THE CHALLENGES FACING **COP26**

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STANLEY JOHNSON

Stanley is above all a West Countryman. He was born in Cornwall in August 1940, and educated at Ravenswood School, followed by Sherborne School and Exeter College, Oxford, where he won a Stapeldon Scholarship in Classics. Stanley was awarded a Harkness Fellowship to the United States in 1963.

He is a former Conservative member of the European Parliament (MEP 1979-1984). He has also worked in the European Commission (1973-1979) as Head of the Prevention of Pollution division and (1984-1994) as Senior Adviser to DG Environment and as Director of Energy Policy.

Before joining the Commission, Stanley served on the staff of the World Bank and the International Planned Parenthood Federation. Stanley has been an adviser to Price Waterhouse Coopers, a director of ERM, a trustee of the Earthwatch Institute and Plantlife International and an environmental adviser to Jupiter Asset Management. He is currently a trustee of the Gorilla Organisation (www.gorillas.org) and an Ambassador for the United Nations Convention on Migratory Species (CMS) (www.cms.int).

He has had ten books published, including the Politics of the Environment, the Earth Summit and the Environmental Policy of the European Communities. He has also had nine novels published, including The Commissioner which was made into a film starring John Hurt. In 1962 the won the Newdigate Prize for Poetry.

Stanley was awarded the Greenpeace Prize for Outstanding Services to the Environment (1984) the RSPCA Richard Martin Award for services to animal welfare (1984), the WWF Silver Medal (2012), the RSPB's Medal for Services to Nature Conservation' (2015) and the WWF Leaders of the Living Planet Award

INTRODUCTION

One balmy summer's evening, at the beginning of June 1972, I walked with the crowd through the streets of Stockholm behind a huge inflatable Leviathan chanting "Save the Whale". That was the time of the first UN Conference on the Human Environment (UNHCE). Barbara Ward and René Dubos' book Only One Earth: the care and maintenance of a small planet, specially commissioned for the conference, featured on its cover a photograph of a pale blue fragile orb which US astronauts had recently taken from space. This was Planet Earth, and we were busy making an awful mess of it.

Though 'climate change' had barely featured as an issue at Stockholm, international concern grew dramatically over the next two decades. I was lucky enough to be present also in Rio de Janeiro, Brazil, twenty years later, in June 1992, when the 'Earth Summit', properly named 'the United Nations Conference on Environment and Development' (UNCED) adopted the United Nations Framework Convention on Climate Change (UNFCCC) was adopted. Applause rang out in the vast Conference Centre. People danced in the street and on Rio's famous beaches.

In adopting at Rio the UN's Climate Change Convention, the nations of the world committed themselves to one overarching ambition: namely "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

I never envisaged back, back in 1992 just how long it would take to put flesh on the bones of the new treaty. Environmental enthusiasts – and I was one of them - were perhaps deceived by the success of recent international efforts to avoid the destruction of the ozone layer, as exemplified by the Vienna Convention on the Protection of the Ozone Layer (1985) and its Montreal Protocol on Ozone-Depleting Substances (1987).

In the event, dealing with greenhouses gases (GHGs) with multiple emitters was much more complicated than dealing with the relatively small number of manufacturers of ozone-depleting substances such as chlorofluorocarbons.

It took 23 years for the UNFCCC's 21st Conference of the Parties, held in Paris in December 2015 (COP 21), to establish its key operational goal, viz "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change."

The Paris Agreement of 2015 recognized the gap between where GHG emissions were heading and where they needed to be to limit dangerous levels of warming. Under the Agreement all Parties are required to submit 'nationally determined contributions' (NDCs) to reduce GHG emissions in the near term, as well as long-term low emission development strategies (LT-LEDS) which should guide their transition to a low-carbon, climate-resilient future by mid-century. Unfortunately, the pledges made by governments in Paris in 2015,

far from achieving 'not more than +1.5C goal', in fact implied a global temperature increase of more than 3C above pre-industrial levels by the year 2100.

Happily, some countries have since revisited their NCDs and/or adopted legally binding net zero targets. Nevertheless, even if the revised programmes are fully implemented (which is by no means certain), global temperature would still rise by 2.4C by the end of the century.

So, the key issue now – perhaps the most important issue of our time – is how to 'close the gap' and get the world back on track. That is what COP 26, to be held Glasgow next month, is all about.
Because it falls to the UK to preside over that meeting, Britain's role is crucial. Realistically, Alok Sharma, MP, as President Designate of COP 26, has a Herculean task on his hands.

