low-income countries, produce very few emissions in total or on a per capita basis and so have not yet reached the necessary levels to need to mitigate their environmental impact.

Concern for the environment develops when populations have adequate amounts of necessities such as food, shelter, clothing, transport and energy. Consequently, growth and wealth derived from economic liberalization, facilitates the adoption of more efficient technologies and practices which in turn lead to lower GHG emissions and an improved environment. In marked contrast, interventionist policies that limit economic liberalization can hinder the adoption of more efficient technologies, reducing the capacity of countries to reduce their environmental impact.

Therefore, it is crucial to evaluate global strategies and consider alternative approaches that promote sustainable economic growth and technological innovation to more effectively address the challenge of climate change.

FIGURE 6

Proportional contribution (%) to global average surface temperature change by country income.[133]



Source: Our world in Data

The trend of greater efficiency and less pollution in developed economies can be explained through the Environmental Kuznets Curve (EKC). This theory suggests that in the early stages of economic development, environmental degradation increases in parallel with rising emissions, reflecting a state of affairs where countries prioritize economic growth over environmental protection.

However, as countries reach a higher level of income and development, they begin to have the resources and technology necessary to reduce their environmental impacts. In this phase, institutions strengthen, and stricter environmental policies are implemented, promoting sustainable practices and facilitating the adoption of cleaner technologies. Thus, the Environmental Kuznets Curve describes the inverted "U" relationship that economic development and environmental preservation would have. Lower-income countries are still on the ascending part of the curve, increasing their emissions as they accelerate their escape from poverty, while developed countries are on the descending phase, having a greater capacity to reduce their environmental impact through innovation, regulation and trade.

What role does economic freedom play in shaping the environmental Kuznets curve? Generally, it is postulated that higher levels of economic freedom can lead to better environmental outcomes through mechanisms such as technological innovation and resource use efficiency. However, this relationship is not uniform, and the interaction between the analysed variables varies according to the degree of economic development, the institutional characteristics of each country, etc. However, according to Danish researcher Christian Bjørnskov, societies with a high level of economic freedom have an earlier EKC inflection point, that is, they manage to reduce their environmental footprint at a lower income level than countries with less economic freedom, favouring an earlier transition to less polluting production models.[134]

Countries with high levels of economic freedom tend to be more resource-efficient and quicker in adopting clean technologies. This phenomenon is partly explained by greater competition and lower regulatory barriers that promote innovation and investment in green technologies. Whenever consumers have disposable income and are free to choose, many will demand the most beneficial and harmless options.

Studies have shown that societies with freer markets show greater adoption of technologies that reduce CO2 emissions and other greenhouse gases. Rafiou Raphaël Bétila's estimates that economic freedom has a significant positive impact carbon reduction, both directly and indirectly. Specifically, his research finds that a 1 per cent increase in economic freedom levels reduces carbon emissions by around 0.29 per cent. In fact, renewable energy consumption accounts for between 24.5 and 34 per cent of this total effect.[135] Indeed, research by Bjørnskov shows that countries with higher levels of economic freedom not only innovate more but also disproportionately direct their innovative efforts towards emission reductions and environmental sustainability.

The quality of institutions, an enabling regulatory environment, a solid legal security system and efficient regulation are essential to ensure that economic activities do not degrade the environment. Bjørnskov elucidates particularly how the quality of the legal and regulatory framework significantly contributes to achieving the earlier inflexion points in the EKC, which precisely occurs in countries with high levels of economic freedom. In this sense, having strong institutions and good governance allows the benefits of growth to translate more quickly into effective environmental improvements.

Although most studies focus on CO_2 emissions, it is also important to consider the evolution of other greenhouse gases. Adding the total emissions of different greenhouse gases, Bjørnskov (2024) estimates that the EKC inflexion point is reached with a per capita income close to $80,000. However, in the case of the economies among the 10 per cent of countries with the highest economic freedom, this threshold is reached with a per capita income of $25,000, almost 70 per cent lower. Freedom matters *enormously.* To be clear – 'freedom' here

133 The measurement takes into account the change in global average surface temperature as a result of the amount of cumulative emissions of three gases: carbon dioxide, methane and nitrous oxide.

134 Christian Bjørnskov, "Economic freedom and the greenhouse gas Kuznets curve". *European Journal of Political Economy, 82*, 102530, 2024.

135 Rafiou Raphaël Bétila , "Economic freedom and carbon emissions across the globe: the mediating effect of renewable energy consumption", *Environmental Science and Pollution Research, 30*, 86300-86327, 2023.

means the ability to buy, sell, hold and improve private property within the law and without expriopriation or coersion. It is contract being raised above status and therefore allowing all to bargain on equal terms without corrupting state influence. It is a negative concpetion of liberty.

Sustained economic performance is another clear benefit of economic freedom. The link between economic performance and sustainability is the crucial second arm of how economic freedom can lead to better long-term environmental outcomes. By promoting an environment where businesses can operate freely and compete, more efficient and less polluting solutions are incentivized. High levels of economic freedom have been more effective in reducing their emissions and improving their environmental performance. These conclusions are important for public policy design, as they indicate that promoting economic freedom can be a viable strategy to achieve environmental and sustainability goals. Additionally, the data shows that countries with greater economic freedom not only achieve significant emission reductions but also do so at a faster rate than those with lower levels of economic freedom.

The Cost of regulations purporting to prevent Climate Change

The alarmism regarding the consequences of climate change on economic development should also be highlighted. We know that degrowth is not a viable option and is contrary to emissions reduction in developing economies, which is necessary for a global reduction of GHG emissions.

The uncertainty about the cost of climate change is considerable due to the complexity and variability of the factors involved. The DICE models (Dynamic Integrated model of Climate and the Economy) developed by William Nordhaus attempt to capture this uncertainty by integrating economic and climate data to project future impacts[136]. However, damage estimates at different levels of global warming are highly sensitive to initial assumptions and the accuracy of available data. This lack of certainty is exacerbated by the difficulty of predicting climate tipping points and non-linear effects that can have disproportionate consequences.

Given this level of uncertainty, it becomes essential to use discount rates when evaluating climate policies. Discount rates allow future costs and benefits to be compared in present terms, providing a basis for making rational economic decisions in the face of uncertain events. The choice of an appropriate discount rate is crucial, as it reflects how we value future well-being compared to the present. A higher discount rate reduces the present value of future benefits, which may justify lower current investments in climate mitigation.

136 William Nordhaus, *El casino del clima: Por qué no tomar medidas contra el cambio climático conlleva riesgo y genera incertidumbre*, 2019, Ediciones Deusto.

The implications of choosing a higher or lower discount rate are significant. A high rate may disincentivize investments in mitigation policies, under the premise that future benefits are less valuable. This could lead to greater risks of severe long-term climate impacts. On the other hand, a low discount rate increases the present value of future benefits, promoting greater investment in mitigation now to avoid higher costs in the future. This choice reflects a more precautionary stance towards climate uncertainty.

William Nordhaus argues for using a discount rate of around 4%, based on economic analyses that balance costs and benefits over time. This rate is considered appropriate because it does not excessively devalue future benefits, thus allowing reasonable investment in mitigation that can prevent catastrophic climate damage without imposing unsustainable economic burdens in the present.

The Nordhaus model, predicts the costs of climate change are manageable compared to the more alarmist predictions. According to his projections, the cost of reducing emissions to meet international climate goals would range between 1% and 2% of annual global GDP. This is because the DICE model integrates economic and climate effects in a way that allows for a balanced analysis of mitigation policies. With appropriate policies and a reasonable discount rate, it is possible to limit the negative economic impacts of climate change without incurring prohibitively high costs.

In summary, according to Nordhaus, there are no silver bullets to help us reduce the consequences of climate change at once. The key is to take advantage of the opportunities provided by global innovations across all sectors. Therefore, the proposals that countries like Spain need are those that promote greater freedom to undertake and innovate, and not more restrictions and taxes. This would also be true of the UK which has limited the technology choices for reducing emissions in the near future. Unfortunately adopting some of the most expensive and least efficient solutions.

That is, an effective climate policy must carefully balance costs and benefits, considering the technological and economic adaptation and mitigation capacities available. A pragmatic and evidence-based, market approach should be advocated, considering both the risks of climate change and society's adaptation and mitigation capacities, avoiding hasty and costly measures that might not provide the expected benefits while ensuring sustainable and balanced development.

Supply-Side Policies to Accelerate Decarbonisation.

We have seen that any climate change mitigation strategy must start from the premise that economic freedom is a key variable for resolving both poverty and climate change. To achieve this, it is necessary to accelerate innovation through market liberalization, a vector capable of consolidating freer economies that are also richer, which induces more innovative and ultimately cleaner production models.

Therefore, a proposal capable of driving decarbonisation more effectively and viably involves advancing deregulation and removing barriers to greater market openness to inclusive competition. Such free market streamlining means reducing not only overly stifling and exclusionary rules and regulations, but also reducing key fiscal barriers - taxes, tariffs and fees - that slow the pace of innovation.

Opening up markets stimulates and incentivizes innovation, and lowers the cost of inputs. Reducing key investment tax rates facilitates the financing of more efficient solutions, regardless of the specific technologies involved. The Climate & Freedom Accord (CFA) proposes such a framework, with a two part strategy:

- open up markets to innovation, competition and private-led conservation;
- finance those new opportunities with technology neutral supply-side tax cuts designed to reduce the cost of capital and accelerate capital flows to new and decarbonizing investments.

These accelerated international capital flows also serve a double-duty: they will attract nations to join the CFA free market framework.

With more competitive investment taxation, capital flows will increase, and the costs associated with undertaking new investments will be lower. Such an approach contributes to accelerating the development and implementation of more efficient and cleaner technologies, replacing older, more polluting methods without favouring any particular technology.

A country like Spain or the UK can commit to simplifying market operations through two key measures. The first involves eliminating negative incentives, cronyism and special privileges of conventional climate policies (special tax credits, technology-biased subsidies, carbon taxes, tariffs and trade barriers, monopolistic markets, state-owned enterprises, etc.). The second involves implementing free market policies (free trade, competition in unsubsidized energy markets, clear definition of economic and property rights, low taxes, a simple, streamlined regulatory framework, a framework for private land and resources conservation, with special protection and public access for areas with especially high natural value and beauty, and respect for common law public trust traditions, etc.).

These liberalization measures have the potential to promote foreign investment and economic growth while supporting decarbonisation and technological innovation.

To incentivize and support this shift to freer markets, and to offer a free market consistent replacement for negative and technology-biased incentives (e.g., carbon taxes or subsidies), policymakers should prioritize the use of several kinds of decarbonizing, technology-neutral positive incentives. Specifically, two kinds of existing supply-side tax cuts have a successful track record for promoting growth and decarbonizing innovation. Two more are proposed for the first time in this paper. These two new complementary proposals are Rapid Innovation Funds (RIFs) – on the debt side of the capital markets – and equity-based Decarbonisation tax cuts (DCTs).[137]

Three additional proposals also address specific challenges posed by the need to incentivize (1) a faster shift to competitive markets, (2) more rapid development of high value game changer innovations, and (3) expanded private conservation of natural resources, with the potential to eliminate many percentage points of global emissions.

Full, Immediate Expensing, and Tax Exemption for Reinvestment:

For simplicity, we use “full expensing” to describe 100% capital allowances, policies variously known as “full expensing,” “immediate expensing,” “capital expensing,” or “accelerated depreciation.” Applied in countries such as the United Kingdom and the United States, the goal of these policies is to drive investments, jobs, growth, innovation and Decarbonisation by lowering the cost of investment in property, plant and equipment (PP&E). These expensing policies allow investments in PP&E, and sometimes research and development (R&D), to be expensed quickly or even immediately, to reduce current income (and hence, current taxes) either in the same tax year when made, or within two or three years – rather than slowly over the useful life of the assets created by the investment (perhaps 10, 20, 30 years or more) or, slowly, against future income from the assets or R&D. Expensing quickly or immediately greatly reduces the cost of capital for new investments. Such programs have proven effective in stimulating investment and promoting economic growth, improving productivity and creating a more competitive economy, that, additionally has a lower energy intensity.

In 2017, the United States implemented full expensing for both Property, Plant and equipment (PP&E) and Research and development (R&D), as part of the Tax Cuts and Jobs Act (TCJA). Studies show that the policy (as with the Reagan administration’s introduction of accelerated depreciation in 1981) successfully incentivized business investment and stimulated economic growth by freeing up capital for rapid and continuous reinvestment. It significantly reduces the cost associated with new business investments, promoting equipment modernization and the adoption of more efficient technologies. Although not originally intended for Decarbonisation, studies find that investing in new equipment cheaper generally results in the faster, widespread adoption of the latest, cleanest most efficient technology, thus contributing to a faster reduction in carbon emissions and the more rapid development of decarbonizing innovation.[138,139]

137 Both new proposals are inspired by the Climate and Freedom Accord (CFA), a template for an international free market agreement on climate and sustainable development. The RIF proposal is named *CoVictory Bonds, Loans & Savings Funds (CoVictory Funds) in early versions of the CFA, but also sometimes referred to a*s debt-side clean tax cuts, or *debt CTCs.* (CTC is an acronym for *clean tax cuts*). The CFA called the DTC proposal Clean Tax Cuts or sometimes *equity CTCs, because the same basic tax cut design – a business income reward for reducing a product externality – can also reward pollution reducing innovation*. The CFA can be found here: https://cleantaxcuts.org/wp-content/uploads/climatefreedomaccord-straw-230202.pdf

138 Kyle Pomerleau, “Why Full Expensing Encourages More Investment than A Corporate Rate Cut”, Tax Foundation, 2017. See: <https://taxfoundation.org/blog/full-expensing-corporate-rate-investment>. See also: Andrew Moylan y Andrew Wilford, “What’s the Deal with Full Expensing?”, National Taxpayers Union Foundation, 2017. Available at: <https://www.ntu.org/foundation/detail/whats-the-deal-with-full-expensing>.

139 Alex Muresianu, “How Expensing for Capital Investment Can Accelerate the Transition to a Cleaner Economy,” Tax Foundation,

The full and immediate expensing introduced by the TCJA reform in the United States has had a positive and significant impact, according to available evidence. More specifically, the literature suggests that companies that benefited from this complete deduction increased their investment levels in both PP&E and R&D considerably in the years following the law's implementation.[140] In particular, a study collected by the National Bureau of Economic Research finds that companies increased their investment by 20 per cent compared to what would have happened under an unchanged scenario.[141]

In fact, according to the United States Joint Committee on Taxation, which is the non-partisan congressional body that assists the House of Representatives and the Senate on tax legislation and regulations, this policy particularly benefits those dependent on investments in fixed assets, so sectors requiring low-emission technology and machinery can significantly reduce their tax burden if they bet on such investments. This is precisely what has helped boost productivity and production capacity in key sectors such as industry and technology. In short, "full expensing" has improved the United States' fiscal competitiveness and, at the same time, generated a significant initial economic stimulus, although evaluating its long-term effects continues to be a subject of research.[142]

The United Kingdom has also implemented full expensing of plant and machinery[143] to incentivize business investment in the country. From April 1, 2023, companies subject to corporate tax in the United Kingdom can deduct 100 per cent of their spending on plants and machinery in the same fiscal year in which they acquire such production goods. This significantly reduces the effective tax cost of investment, promoting a continuous investment cycle that renews and improves the economy's capital stock. This policy, initially introduced temporarily in 2021 to stimulate the economy after Covid closures, has become a permanent measure that can help continue stimulating the economy in challenging economic conditions, like the current one.

The current corporate tax model in countries like Estonia also serves as an innovative example of the type of formula that can help promote investment by avoiding double taxation of corporate profits. In the Baltic country, corporate profits are not taxed until they are distributed to shareholders, either as dividends or through share buybacks. This simple and transparent system has significantly reduced compliance costs and improved tax collection efficiency. Furthermore, this formula has contributed to a very dynamic economic environment by promoting reinvestment and facilitating the growth of more efficient and innovative companies. The bet on this reinvestment tax exemption has ultimately positioned Estonia as a leading country in Europe in terms of startups per capita and capital invested per inhabitant.[144] Estonia is also ranked first in the Yale Environmental Performance Index.

To encourage investment in research and development (R&D) and improve business efficiency, Spain could greatly benefit from implementing such a policy. In addition, a full and immediate expensing model would help companies deduct the total cost of their investments in capital assets in the same year they make them, instead of being forced to distribute such tax discounts over several years. This would significantly reduce the cost of capital, incentivizing companies to invest in new technologies and more efficient equipment, which in turn would increase competitiveness and ultimately reduce the environmental footprint. A virtuous cycle.

Rapid Innovation Funds (Tax-Exempt Debt for PP&E and Conservation)

Rapid Innovation Funds (RIFs or debt CTCs) are leveraged, debt-based financial instruments designed to incentivize investments in property, plant, and equipment (PP&E) and conservation projects by exempting taxes on interest income earned[145]. These funds allow companies to issue tax-free private debt, lowering their cost of capital by reducing the interest rates associated with these operations and making it more economical to undertake new investments.

For example, these funds could finance the installation of advanced energy and industrial infrastructure. A company or financier could issue tax-free bonds to finance the construction of multiple projects. For example: new wind farms; geothermal and new nuclear plants; LNG terminals; energy storage systems; or advanced manufacturing facilities. These bonds and loans would attract investors due to the tax-exempt interest while reducing the financing costs for these new plants. New plants are likely to be cleaner and more efficient than older plants.

As we have seen with full expensing, reducing the cost of PP&E accelerates the widespread adoption of the newest, cleanest most efficient technology, whatever the energy source. This modernization would increase the efficiency of the facilities, and the production of cleaner – and also cheaper – energy and products, thereby reducing CO2 emissions while reducing prices for consumers. All without picking winners or losers, but rather, simply by reducing the cost of new investments across the board.

January 12, 2021, https://taxfoundation.org/energy-efficiency-climate-change-tax-policy/#Key

140 Philip Rossetti, "The Effects of the Tax Reform on Energy and Environmental Research and Development," R Street Institute, R Street Shorts No. 103, May 2021, https://www.rstreet.org/wp-content/uploads/2021/05/Final-Short-103.pdf

141 Gabriel Chodorow-Reich, Matthew Smith, Owen M. Zidar y Erick Zwick, "Tax Policy and investment in a Global Economy", *National Bureau of Economic Research*, Working Paper No. 32180, 2024.

142 Joint Committee on Taxation, "Macroeconomic Analysis of the Tax Cuts and Jobs Act as Passed by the House of Representatives on November 16, 2017", 2018. Available at: https://www.jct.gov/getattachment/ec60f967-5eac-44d3-95f3-642ebf8b-160c/x-66-17-5050.pdf

143 Capital allowances: full expensing for companies investing in plant and machinery from 1 April 2023 until 31 March 2026 - GOV. UK (www.gov.uk)

144 William McBride, Garret Watson y Erica York, "Taxing Distributed Profits Makes Business Taxation Simple and Efficient", Tax Foundation, 2023. See: <https://taxfoundation.org/blog/distributed-profits-tax-us-businesses/>.

145 The funds are likely to be borrowing and paying out tax exempt interest, and using the borrowed capital to invest in PP&E projects, and also leverage equity that the funds raise. Funds may be both borrowers and re-lenders, as well as equity investors in individual projects

RIFs and full expensing share a similar goal: reducing the cost of new investment in PP&E, in order to drive both prosperity and decarbonizing innovation. They are not, however, duplicative, but complementary. The difference is that the "full expensing" model is a business expense deduction that frees up *internal capital* for new investment but will be limited by a company's annual revenue or their ability to borrow and repay capital. while Rapid Innovation Funds can provide the flow of *external capital* companies need for new investment. They can work side-by-side to more powerfully reduce the cost and accelerate innovation associated with the means of production.

In contrast to carbon pricing, both full expensing and RIFs provide an alternative method to address climate change. Alternative methods that do NOT take the externality directly into account with a disincentive (as does carbon pricing – which leads to unwanted side effects), but instead use "innovation valuation" as an incentive that lowers the cost of capital for investment and increases the return from the adoption of innovative technologies. In other words, these policies recognize the positive externality of innovation and strengthen that public benefit by reducing the cost of innovative investment. As we shall see, this is a different approach to Decarbonisation versus the other kinds of CFA clean tax cuts discussed below, despite a shared identity as environmentally beneficial positive incentive rewards in the form of technology-neutral supply-side tax rate cuts.