His most important job is to persuade governments around the world to strengthen their emission reduction programmes for 2030. This is the decade that counts if we are to close the gap. Here the G20, whose members include China, India, and Brazil, will play a crucial role. If all G20 countries were to align their 2030 targets with a 1.5C domestic emissions pathway, the 2030 emissions gap could be narrowed by 64 per cent, thereby bringing the world much closer to a 1.5C emissions pathway.

But COP 26 could go one step further. Glasgow 2021 could adopt a Global Net Zero Carbon 2050, complementing the Paris objective, even if some countries are not yet ready to commit themselves to

such a goal in terms of their own national legislation.

As far as the UK is concerned, the Net Zero Carbon by 2050 goal is already enshrined in law (as it is in the case of the EU, Japan, and Canada.)

And there is no doubting the Prime Minister's own commitment. Speaking at the United Nations in September, UK Prime Minister Boris Johnson said:

"We are fast-approaching a critical moment for our planet and our people, when – in just one month's time – world leaders will gather in Glasgow for the long-awaited Cop26 climate summit.
"We need everyone to bring their ambition and action, so we can limit rising temperatures and set the world on the right path to net zero emissions.

"That means bold commitments on coal, cars, cash, and trees: to drive forward our green, industrial revolution with clean energy and electric vehicles, close the gap on the climate finance promised to developing nations, and halt devastating deforestation.
"We've seen positive progress so far, but it isn't enough. I look forward to meeting with leaders – from big emitters to climate vulnerable nations – to make sure Cop26 counts"

Realistically, much depends on China. With 23.9 share of Global GHG emissions in 2018, China can determine whether or not COP 26 will be seen as a success.

China has already committed itself to a 2060 net zero target, which means that its trajectory between peak emissions (2030) and net zero will be among the fastest in the world. It has promised not to finance any more coal-fired power stations in third countries.

If China agrees not to object to a Global NZC2050 goal, if it commits to advancing its domestic 2030 'peaking' target, the whole atmosphere at Glasgow would surely be transformed.

LIAM FOX MP

The Rt Hon Dr Liam Fox MP has been Member of Parliament for North Somerset since 1992. Dr Fox held several roles in John Major's Government, including as a Foreign & Commonwealth Office Minister. Between 1997 and 2010, he held several roles on the Conservative Party Opposition Front Bench such as Constitutional Affairs Spokesman, Shadow Health Secretary, Conservative Party Chairman, Shadow Foreign Secretary and Shadow Defence Secretary. Dr Fox served as Secretary of State for Defence in David Cameron's Government from May 2010 until October 2011.

Between July 2016 and July 2019, he served in Theresa May's Government as Secretary of State for International Trade and President of the Board of Trade.

As International Trade Secretary he was tasked with creating the UK's first Independent Trade Policy for forty years post-Brexit. Before entering politics, Dr Fox worked as an NHS doctor and then as a family GP. He is also a former Civilian Army Medical Officer and Divisional Surgeon with St John Ambulance. In 2012, he founded the military charity 'Give Us Time'.

COP26 CHALLENGES IN CONTEXT

The road to COP26 was never going to be easy but it has been made even more difficult than expected due to the Covid 19 pandemic which has distracted the attention of many of the world's political leaders. The event itself, and the decisions which will flow from it, however, could not be more important.

The hosts, the UK government, has called on all G20 countries to sign up to net zero, set out clear plans to cut emissions by 2030, and commit to ending coal power, transitioning to electric vehicles, and restoring nature, with the richest nations providing financial support to the rest of the planet to go green. Four key goals have been set out for the Glasgow meeting –mitigation, adaptation, finance and collaboration.

COP26 is, of course, not a single event but part of a continuing process. We had COP25 in Madrid, hosted by Chile, COP24 in Katowice, Poland, COP23 in Bonn, Germany, presided over by Fiji and COP22 in Marrakesh, Morocco. But, important as though these meetings have been, the main challenges for the UK summit in Glasgow flow from the landmark Paris Agreement, the legally binding international treaty on climate change adopted by 196 Parties at COP21 in Paris in 2015. COP isshort for the Conference of the Parties to the UN Convention on climate change (UNFCCC).