Full expensing is also an existing tax policy, with well researched impacts. RIFs are an entirely new proposal, albeit vetted by multiple expert working groups. While the impacts of RIFs cannot be fully studied until after they are implemented, the similarity to full expensing, the shared goal of reducing the cost of new investment economy-wide, without picking winners or losers, leads to the conclusion that the impacts would be similar. But additive. RIFs have some important capabilities with respect to unlocking external capital, as described below, that full expensing cannot match.

Rapid Innovation funds are specifically designed to drive the development and adoption of clean technologies, accelerating the transition to a low-carbon economy. Above all, they offer an innovative, extremely flexible and inclusive solution aimed at mobilizing all kinds of private capital and channelling it into innovative technology projects. This goal is consolidated through tax-exempt private debt instruments: bonds, loans, savings accounts... These vehicles aim to reduce the cost of capital for those investments developed in relation to the acquisition, construction or improvement of properties, plants, and equipment. The idea is that such investments become more attractive to investors by eliminating taxes on interest received.

This approach can have not just national, but global reach if used as an incentive for nations to join an international free market climate agreement, such as the CFA. This would allow capital raised in any country participating in such a climate pact to be invested without borders in projects developed in any pact countries, thus accelerating international capital flows, expanding free markets, and fostering a reward-based framework for global collaboration on climate issues.

Such cooperation is a crucial aspect of scaling up the impact of such a vehicle. The simplicity and capability for international reciprocity baked into these funds could make them particularly effective in fostering future agreements between countries. By facilitating mutual recognition of tax exemptions, countries participating in such an agreement reduce the risk of regulatory or tax discrepancies that could hinder the free flow of cross-border investments that can facilitate efficiency and thus Decarbonization. This integrated approach ensures that projects can be efficiently financed and deployed on a global scale, accelerating the transition to cleaner energy and technologies worldwide. This is not unprecedented: the OECD has agreed to a global minimum business tax of 15% and global anti-base erosion rules[146]. The CFA, however, shows that lower or even 0% tax rates on capital debt can have important climate, environmental and economic benefits, and so merit exemption from global minimum tax rules.

Developers, financiers, investment funds and banks would be empowered to raise all kinds of tax-exempt private debt instruments (bonds, loans, and savings accounts) with the proceeds either financing individual capital projects or pooled in funds that finance many such projects. These vehicles would reduce the cost of capital for investments in new PP&E or conservation investments, thereby accelerating the pace of technological and environmental investment and innovation.

One of the main advantages of Rapid Innovation funds (and the Decarbonisation tax cuts mentioned below) is technological neutrality. Unlike traditional policies that favour the implementation of some technologies over others through specific subsidies, the proposed incentives do not discriminate between one type of technology or another but rather accelerate the adoption of the latest, most efficient innovations across all technologies. This allows market forces to determine the most efficient and effective solutions for any market or area, avoiding distortions and promoting greater innovation. Not being tied to specific technologies, rapid innovation funds can adapt to a wide range of projects, from renewable energy installations to advanced techniques designed for manufacturing and industry.

Rapid innovation funds offer several advantages over traditional carbon pricing and subsidy methods. By reducing the costs of raising capital, they increase financial leverage capacity and elevate investment profitability, making projects more financially viable. This double advantage attracts more investment in both debt and equity markets, promoting a more dynamic and efficient financial market. Additionally, their flexible design allows their application in different countries, for various objectives, so they can also help other goals, such as combating stagflation, redeveloping 'Rust Belt' areas or financing the reconstruction of areas devastated by conflicts or natural disasters.

These funds are designed to be highly democratic and inclusive, providing easy access to investment incentives for both large and small investors and firms. Such inclusiveness

146 Global Minimum Tax | OECD

contrasts sharply with the complex tax credits that often favour large corporations, excluding smaller operators. By democratizing such scenarios, Decarbonisation acceleration funds help small and medium-sized enterprises (SMEs) and small investors to actively participate in the transition to a low-carbon economy.

A practical example of how an SME could benefit from Decarbonisation acceleration funds would be a company dedicated to installing solar panels in rural areas. Thanks to the incentives provided by these funds, the SME could access a lower interest loan to acquire new state-of-the-art equipment, because the lender would not pay taxes on the interest earned. As a result, the SME could expand its operations and increase its installed capacity, allowing more rural communities to access clean energy and thus reducing their carbon footprint.

Small investors could participate easily, either directly through collective RIF investment funds (set up either as fixed income funds or private equity funds), or via savings accounts, certificates of deposit, pension funds, or even equity investments in companies using RIF financing. Together, these incentives would promote greater inclusion and democratization of investments in innovative and sustainable technologies.

Rapid Innovation Funds also stand out for their ability to promote both economic freedom and environmental sustainability. By aligning economic incentives with climate goals, they create an environment where investments in new technologies and more efficient equipment are not only financially viable but can also generate better environmental outcomes. This ensures that the transition to a less carbon-intensive economy can be both economically and environmentally sustainable, promoting global prosperity and sustainability.

By combining the rapid innovation fund policy with the full and immediate deduction of investments and the reinvestment tax exemption, countries that adopt these policies would become leaders in terms of offering tax incentives for business investment activation and deployment, resulting in more growth and employment, but also more innovation and productive and technological efficiency, with all that this implies for the environment.

Finally, although RIFs are such a new proposal that they have never yet been implemented, we do at least know a great deal about pitfalls to avoid in the design of tax exempt debt markets. The US tax exempt municipal bond market was never designed for efficiency, but rather emerged unplanned, rife with unintended distortions when a Congressional reluctance to tax state debt collided with a progressive tax code, in a framework destined for inescapable cronyism: the borrowers are politicians, and the market makers are political appointees. Policy makers should be careful to understand the pitfalls of such arrangements, and avoid them by sticking closely to the policy design recommendations explained in Appendix A: “How to Avoid the Pitfalls of the US Municipal Bond Market.”

Decarbonisation Tax Cuts

Rapid Innovation Funds – a debt-side tax exemption which makes new capital investment cheaper in order to accelerate innovation in the means of production – should be complemented by equity-side Decarbonisation tax cuts (DCTs) – tax rate cuts (or rebates) that reward the acceleration of core product innovation, targeting clear technology-neutral metrics of emissions reduction, especially in sectors with the greatest carbon footprint.

In this way, we would target innovation both in the means of production and also in the most emissions-efficient products themselves. In addition, we not only accelerate and increase capital flows for all new capital investments, but we simultaneously steer those increased capital flows directly towards decarbonizing product innovation, without picking winners and losers.

Specifically, Decarbonisation Tax Cuts (DTCs) is an innovative proposal within the Climate & Freedom Accord (CFA) that aims to reduce tax rates on business and investor income derived from products achieving outstanding greenhouse gas (GHG) emission reductions.[147] This mechanism of positive incentives, known as equity DTCs, could be aimed at the five key sectors responsible for 74% of the UK’s emissions in 2023: transport (29%), Buildings and product use (domestic emissions) (20%), industry (14%), and electric power generation (11%)[148]. Or they could be directed towards the least productive sources of emission, for example, 5% of UK emissions come from Waste, such as landfill, composting, incineration without energy recovery and wastewater handling

The central idea is to provide a “performance bonus” in the form of a tax reduction for companies that significantly reduce their emissions, thus promoting the rapid adoption of clean technologies without direct government intervention in selecting specific technologies.

The performance bonus could be offered as a 5 percentage point tax rate reduction for the highest performing firms in a sector and a sliding scale for lower performance. The tax cut should apply to both business and investor income tax rates, on the proportion of income from the products responsible for achieving a simple, well reported performance metric of emissions reduction that year.

For example, in the automobile industry, sustainability can be summarized in one number: the average vehicle fleet emissions. So the lower the emissions, the lower the tax rate on business and investor income. From the board room to the shop room floor, every investor and employee owns stock in their automobile company, which gets more valuable as

147 In the CFA, DTCs are called Clean Tax Cuts, or equity CTCs, because they can be applied to other environmental externalities besides GHGs, without picking winners and losers. “Clean” signifies both that these tax cuts mitigate the market failure of negative externalities, and also that they avoid the market distortions caused by government policies that impose barriers and burdens.

148 [30] https://assets.publishing.service.gov.uk/media/6604460f91a320001a82b0fd/uk-greenhouse-gas-emissions-provisional-figures-statistical-release-2023.pdf

emissions and the tax rate is reduced. This tax rate cut reward provides a simple method of aligning corporate culture, from top to bottom, with a goal of emissions reduction.[149]

The metric used would differ from sector to sector because emissions are measured differently in say, automobiles versus power plants versus construction. This appears to be a viable qualification method for the 5 key sectors that produce the most waste or emissions: transportation, electrical power, construction/real estate, and industry.

The importance of equity DTCs lies in their ability to internalize the negative externalities associated with GHG emissions. Instead of imposing a direct carbon price – a disincentive with problematic side effects – equity DTCs increase the return on investment for successful carbon-reducing innovations. DCTs recognize the positive externality and public benefit that comes from decarbonizing innovation and embed that public value into new equity investments with a reduced tax rate. DCTs use positive incentives of "Decarbonisation valuation" as an alternative to the disincentive of carbon pricing and emissions trading schemes.

This positive incentive approach decreases costs and prices, rather than increasing them. DCTs give companies a clear financial incentive to invest in technologies and processes that lower their product emissions, as they will benefit from lower tax rates as well as more efficient processes. In this way, the social cost of GHG emissions is reflected in business decisions without the disadvantages of a carbon tax or emissions trading, such as regressivity, deindustrialization, uncompetitiveness and the off-shoring of production and emissions. DCTs would not only avoid regressivity, they would help reduce deindustrialization, and uncompetitive manufacturing. They would genuinely reduce emissions, rather than simply offshoring them to countries with less restrictive environmental regulations.

The benefits of equity DTCs are manifold. Firstly, this approach encourages competition and technological innovation by allowing innovators, rather than politicians, to choose the most effective technological solutions. This promotes a free market environment where competition between solutions will encourage the most efficient technologies to prevail, accelerating the progress towards Decarbonisation. Additionally, by reducing tax rates based on environmental performance, a continuous incentive is created for companies to not only meet but exceed their product emission reduction targets, as each additional improvement can translate into greater tax savings.

Finally, it's important to emphasize that equity DTCs, and debt-based RIFs are both different kinds of technology-neutral clean tax cuts that promote different pathways to decarbonizing innovation. They are not duplicative, but rather complementary. They multiply each other's impact, beyond what either would achieve alone.

First, the basic mechanism differs: "innovation valuation" versus "Decarbonisation valuation."

149 https://cleantaxcuts.org/wp-content/uploads/char-art-transp-cafectc-adams-170301-170414.pdf

We need to do both. The nature of innovation is such that we never know which innovation is likely to have a larger decarbonizing impact.[150] So it is not enough to promote decarbonizing innovation directly. It is essential to promote all innovation in order not to miss unexpected applications with large unforeseen benefits.

Second, RIFs and DTCs operate in different parts of the capital markets, with different purposes. RIFs most directly promote innovation in the means of production. They also will most strongly accelerate capital flows in large quantities for capital projects. DTCs most directly promote decarbonizing innovation in the products that are most emissions intensive, influencing the products produced by new (and old) capital projects.

Together, RIFs deliver increased capital flows for innovative means of production, while DCTs direct a larger share of those increased capital flows to the development of lower carbon products in sectors responsible for the highest emissions.

Moreover, RIFs and DCTs, together, could have not just national, but global impact, as part of the core framework of an international free market climate agreement like the CFA. Many nations are currently neither taking serious climate action nor pursuing the free market policies that would promote healthy development. RIFs could attract many such nations to join a decarbonizing free market framework that both promotes sustainable development and includes the use of DCTs to directly take the carbon externality into account. The combination could contribute to a globally coordinated approach to Decarbonisation without the need for strict regulations or universal mandates. RIFs and DTCs, together, could replace far more costly, expensive, unpopular and ineffective international climate policies, like the CBAM or emissions trading schemes, with large economic and environmental benefits from the switch. As part of an international agreement, countries can adopt this tax incentive mechanism to attract investments and promote innovation within their borders. This not only facilitates the flow of capital towards clean technologies but also fosters greater cooperation among nations to achieve global climate goals, leveraging the power of the free market and competitiveness to drive sustainable solutions

Implementing DTCs establishes a fundamental strategy to incentivize companies to invest more in clean product innovation to reduce their greenhouse gas emissions. This policy proposes reductions in the corporate tax for those investments in more energy efficient, low-emission products, thus playing a crucial role in the transition to a low-carbon economy. DCTs not only alleviate the tax burden on companies but also stimulate innovation and the development of cleaner technologies.[151]

150 Also different solutions will be more effective in different areas or industries. For example, solar farms will produce more electricity in Spain than in the UK where there is more cloud cover and being further north, less daylight. So perhaps, CTCs that target land use efficiency of solar power would be something Spain, but not the UK, would find useful to legislate. Under the CFA, nations can tailor DTCs and CTCs to differing national needs to accelerate whatever kinds of innovation would be most helpful.

151 Again, an international climate agreement could include this type of policy by creating a reciprocity framework that respects similar kinds of clean tax rate cuts among signatory nations, exempt from any global minimum tax penalties, or national taxes imposed on foreign earnings. This would facilitate decision-making without distortions linked to the different tax rules of each country.

Therefore, linking corporate tax rates to carbon emissions would accelerate the transition to a sustainable economy and ensure that innovations are 'bottom-up' solutions from companies and private operations rather than 'top-down' one-size-fits-all solutions from Governments.

This will be important for the UK where the economy is now 80% services and moving towards the development of Artificial Intelligence, robotics and increased data collection. These new industries require large amounts of electricity just as the government is hoping to convert heating from gas boilers to electric heat pumps and transport to electric vehicles. The most obvious solution will be for developers of AI, robotics and data collectors to develop private electrical production. Hopefully using Small Modular nuclear Reactors rather than diesel generators, but either will reduce the load on the UK's electricity grid. This is not unprecedented. The last remaining aluminium smelter in the UK has its own hydroelectric power supply[152].

While SMRs are already in operation in Russia and China. The UK government has developed a Regulated Asset Based (RAB) financing model to fund SMR development but there is no encouragement for individual companies to build their own power supply even though UK commercial electricity is the most expensive in the developed world and the UK Grid has an 18 month wait to connect new energy producers.

Access to cheap coal power was the unique selling point of many British industrial towns during the Industrial Revolution. There is no reason why industry-based local power production could not again help the UK 'level up' its left-behind regions (areas that miss out on the massive growth in financial and business services).

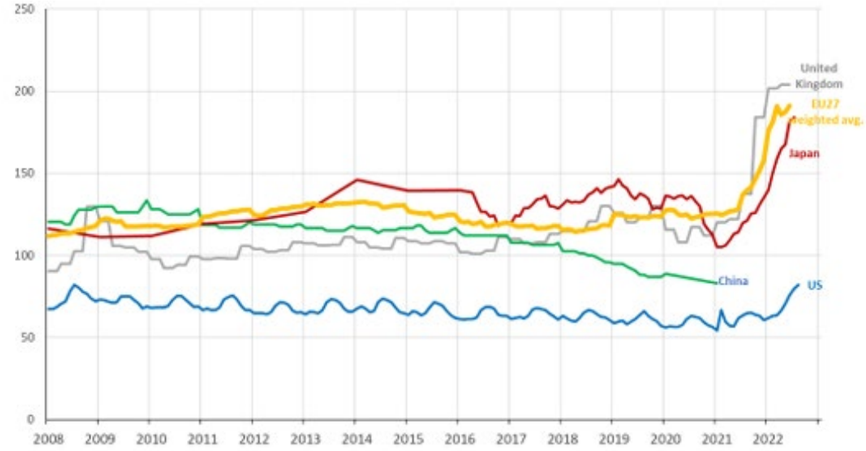
The development of more cost-effective batteries could also be encouraged by the use of RIFs and DTC. The University of Sheffield developed a sodium-ion battery for a joint venture company, Faradion, but the technology was sold to an Indian company, Reliance Industries Ltd in 2021 rather than being commercially developed in the UK[153]. More effective RIFs and DTC could change this. Sodium-ion technology has significant cost and resource availability advantages over lithium-ion technology for large-scale energy storage.

The most important element for the adoption of new technologies is demand but the government's present initiatives to reduce CO2 emissions are aimed at taxing manufacturers who simply pass on the costs to their customers, discouraging sales. Providing tax rate reductions to accelerate the adoption of efficient technologies and processes that can lead to substantial improvements in productivity and environmental benefits.

Additionally, the DTCs are designed to act as a performance-based incentive, where companies that achieve the greatest emissions reductions benefit from lower tax rates. This approach aligns corporate behaviour with productivity goals that will also achieve environmental goals without the drawbacks of compromising returns to obtain an arbitrary ESG score or paying conventional carbon taxes, resulting in deindustrialization.

A key element of this proposal is that it is technology-neutral. A key element of any free market solution is competition. Not only competition between providers but also between technologies. Equal promotion of alternative solutions is also important. At present most UK investment in alternative energy is channelled towards wind power because of the high guaranteed returns under the government's Contract for Difference program. UK governments have become fixated by wind generation for electricity and by subsidizing this method, it has become very difficult for other systems to develop and gain market share.

Worse still, the UK's excessive pricing structure for wind power, the intermittency of wind, and the additional cost of grid balancing due to the need to keep gas-generated backup power stations ready to step in at all times to keep the UK's electricity grid at 50Hz, which is added to industrial electricity prices, has accelerated the UK's deindustrialization. UK commercial electricity was about a third more expensive than the US in 2008, double US prices in 2019 and was about 150% higher than the US in 2023. Over the same period, China's industrial electricity prices have fallen steadily[154].



Source: Trinomics et al. (2023), S&P Platts, Eurostat, US DoE, Enerdata (NBS, E-Stats, BEIS, KESIS), IEA.

While the initial focus is on key high-emission sectors, the Climate & Freedom Accord does not exclude the possibility of applying DTCs to other sectors and externalities in the future. As new technologies and opportunities for emission reductions emerge, the scope of DTCs can be expanded to include additional areas and challenges. For instance, all kinds of metals and minerals appear essential to the energy transition, in massive quantities. However mining produces a great deal of non-GHG pollution. Clean tax cuts can be used to promote

152 https://miningdigital.com/smart-mining/pound330m-purchase-sole-aluminium-smelter-uk-opens-door-industry

153 https://faradion.co.uk/reliance-new-energy-solar-to-acquire-faradion-limited/

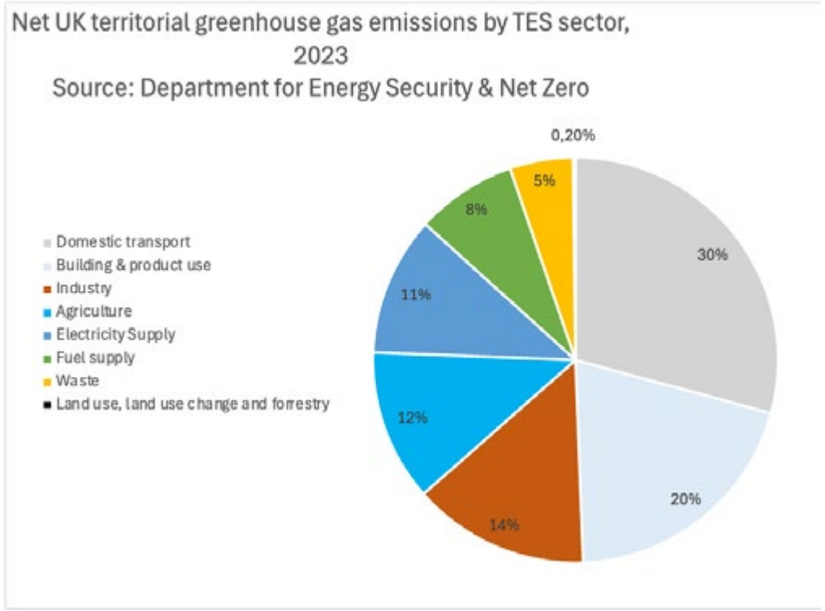
154 eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024DC0136

"green mining" that reduces all waste and pollution. This flexibility ensures that the policy can adapt to changing circumstances and continue to drive innovation across the economy, contributing to long-term sustainability and Decarbonisation goals.