In assessing the challenges to COP26, therefore, it is useful just to remember what was agreed in Paris. The stated goal was to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

To achieve this long-term temperature goal, countries promised to aim to peak greenhouse gas emissions as soon as possible and to achieve a climate neutral world by mid-century. The agreement began a process that worked on five year cycles of increasingly ambitious climate action by its signatory nations. By 2020, countries were required to submit their plans for climate action, known as Nationally Determined Contributions (NDCs). In their NDCs, countries are required to set out the actions they will take to reduce their greenhouse gas emissions and also the measures they will take to build resilience in order to adapt to the impacts of rising temperatures. They also agreed to set out, by 2020, long-term low greenhouse gas emission development strategies (LT-LEDS) although, unlike NDCs, these were not mandatory.

The Paris Agreement provided a duty for developed countries to take the lead for providing financial assistance to countries that are less wealthy and more vulnerable, while for the first time also encouraging voluntary contributions by other parties. According to the UN, "Climate finance is needed for mitigation, because large-scale investments are required to significantly reduce emissions. Climate finance is equally important for adaptation, as significant financial resources are needed to adapt to the adverse effects and reduce the impacts of a changing climate."

All of this was to be monitored under a process known as the Enhanced Transparency Framework (ETF). Under ETF, starting in 2024, countries are required to report transparently on actions taken and progress in climate change mitigation, adaptation measures and support provided or received. It also provides for international procedures for the review of the submitted reports.

Many of the challenges in Glasgow relate to finalising and concluding measures begun in Paris in 2015.

Timeframes

Even at this late stage, there is no agreement about the common timeframes that the 2025 NDCs cover. Common timeframes denote the parties' agreed time to implement the climate change measures described in their NDCs. The Paris Agreement calls on countries to communicate an NDC every five years, and countries that use a ten-year timeframe are still required to submit five-year interim targets. The Paris Agreement does not, however, define a common implementation period, or "timeframe" and as result, the first round of NDCs cover timeframes that end in either 2025 or 2030. Attempts to resolve this problem at COP 25 in Madrid were unsuccessful and will be a key challenge in Glasgow. There are also challenges around agreement on the enhanced transparency framework which will make countries accountable for their climate commitments and questions around whether the ETF has actually taken the process forward and whether the peer exchange process has made any material difference.

Adaptations

A recent Chatham House publication: "Raising Climate Ambition at COP26" set out the challenges very clearly. It said "While climate change affects all nations, it is generally those who have emitted the least that continue to be the hardest hit. In many climate-vulnerable developing countries, a lack of financial resources is among several constraints that negatively affect their ability to mitigate and adapt to climate change. Covid-19 has aggravated this challenge: while industrialised countries have implemented unprecedented stimulus measures to support their economies – and vaccinated large parts of their populations – many developing countries continue to face a health and economic catastrophe."

Some of the most already vulnerable populations are at greatest risk from the changes in our climate. It is not surprising that some of the poorest countries are angered by their belief that they have done the least to create climate change but are the ones who will be most affected by it. Some of the challenges at COP26 will be around how we build resilience for some of the world's poorest people and how we will ensure that sufficient finances will be put in place for items such as flood defence, early warning systems and resilient agriculture.

Loss and damage

There are some climate impacts that no amount of funding or adaptation adequately address; this is the issue of loss and damage. According to the World Wildlife Fund "Loss and Damage results when climate change impacts exceed our capacity to respond. With inadequate mitigation action and adaptation support, losses and

damages are increasing. Loss and Damage from climate change is not a distant issue for many vulnerable countries, their people and nature. Rather, they are experiencing dramatic losses and damages daily". The key question will be how we ensure that there is sufficient action, in both financial and practical terms, to ensure that help is available when it is needed.

At COP26 the UK will be seeking to fully operationalise the Santiago Network, which was set out at COP25. The vision of the Santiago Network is "to catalyse the technical assistance of relevant organisations, bodies, networks and experts, for the implementation of relevant approaches for averting, minimise and addressing L&D at the local, national and regional level, in developing countries that are particularly vulnerable to the adverse effects of climate change". The challenge, as always, is how these noble sentiments will be implemented in practice.

Concluding article 6 and carbon markets

Pressure is growing in some of the world's most advanced markets to introduce some form of carbon border adjustment mechanism. This is often being resisted (for example in the UK, EU and US) on the basis that it would be better to find a globally applied formula for pricing carbon. The real challenge will be how the most powerful economies in the world will react if no agreement is reached in Glasgow. Will we see "a carbon border tax" and if so what might be the difficulties, opportunities and consequences? If not, what other alternatives might there be to deal with the issue of the economic advantages created by those who produce cheaper goods through higher

pollution? This is likely to be a huge political issue not just in Glasgow but in its aftermath.