In 2023, the UK emitted 384.2 million tons of greenhouse gases. Of this figure, 86% is explained by the activity of the sectors indicated above, as we can see in Figure 7. The UK has met its Carbon Budget targets every year since 2009 and has more than halved its total greenhouse emissions since 1990. UK road transport emissions fell dramatically in 2020 and have not recovered as many people continue to work from home for some period during the working week and road charges have discouraged people from driving. However, this has not improved UK productivity. The UK has reduced its emission from electricity production by 20% between 2022 and 2023, but still has the third highest commercial electricity prices in the developed world. If goals are achieved in this area, the results for overall production will be much greater – and the cost-benefit profitability of such a program will be higher.

FIGURE 7

Distribution of greenhouse gas emissions by sector in the UK, 2023.



From the pie-chart above it is obvious not all GHG emissions as equally deserving of reduction. Cutting the 5% of emissions from domestic waste would have a greater benefit to the UK population than further reductions in the emissions from the production of food, housing and transport.

While total commercial emissions have fallen since 2010, some of the most important substances for modern life have highly energy-intensive production but also have no emissions-free substitute. For example, 71% of fertilizer production costs is energy, for steel alloys and silicon it is about 38%, ceramics 37%, primary aluminium 34%, glass 23% and zinc 22%[155]. Charging these industries for their emissions by carbon taxes, emission trading schemes and imports with a Carbon Border Adjustment Mechanism (CBAM) just makes life more expensive for the industries that depend on these products as inputs and eventually for the population who consume the end products, without reducing emissions.

Another aspect to consider is the cost of such a policy in terms of revenue collection. In this regard, it is worth noting that corporate tax revenues in the last fiscal year with available data (2022/23) amounted to £85 billion, this includes offshore corporation tax, the Bank surcharge, the Bank levy, the residential property developers' tax and the energy profits levy on UK oil and gas companies. 2023/24 corporate taxes are estimated to be in the region of £103 billion and will be released on 26 September this year.

The UK now taxes its oil and gas companies with additional 'windfall' taxes, in place until 2028. These taxes raised £2.6 billion pounds in the tax year 2022/23 but have mostly encouraged these oil and gas companies to close their operations in the UK, rather than to lower their emissions or develop better technology. Although these windfall taxes were not about emissions as much as that these companies had the audacity to be able to supply the UK and the EU with oil and gas after the UK and the EU had placed sanctions on Russian supplies in 2022 following its invasion of Ukraine.

By fostering supply-side policies, such as tax-free debt for innovation, an overall increase in economic activity is expected, which in turn increases state revenues. If manufacturers move to more efficient technology, costs for end users should fall due to a reduced need for carbon taxes, emission allowance trading and CBAM. Lower costs should in turn encourage economic activity, which would benefit the entire economy especially if industries that are moving out of the UK to avoid the high energy costs and emission taxes could be encouraged to stay and develop more efficient technology.

Game Changer Tax Cuts

Furthermore, the CFA pact also proposes Game-Changer Tax Cuts – incentives for disruptive innovations, or game changers, a powerful tool to stimulate revolutionary advances in Decarbonisation. This proposal provides 15 years of total tax exemption to companies that develop profitable transformative innovations that we can foresee in advance would eliminate a significant whole number percentage of global emission if deployed at global scale. For example, projects that aim to develop zero-emission fuels and, by extension, engines that run on such fuel. Another example would be the production of profitable zero-emission concrete or a material that could replace concrete. This policy could incentivize companies to invest significantly in research and development, knowing that the benefits generated by these innovative technologies would be tax-exempt for the first ten or fifteen years of operation.

155 eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024DC0136, page 12

Like DTCs, Game Change Tax Cuts take the GHG externality directly into account. Much like the XPRIZE, they are designed specifically to reward specific hard-to-achieve but foreseeable breakthroughs involving difficult technical and commercialization challenges, while DTCs reward continuous, ambitious improvement of existing product lines in high emission sectors.

This unprecedented exemption would reduce financial barriers to innovation and ensure that successful technologies can be quickly scaled to meet global demand. Furthermore, if applied in all participating countries in a large international agreement, it would expand the potential market for these technologies, attracting private capital and accelerating the development of sustainable and competitive solutions attracting investments and global talent. Game changer Tax-exemptions would also help companies compete with imitators and IP theft, by giving a financial advantage to the originator.

Similarly, incentives for disruptive innovations avoid the problems of traditional subsidies, which often select winners and losers, creating market distortions. In contrast, incentives for disruptive innovations provide a broad benefit that rewards any company's activity capable of achieving significant advances. This fosters a competitive environment where the best technologies can move forward based on merit and effectiveness, promoting a faster and more efficient transition to a low-carbon economy. A possible definition of disruptive innovation could be one that reduces the emissions of a pre-existing technology for a specific sector or industry.

The CFA's proposal for Game Changer tax-cuts for innovative products that can efficiently replace emission-intensity products or their production methods would reduce emissions and do so without reducing the living standards of end users.

This suggests a possible variation on the Game Changer Tax Cut concept. Offering patented innovations international tax-free status amongst countries signed up to the CFA would help alleviate the imitation problem many Western developers have with countries that do not enforce intellectual property rights. International tax-free status would encourage more companies to spend money on research and development, knowing that income derived from the resulting products will have a tax advantage against competitors and imitators who have not invested in developing new ideas.

From a treasury point of view, there would be no 'loss' of revenue from these new innovations as they do not yet exist and are unlikely to ever exist under the present subsidy and taxation regime. Presumably, the HMT is already expecting a loss of corporate tax and emission tax revenue when these companies and processes are driven out of the UK entirely. We are already seeing this happening in the UK with fertilizer production and in Germany, BASF has moved at least one of its factories to China, not just because China has cheaper energy and lower environmental taxes, but because China has also become one of its largest customers. If demand for their products collapses due to environmental regulations, we should not be surprised to see companies move their operations to countries where demand for their products is still strong.

Allowing a new process for silicon production developed and patented in, for example, the US, to not only be free of corporation taxes on its production in the US but also if the company establishes production facilities in other CFA countries or sells its patent, the production carries its tax-free status with it. This would also discourage competitors from breaking their IP rights as they will not benefit from the tax-free status and would have an immediate tax disadvantage. However if instead, they develop their own patented improved product, this too would gain tax-free status in CFA countries.

The auditing of what is a new and improved process would be done by the patent offices, who would determine which products are truly new and which are copies of previously patented ideas. One potential pitfall could be arbitrary bulk patent applications, being made by companies to prevent new developments by rival firms, but this could be prevented by only granting tax-free status to goods or processes in production and not to pie-in-the-sky ideas.

The reason for applying this measure lies in the additional incentive it provides to companies. By allowing emission-reducing innovations to directly reduce the tax burden, companies are motivated to be more ambitious in their research and development. As with Game Changer Tax Cuts, this approach not only promotes the adoption of more sustainable practices but also ensures that tax benefits are directly linked to specific emission reduction actions, thereby aligning economic and environmental goals more effectively.

Tax-free status, in this variation, would apply to any innovation that reduces environmental impact. Whether in energy production methods, improved energy efficiency manufacturing processes, cost-effective battery technology, carbon capture for industrial use or storage, or processes that led to significant reductions in emissions from waste. All innovations contributing to environmental sustainability would be eligible for this tax-free status.

A key advantage of tax Game Changer and Decarbonized Tax Cuts is that these incentives cannot create a subsidy bubble, because they can only be used by profitable firms. Tax rate reductions cannot be used to support the unprofitable or the subsidy-dependent.

In addition, these measure are neutral and technologically inclusive, avoiding the creation of market bubbles and rent-seeking investors who now dominate UK renewable energy production. In a sharp contrast, Contracts for Differences provide subsidies above the current market rate for electricity. If not, no one will bid for any UK off-shore wind licenses, as the UK government discovered in 2023. But after increasing the Contract for Difference prices by 66% for the following year[156], there were a record number of bids[157]. Instead, the proposed

156 Boost for offshore wind as government raises maximum prices in renewable energy auction - GOV.UK (www.gov.uk)

157 Government secures record pipeline of clean cheap energy projects - GOV.UK (www.gov.uk)

decarbonizing tax rate cuts allow for a more balanced, diversified, and decentralized solution, ensuring that the market is not distorted and effectively and sustainably drives emission and waste reductions.

De-monopolisation Tax Cuts

In addition to rapid innovation funds and Decarbonisation tax cuts, other measures included in the proposed Climate & Freedom Accord (CFA) could help Spain and the UK on the path to higher environmental performance promoted through economic freedom and innovation. Among the principles listed are competition and anti-monopoly policies, special incentives for disruptive innovations, or deductions for philanthropic actions aimed at better conservation of natural spaces.

Competition and anti-monopoly policies are crucial strategies to improve market dynamism in key sectors, such as energy and public services. Therefore, offering a general or total tax exemption on capital gains (De-monopolisation tax cuts) to those investors and companies that sell monopolistic or oligopolistic assets to promote a more competitive market context would create a strong incentive to help dismantle such structures. This measure not only promotes a less rigid and more competitive market but also attracts activist investors looking to restructure and improve sector efficiency, with all that this implies in terms of innovation and environmental benefits.

Competition is crucial for improving market dynamism in key sectors, such as energy production and public services. The UK privatized most of its state monopolies over 30 years ago. The present government is proposing to re-nationalise some of them. But although the companies may be publicly owned many are still monopoly suppliers. This is especially true of electricity distribution. Electricity is central to the UK's economic future. However, subsidies for intermittent production methods do not consider energy storage. Consequently, the UK's National Grid has to pay wind farms to turn off their turbines whenever the wind is too strong and keep gas-fired production ready to step in with the wind drops. This disincentivises producers from building pumped water storage or developing better battery technology.

The UK economy is dominated by service industries such as Business services, financial services and insurance and is increasingly moving towards data centres, Artificial Intelligence and robotic development. These industries depend on electricity to function, yet electricity production in the UK is predominately supplied by gas and wind, alternating between the two. This technology is less than ideal, the first is carbon-free but intermittent and the second is not carbon-free but it is reliable and dispatchable. The obvious solution would be nuclear electricity, possibly small independent nuclear reactors to supply an industrial area, a free port, a data centre hub or even the City of London. Just as coal mines once powered their local industries. On a similar theme, encouraging battery development or other forms of energy storage such as creating green hydrogen from seawater would be a better use of investment funds than paying wind farms to turn off. This technology is already being proposed and developed internationally: such as hydrogen production from unused hydroelectric power in the Philippines, to small modular nuclear reactors in operation in China and Russia.

Removing the monopoly on power distribution in the UK from the UK's national grid would allow energy production to localize, and provide power to a new industrial zone, a free port or a new data centre. This isn't unprecedented. The last two aluminium smelters in the UK generated their own electricity. Many businesses in South Africa have their own diesel generators so that they can keep their operations going during brown-outs. Planned outages, or load shedding, due to insufficient power is something that the UK should be consciously trying to avoid. With the Government enforcing all new cars to be electric vehicles by 2030 and for residences to convert their gas-fired boilers to electric air source heat pumps, the UK will need a lot more electricity. Encouraging new industries or new development areas or even new residential areas to also generate their own electricity would be a unique selling point to attract buyers or new companies to locate there. This would create a more attractive environment for new companies capable of betting on new technologies, facilitating the consolidation of clean and sustainable innovations.

Dismantling monopolies would help diversify the energy market, allowing for the adoption of innovative technologies and sustainable practices. With greater competition, energy production companies would have more incentives to improve their efficiency and, along the way, reduce their emissions. This, in turn, would benefit consumers with lower prices and better service quality while promoting a more robust economy and, through that development, a more environmentally friendly environment.

Charitable tax incentives for conservation

Finally, a charitable deduction model close to the American paradigm can promote philanthropy in the conservation and safeguarding of natural spaces. Such an approach would allow individuals and companies to more easily donate to non-profit organizations and projects focused on these tasks. Indeed, a global agreement that generalizes such tax treatment for environmental philanthropy could favour such development regardless of the country of action, thus mobilizing additional resources. The CFA proposes synchronising charitable and conservation easement tax deductions amongst all CFA nations, allowing simplified cross-border charitable donations by mutually recognising charitable organizations as tax exempt and capable of receiving donations from citizens of all CFA nations.

By providing these support incentives for charitable donations, the tax burden borne by the private sector is reduced, facilitating investments in the conservation of natural spaces. Internationally, a standardized register of associations and organizations could help build a global framework, in line with the nature of the goals set out.

These donations complement reference sustainability efforts by mobilizing more private resources focused on critical projects. Involving the private sector in this way can significantly enhance the impact of such initiatives. By facilitating the flow of funds towards environmental efficiency projects, Spain can further accelerate its climate goals.

Conclusions

This paper shows that economic freedom is a crucial factor in consolidating more efficient production models. There is much talk of Decarbonisation as a goal, but if the aim is to move towards an economy with lower emissions of carbon dioxide and other greenhouse gases, it seems logical to review the available evidence in this regard. Once we do this exercise, we can see that countries with higher levels of economic freedom tend to have better environmental performance, based on incentives that promote more efficient and innovative production. Safeguarding private property, competition in markets and efficiency in the use of resources are characteristic factors of liberalized economies that facilitate the deployment and adoption of cleaner technologies and more sustainable practices. This shows that a context of economic freedom is not only compatible with climate objectives but also facilitates their achievement.

For this reason, this document suggests the implementation of a series of measures designed to significantly accelerate Decarbonisation and, at the same time, expand economic freedom. The main tools suggested are as follows:

- The creation of **Rapid Innovation Funds** (RIFs) is proposed to decarbonize the means of production. These financial instruments, based on tax-exempt debt, are designed to accelerate external capital flow to investments in property, plant or equipment. Companies contributing capital to these funds would not pay taxes on the interest income generated, which would reduce capital costs and lower the cost of new business investments. Making new investments cheaper promotes the rapid adoption of newer, more efficient, cleaner and innovative technologies, accelerating economic activity and reducing the energy intensity of production.

- Property, Plant and equipment purchased with RIF financing, should qualify for **full and immediate depreciation of business investments** or changes in corporate income tax to exempt reinvested business profits. And allow this investment to be carried over for up to 10 years.

- **Decarbonisation Tax Cuts** (DTCs) to reward innovative firms that achieve the highest emissions reduction in their core products, starting with the five sectors that account for 85% of greenhouse gas emissions: construction, manufacturing, transportation, energy and electricity. The suggested “performance bonus” would come as a tax rate reduction of five percentage points for the highest performing firms.

- **Use De-monopolization Tax Cuts** to incentivize National Grid investors to accept a sale of the company and its assets into a private competitive framework, like ERCOT in Texas. Removing the National Grid’s monopoly on electricity distribution in the UK, allowing industrial parks, free-ports, data centres or even new town housing developments to supply their own electricity.

- **Game Changer Tax Cuts** should reward firms that commercialize profitable breakthrough innovations that remove a significant whole number percentage of global climate emissions, with tax exemption for 15 years. Alternatively, we suggest tax-free profits for patented innovations in more efficient production methods for products sold in countries signed up to the CFA. These technologies could range from improved battery technology to more efficient combustion engines to decomposing plastic packaging.

- Increased tax breaks for **Environmental Philanthropy**, for example, creating incentives to place more lands under voluntary conservation easements, in line with U.S. rules that allow tax deductions for land conservation and charitable donations;

These proposals will increase economic growth in a manner that will also develop new technology and improve the environment and create an economic model that will be followed at the European and global levels. The implementation of these tax deductions can serve as a starting point for a more effective and dynamic climate agreement, based on greater economic freedom and, with it, a more efficient, innovative and cleaner productive framework. The UK’s leadership in this field can serve as an example for other countries seeking to balance economic growth with environmental sustainability. The adoption of similar economic incentives in different regions of the world can accelerate the transition to a more efficient and less carbon-intensive economy, reducing global greenhouse gas emissions more rapidly. By positioning itself as a leader in the field of free-market environmentalism, the UK can positively influence the development of sustainability policies globally.

The combination of economic freedom, innovation and sustainability is key to meeting the environmental challenges of the 21st century and promoting more efficient and environmentally friendly economic growth.

APPENDIX A

Economic freedom and environmental performance in OECD countries, 2021.

Country	EF	Ranking EF	EPI	Ranking EPI
Switzerland	8.5	1	65.9	8
New Zealand	8.4	2	56.7	23
United States	8.1	3	51.1	28
Ireland	8.1	4	57.4	21
Denmark	8.1	5	77.9	1
Australia	8.1	6	60.1	15
United Kingdom	8.0	7	77.7	2
Canada	8.0	8	50.0	31
Estonia	8.0	9	61.4	13
Lithuania	8.0	10	55.9	26
Iceland	7.9	11	62.8	9
Luxembourg	7.9	12	72.3	5
Finland	7.8	13	76.5	3
Sweden	7.8	14	72.7	4
Czechia	7.8	15	59.9	17
Japan	7.8	16	57.2	22
Netherlands	7.8	17	62.6	10
Costa Rica	7.8	18	46.3	35
Germany	7.7	19	62.4	12
Latvia	7.7	20	61.1	14
Austria	7.7	21	66.5	7
Norway	7.7	22	59.3	18
Chile	7.7	23	46.7	34
Israel	7.6	24	48.2	32
Portugal	7.5	25	50.4	30
Spain	7.5	26	56.6	24
Slovakia	7.5	27	60.0	16
Korea	7.5	28	46.9	33
Belgium	7.4	29	58.2	19
France	7.4	30	62.5	11
Hungary	7.4	31	55.1	27
Italy	7.3	32	57.7	20
Slovenia	7.2	33	67.3	6
Poland	7.1	34	50.6	29
Mexico	7.0	35	45.5	36
Greece	6.9	36	56.2	25
Colombia	6.6	37	42.4	37
Turkey	6.3	38	26.3	38

APPENDIX B

How to Avoid the Pitfalls of the US Municipal Bond Market

The tax-exempt debt market for Decarbonization acceleration funds should be one, big, liquid market, where every security has a similar value for every investor, so that the market is very liquid, and trades are easy and transparent. As in the corporate bond market.

The US tax-exempt municipal bond market is not like that at all. The US muni market is not one big liquid market, but more like 50,000 markets, because each of the roughly 50,000 US tax-exempt bond issuers are locally tax exempt only to investors residing in that tax jurisdiction – a very small market. That makes most muni bonds thinly traded and highly illiquid because of that limited local appeal.

The progressive tax code makes that illiquidity problem even worse. Tax exempt debt has more value for tax payers in a high income tax bracket, paying higher tax rates. So the muni bonds don't even appeal to all potential investors in one jurisdiction, only the high tax bracket tax payers.[158]

Another problem: some of the largest investors, the US pension funds and college endowment funds, are tax-exempt. They pay no taxes on interest anyway, so buy only taxable bonds with higher interest rates. This further compounds the illiquidity problem for tax exempt debt.

Compounding all these problems is the sad fact that the muni market dealers are politically appointed, and so, like many political cronies, have found ways to extract rents. Muni markets are not transparent. Unlike the corporate bond market, one cannot get a market price quote. Muni dealers will only tell you their price, not a market price. This allows them to impose hidden fees and mark ups. These practices not only directly increase the interest rates borrowers pay, they further add to the illiquidity of the market.

Illiquidity itself raises interest rates significantly, imposing a high "illiquidity risk premium as a result". Investors demand a higher interest rate because who knows if they will be able to find a buyer for the bonds, if there is a need to sell. As a result of all these factors, US cities

158 The tax benefit, and also the government tax expense, is greatest for the highest income tax payers. Some economists see this as a form of subsidy leakage, with high income tax payers capturing more of the tax benefit than the municipalities issuing the tax exempt debt. However the fault here is not the use of tax exempt debt. It is due to the use of a progressive tax code applied to debt income. A flat tax on debt would entirely avoid the leakage and illiquidity problems produced by progressive tax rates.

and states now pay up to 1.12 percentage points higher interest on tax exempt debt than they should because of this, according to one study. [159]

There are several ways to eliminate these illiquidity problems for the DCAF debt market:

Most importantly, a single flat tax on taxable interest, payable by all investors, would mean that investors large and small, and across all jurisdictions, would be equally treated and equally attracted to taxable debt, or tax exempt debt of equal risk, and subsidy leakage of this sort would be eliminated. Tax exempt interest rates would be lower, and the market would be more inclusive, broader, and extremely liquid, with no significant illiquidity risk premium. The following provisions would make DCAFs and the entire debt market, far more efficient and inclusive:

- The UK (along with any future CFA nations) should adopt a standard flat tax rate on taxable interest for all investors, to avoid large distortions. For instance, a 20% combined rate for all national and sub-national jurisdictions, would be near the OECD average.

- DCAFs should be tax exempt in all sub-jurisdictions, to prevent the balkanization that afflicts the US muni-bond market.

- DCAFs, packaged as securities, should trade on the corporate bond market, with market price quotes, to avoid the non-transparency and hidden fees in the muni-market.

- To protect pensioners, in this scenario where pensions pay a 20% standard tax on taxable debt like every other investor, the adjustment would be that the pensioner is NOT taxed on the share of income either from any taxable debt or any tax-exempt DCAF debt, after the pension pays any taxes due. The required pension payout would be reduced both by any taxes paid OR exempted on any debt. Doing so reduces pension fund liabilities while pensioners get the exact same after-tax income, as always. In this way, neither the pensioner not the pension is affected by the pension paying a tax on taxable interest, and the pension does not have a bias for taxable debt vs. tax-exempt DCAF debt. Therefore, it opens up the huge lower- and middle-income pension fund market for DCAFs, and possibly other tax-exempt debt. There is no tax cost, as it saves governments the tax expense that tax exempt pension funds currently generate with respect to the taxable securities that they hold (for which income pension funds are not currently taxed). It also makes the overall market for tax exempt bonds more universal with respect to investor appeal, and so stronger, more liquid and robustly traded.

- The 20% flat tax on taxable debt, payable by all investors, could raise taxes paid by tax-exempt charitable organization on taxable debt. However, that proposal would also decrease the interest rate they pay on any tax-exempt debt they issue by more than a full percentage point. The CFA also proposes other provisions that would likely increase charitable donations overall. So, in the interest of a cheaper, more efficient tax-exempt bond market, lower borrowing costs and higher donations, the proposal treats non-profits more than fairly.

- These measures would create a large, liquid market for DCAFs (and other tax-exempt bonds), with fairly uniform pricing, and would even fix the distortions that balkanize the current US muni-bond market, resulting in higher interest rates because of illiquidity risk.

159 Andrew Ang and Richard C. Green, Lowering Borrowing Costs for States and Municipalities Through CommonMuni, The Hamilton Project Discussion Paper 2011-01, 7 (Feb. 2011), available at http://www.brookings.edu/~/media/Research/Files/Papers/2011/2/municipal%20bond%20ang%20green/02_municipal_bond_ang_green_paper.PDF.

CONCLUSION

BRITAIN'S INTERNATIONAL ROLE

Robert Armstrong

The key offering of the Climate and Freedom Coalition's Accord is a comprehensive and interconnected set of proposals which are proven effective, mutually reinforce each other, and which offer opportunities and incentives to secure as widespread an international adoption as possible. To secure this widespread adoption, several proposals amongst them aim to secure better economic conditions generally, to offer to heterogenous nations powerful incentives for participation, or to accelerate the impact of other climate-focused policies, for instance by securing lower borrowing costs.

The body of this paper has established the need, principles and details of free market climate policy, and has evaluated the impacts of adopting it in as focused a manner as possible. As such, the wider geopolitical and geostrategic argument for climate policy in general, and free market climate policy in particular, has not yet been fully elucidated. The case remains to be made.

International development policy

International development is key to bringing countries into strategic partnership with the UK. This includes climate policy but extends to broader economic, political, scientific and military cooperation. In practice, just as with central Europe, Japan, South Korea, and much of South-east Asia, this means helping countries become rich and free and therefore western-aligned. Research has consistently shown that property rights[160], efficient courts[161], inclusive competition[162] in labour but especially competition markets[163] and deregulation[164], all significantly boost economic activity alongside freedom.

Not only have freer and wealthier countries been shown to care about (and value more highly) clean and sustainable environments,[165] but they have a greater capacity to invest in solutions and freely bargain (Coase, 1960) on externalities. As Coase clarified in 'The Problem of Social Cost' (1960), lowering transaction costs as far as possible is critical to achieving an efficient economic outcome. This means removing government interferences, levies, charges and taxes on bargaining in a profound way. In brief, expanding freedom and solving climate change internationally are not only compatible but mutually reinforcing.

160 Haydaroglu, Ceyhun (2015) : The relationship between property rights and economic growth: An analysis of OECD and EU countries, DANUBE: Law, Economics and Social Issues Review, ISSN 1804-8285, De Gruyter, Warsaw, Vol. 6, Iss. 4, pp. 217-239, https://doi.org/10.1515/danb-2015-0014

161 Kapopoulos, P. & Rizos, A. (2024) Judicial efficiency and economic growth: Evidence based on European Union data. Scottish Journal of Political Economy, 71, 101–131., https://onlinelibrary.wiley.com/doi/10.1111/sjpe.12357

162 IMF, Competition, Innovation, and Inclusive Growth, Philippe Aghion ; Reda Cherif, Fuad Hasanov, March 19, 2021, https://www.imf.org/en/Publications/WP/Issues/2021/03/19/Competition-Innovation-and-Inclusive-Growth-50269

163 OECD, Factsheet on how competition policy affects macro-economic growth, 2015 https://www.oecd.org/daf/competition/2014-competition-factsheet-iv-en.pdf

164 CEPR, Sean Doherty (OECD) voxEU, 2017, https://cepr.org/voxeu/columns/how-deregulation-and-globalisation-interact-boost-economic-growth

165 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9668524/

We also know with certainty that competition drives power markets,[166] (Winegarden 2019) as well as consumer goods markets more generally, to decarbonize faster. The dramatic reduction in UK emissions, falling a further 5.7% in 2023 to their lowest level since 1879, has been driven by the transition from coal to natural gas, done entirely for reasons of economic efficiency. As another example, the U.S Environmental Protection Agency (EPA) reports that, "compared to 1970 models of vehicles, new cars, SUVs and pickup trucks are roughly 99 percent cleaner for common pollutants (hydrocarbons, carbon monoxide, nitrogen oxides and particle emissions). New heavy-duty trucks and buses are roughly 99 percent cleaner than 1970 models".[167] While organizations like the EPA like to point to their "phasing out" of leaded fuels as if it were their own doing, the evidence doesn't support that view.

Industry innovated the use of ethanol to raise the octane of gasoline and replace the anti-knock properties of leaded fuel. In other words, industry had already innovated away the need for lead pollutants and was designing engines for unleaded fuel because it delivered better performance than their competition. Industry, not government, also innovated the change from V8 engines to turbocharged four or six-cylinder engines, which deliver similar power while burning less fuel. Steep improvements in fuel efficiency (MPG) continued until around 2016, by which time hybrid technology had been innovated, again by industry, to continue efficiency gains into the next decade. The reason why competition, economic efficiency and environmental efficiency are inextricable is that they are motivated by the same goal: to use as few inputs per unit output.

The importance of this liberalisation and expansion of competition is not just measured in increased output but also in allocative efficiency. It is ultimately the market that faces the strongest incentives to do more with less, and as Hayek pointed out, deals with challenges of information economics. It's why these game-changing innovations have always come from freedom and never from state control. It is this fundamental link between free market competition and environmental efficiency that explains why unfree economies without competition have been the most polluting the world has ever seen, with the smokestack industries of soviet eastern Europe and contemporary communist China. Exporting efficient markets via the Climate and Freedom *Accord* is an opportunity for Britain to align its objectives, to achieve them faster and to do so at a lower cost.

166 https://www.pacificresearch.org/wp-content/uploads/2021/09/ERR_EnergyCompetition_F.pdf

167 https://www.epa.gov/transportation-air-pollution-and-climate-change/accomplishments-and-successes-reducing-air#:~:text=-Compared%20to%201970%20vehicle%20models,percent%20cleaner%20than%201970%20models.

Current policy is not realistic

The Net-Zero policy that the UK currently is pursuing will require $275tn globally in investment by 2050, in today's prices, according to McKinsey[168]. This represents some 320% of global GDP on green physical investment alone. Even this astronomical projection rides on quite generous assumptions about the availability of relevant inputs, including lithium. Currently, global investment sits at $1.7tn a year.[169] This means we need to increase out yearly investment by almost seven times and sustain that level for the next 26 years. That level of investment is not realistic. It is unachievable without placing intolerable restrictions on freedom and upon the global poor.

Two key insights must be drawn. That cooperation must be achieved, and that reducing the fiscal cost of that investment is critical.

Compared to subsidy or carbon pricing, Rapid Innovation bonds and loans attract debt and equity investment at the same time, not by offering tax incentives to both, but by allowing equity returns to rise due to increased availability of leverage. The "cost" in terms of money spent/taxes forgone for the Treasury of subsidy is quite clear. Some investment I is attracted either as a proportion of the investment, say 20% (I/5), or the producer price is raised above the market price to some level 'p+s', costing the taxpayer 's' per unit of the subsidized good. Some revenue is recuperated in both cases through sales tax and corporation tax, and indirectly through payroll and income taxes, assuming that the subsidy has successfully raised output (rather than simply crowding out another investment). Subsidies suffer, as discussed extensively, from subsidizing activities that may have happened anyway or by misallocating resources to uses other than the most productive ones.

Rapid Innovation funds, on the other hand, are more likely to be cost effective. In a representative case of a project funded using 50% equity, 50% Rapid Innovation funds, since equity returns are typically 350% higher than average debt returns, 350% more revenue might be earned on those equity returns than are 'spent' on making the debt tax-free. In terms of return-on-investment, Rapid Innovation bonds can raise £1 in investment at a fiscal cost 70% lower than a subsidy or through incentives such as Investment Savings Allowances (ISAs) in the UK, or IRA tax credits in the US. They do this by efficiently targeting the supply side of the economy. They make the investments *themselves* more attractive.

Equally unrealistic is the extent of cooperation hoped for without significant wealth transfers from developed nations to the undeveloped. This is borne out by most governments limiting their CO2 abatement targets. Suggestions such as the Bridgetown initiative have identified that the Lion's share of this money will need to come from the west – and many want that to

168 https://www.mckinsey.com/capabilities/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring#

169 https://www.iea.org/news/clean-energy-investment-is-extending-its-lead-over-fossil-fuels-boosted-by-energy-security-strengths

happen on a transfer basis[170]. Britain simply cannot afford to take this approach – and hence discussions on the topic are locked in paralysis or tied up with specific attempts to pick winners. A serious attempt to finance the climate transition internationally in a way that rewards nations and savers who lend and lowers the cost of borrowing is conspicuous on the global stage by its absence.

Long term trends

Foreign policy analysts most often start with the locating proposals within long term international trends. If for nothing else, it frames thinking from an 'outside-in' perspective, focusing on coming global trends and how British foreign policy should react to them, (rather than an 'inside-out' approach which starts from British internal political assumptions and tries to proscribe how Britain's foreign policy should reflect them). This is easier with some issues than others.

The rise of China economically, and then as a geopolitical rival, is perhaps the key theatre for Britain overseas, underscored by her adoption of the "East of Suez" doctrine. Britain has oscillated from a position of *rapprochement* during the premiership of the now-Lord David Cameron to a freezing of relations in less than five years. Toward the end of the 2010's, the writing was on the wall that China wanted to see the UK strategically dependent on Chinese imports.[171] After a process of disentanglement, notably with Huawei 5G equipment, Chinese investment in the UK collapsed from more than $30bn in 2017 to less than $2bn by 2019.

It is apparent that British motivations for its naïve courtship of the PRC was for foreign direct investment. What is notable about the Climate and Freedom *Accord* in this context is greater reciprocal access to Western and western-aligned capital markets for exactly the kind of infrastructural and green energy investments that the UK originally sought. The process of 'friendshoring' – detaching supply chains and finance from authoritarian regimes which may leverage them against us – calls for the widest and freest possible supply chains. This is something that the Climate and Freedom *Accord* delivers. But additionally, the removal of carbon border adjustments between signatories of the CFA, and the schemes encouraging mutual recognition of environmental standards, will place enormous pressure on China, as an export-driven economy, to join the CFA.

Their most egregious economic warfare, including currency manipulation, theft of intellectual property, exploitation of *de minimis* rules to undermine the enforcement of safety standards, use of forced labour, and the undercutting on production costs by disregarding CO2 output, would be tempered by joining the CFA. The enforcement of property rights and anti-monopoly provisions would do much of the heavy lifting. Should China not join, they would still face strong incentives to decarbonize to minimise CBAM taxes at the border.

A second trend is global leadership. Climate policy *is* foreign policy[172]. The Paris Agreement, indeed, has been conceived by some as a forum for influencing foreign governments. There is plenty of money and resources in providing solutions to climate change. In the first case, The CFA increases these payoffs via the free market at minimal fiscal costs to governments. But more broadly it creates a collaborative environment, similar to the Paris Agreement except that it gets incentives right. Whereas, in the framework of Paris, there is a scramble for inputs including lithium and cobalt that is being fought by governments in back-room deals, in the CFA there are fully functional markets. Narratives of "climate superpowers" and state-sponsored conflict for key resources can be replaced by the market which allocates them to their most valued uses by the rationing function of price. Indeed, current competition is categorized in China and India by the theft of intellectual property and large-scale espionage at universities and private companies where green technology is developed. International respect for property rights, on threat of removal from the *Accord,* makes innovation more rewarding and ensures that royalties can accrue to the innovators. It decreases the payoff to free riding and increases the payoff to solving humanity's problems. Again, it gets incentives right in the crucial collaborative theatre of international climate diplomacy. It replaces a cynical call for "solidarity" with a genuine incentive to cooperate.

Also, key to strategists' conception of climate leadership is the use of UK aid to buy influence and help nations develop in line with the democratic west rather than in concert with authoritarian regimes. The use of Rapid Innovation Funds (RIFs) uses the power of leverage to buy an outsized amount of market influence at only the fiscal cost of the tax not collected on the debt. In effect, Britain's investors and those of the other members of the CFA could invest at 20p on the pound compared to UK state aid.

Two final geopolitical trends where the CFA holds the potential to remedy concerns is in Britain's exit from the European Union (Brexit) and with respect to the sharp rise in global migrant and refugee populations. In the case of Brexit, the UK has been looking for opportunities to fulfil the promise of a "global Britain" – trading more widely and gearing British business towards export-driven growth. While, on one view, Britian has signed more trade deals in the years since Brexit than any other major economy, ever, and has joined CPTPP, it has failed to strike key target deals with India and the United States. The trade liberalising nature of CFA membership promises a different fundamental approach to international trade negotiations.

Specifically, it is a program of tariff elimination on goods and services and market liberalization.

170 https://www.reuters.com/business/finance/what-is-bridgetown-initiative-asking-paris-financial-summit-2023-06-20/

171 Rogers, Armstrong, Henderson and Foxall, 2020. BREAKING THE CHINA SUPPLY CHAIN: HOW THE 'FIVE EYES' CAN DECOUPLE FROM STRATEGIC DEPENDENCY.https://henryjacksonsociety.org/wp-content/uploads/2020/05/Breaking-the-China-Chain.pdf

172 Wilson Centre, 21st Century Diplomacy: Foreign Policy is Climate Policy, https://www.wilsoncenter.org/publication/21st-century-diplomacy-foreign-policy-climate-policy-full-report

The sticking points of previous negotiations, including food safety and protected industries (the NHS) in the case of the USA, and of mode 4 business visas in the case of India, would simply not come under the free trade established by the CFA. While leaving out key asks makes the process simpler, it also leaves out key benefits including Deep Trade Agreements (DTAs) and the wider set of professional, legal and educational treaties which comprise the gold standard of trade deal. In other words, the CFA is a clean liberalisation of trade policy, but one which does not diminish nor vary the need for trade policy to eliminate the more complex and dynamic non-tariff barriers to trade. Britain instigating the CFA can therefore be seen as a method to expand free trade access for a Global Britain without complicating subsequent negotiations with key partners.

Migration and refugee population growth is the final key trend with which the CFA interacts to Britain's distinct advantage. Britain has been a largely disgruntled recipient of some of the largest inward population movements of the postwar era, both proportionally and in absolute terms. Most academics of migration and demography believe this trend will continue throughout this century. Climate change policy and CO2 abatement will reduce climatic pressures to immigrate, while increased investment via the CFA will, in the medium run, reduce income gaps between rich and poor states which motivate economic migration. The literature additionally draws attention to the relationship between unfree governments, unfree markets and high outward migration. Bringing freer markets and property rights through the CFA can break the extractive structure of monopoly, corruption and insecure property rights that cause the stagnation and inequality that drives unsustainable levels of immigration to the West.

UK opportunities for Growth

Beyond the foreign policy influence, and the commensurate strengthening of state capacity to resolve instability and conflict overseas, the CFA also has the capacity to grow the British economy and rebalance the cost of climate policy away from consumers and taxpayers.

The expansion of capital markets both for UK investment and for investment destined for overseas. The international reciprocity inherent in RIFs promises large financial payoffs for financial markets involved in their creation and sale. Opportunities also exist to arbitrage on risk and offer global diversification. Gaining first mover advantage as a major economy in joining the CFA would help the UK enjoy outsized influence in financing the green transition. As a corollary, attracting foreign money would lower domestic borrowing costs both for UK businesses *and* the state. Our findings in Chapter 1 bear this out. A 2.6% rise in per capita GDP plus a reduction in relative prices due to the wider availability of foreign import goods combine for a powerful increase in purchasing power for both consumers and producers, with the strongest positive contributor (see Chapter 1) being the expansion in free trade.

Fiscally the UK is in a period of historically very high tax and spend. It is anticipated that the October 2024 budget will only reinforce this trend. Without the political appetite to make long term domestic reforms – liberalising markets, lowering prices and raising the purchasing power of citizens through trade and green investment really is the most promising tool left in the drawer.

While Rapid Innovation Funds (RIFs) represent the single largest opportunity – other securities, including Rapid Innovation Bonds, Loans and Savings (RIBLs) offer new products that the UK financial market can sell globally, to help allocate green investment internationally and profit from doing so efficiently and effectively. Indeed, Decarbonisation Tax Cuts (DTCs) and Gamechanger Tax Cuts each offer first-mover advantages in addition to the long-term advantages already discussed in this paper. The UK can make itself a much more attractive location to list tech startups, energy startups, and green enterprises of every colour and stripe.

A radical reorientation

There do remain challenges to overcome. One of the most sobering realities of policy design is that there are always risks, foreseeable and unforeseen, when it comes to substantially reorientating domestic and foreign policy. The CFA is radical in the sense that, in order to provide stable and reliable incentives to solve the climate crisis in the most effective possible way, it automates decision-making in ways that may make strategists uncomfortable. Countries may join the CFA by meeting its requirements while being hostile to Britain's interests and the interests of our allies. Sanctions become much harder to implement and much less effective if we have a legal commitment to trade with a compliant CFA member. Indeed, arguments that favour strategic independence, especially from countries such as China, may find the idea with trading with our enemies too dangerous to bear. Other liberal-minded analysts may worry that, in creating an international agreement, we risk having it either follow the World Trade Organisation (WTO) into impotence or, on the other hand, the takeover of its institutions by forces hostile to free trade and democracy.

On balance, these hazards are unlikely to become real risks. In order to comply with the CFA, a hostile nation will have already demonopolized, enshrined property rights, individual freedoms and democratic governance of economic matters, in a way that *deescalates* geopolitical conflict. We might ask why we would continue to be rivalrous with a nation that had changed sufficiently as to comply with the strictures of the Climate and *Freedom* Accord. As for the risk of institutional capture, the risks can be mitigated, as they have been, by simplifying wherever possible (the 'clean' tariff-free deal) and by relying on mutual recognition (a decentralised approach) to the maximum possible extent. Other design features of the institutions required to govern the *Accord* should be designed with the risk of institutional capture in mind, and Climate and Freedom workshops have been collaborating to that end.

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