Finance

As ever, much of the tension in this international gathering will revolve around money. As the Chatham House report put it "Developed countries must deliver on their 2009 pledge to mobilise $100 billion per year for climate action in developing countries. This is important for raising ambition and crucial for avoiding a breakdown in trust. The implementation of many developing country NDCs is also – at least partly – conditional upon the receipt of enhanced levels of finance. An ambitious outcome in Glasgow will require enhanced support for and increased attention to the key issues of climate change adaptation and 'loss and damage'."

It is worth remembering that the $100 billion figure was first put forward at COP 16 in Copenhagen by US Secretary of State Hillary Clinton. While it was enshrined as part of the Paris Agreement, where from 2020 onwards the rich countries would provide $100 billion every year to help poorer countries tackle the impact of climate change, British Prime Minister, Boris Johnson, recently expressed only a 60% certainty that concrete agreement on the subject might emerge in Glasgow. One of the areas of difficulty is how to determine how much money has actually been given in support and who should be responsible for measuring it. The OECD recently concluded that the amount of climate finance being given was almost $80 billion, well short of the target. One of the problems with this measurement, however, is that it is dependent on figures reported by countries

themselves (and measured by their own criteria) with no independent scrutiny by the OECD.

Differing priorities

It is clear that on a whole range of issues there are differences, mainly between developing and developed countries. Key questions remain unanswered with only days to go before COP26 begins. How big will the financial settlement need to be to satisfy the most vulnerable countries and will the wealthier countries be willing to foot the bill? What concessions will the world's strongest economies demand in return for their finance and will they be able to sell expensive commitments to their democratic electorates? On top of all this, it will be essential to get the world's biggest polluters to agree to decisive, rapid and binding action if the global problem is to be effectively tackled. It is far from clear if some of these will be willing to take the action necessary.

India and China, as two of the world's biggest polluters, will need to agree any changes in Glasgow if they are to be meaningful in the long term. Do they want the same or different things? How willing will they be to block agreement in their own perceived national interests and how much will others be willing to pay to have them on board? Is COP26, ultimately, vulnerable to Chinese, or to a lesser extent Indian, blackmail?

Concerns about China's attitude have been exacerbated by two recent events. The first is the AUKUS deal, the new security and defence pact between Australia, the UK and the US, focusing on

nuclear submarine technology. It is currently unclear whether Chinese President Xi Xinping will actually attend the Glasgow meeting. The second is the current energy crisis. Beijing has previously said that it would cut its coal consumption starting in 2026 and produce 25% of its energy from non-fossil fuels by 2030. Yet faced with an energy shortage, Chinese officials have recently ordered the country's two top coal producing regions to expand their annual production capacity by more than 160 million tonnes.

Shanxi, China's biggest coal-producing region, ordered its 98 coal mines to raise their annual output capacity by 55.3 million tonnes over the remainder of the year while in China's second biggest coal producing region, Inner Mongolia, producing more than ¼ of the national total, local authorities have been asked to notify 72 mines that they may operate at stipulated higher capacities immediately. While production in the region had fallen due to an anticorruption probe targeting the coal sector (where miners were banned from producing coal above the approved capacity) this reversal of policy shows that energy requirements will be placed ahead of politics.

In India, Prime Minister Modi has made it clear that he wants to see the richer economies meet their financial commitments as a prerequisite to India moving on its emissions. This makes discussions on finance a key determinant in India's cooperation and, consequently, the success or failure of the COP itself. This lack of trust, which could end up in a political stalemate, maybe one of the key elements that the talented and energetic president of the COP, Alok Sharma requires all his diplomatic skills to overcome.

As U.N. Secretary-General António Guterres recently put it "If the present mistrust is maintained, if the financial problems are not properly addressed, and if many emerging economies think that because of that, they are not supposed also to make an additional effort, we risk [reaching] tipping points that make the 1.5 degrees target unreachable."

CRAIG MACKINLAY MP

Craig Mackinlay is the MP for South Thanet, first elected in 2015.

Craig's political career began in the early 1990s when, alongside LSE economist Dr Alan Sked, he founded the Anti-Federalist Party – which went onto become the United Kingdom Independence Party (UKIP). Craig briefly led the party in 1999 and contested elections for the party at a European and Parliamentary level for a number of years. In 2005 Criag joined the Conservative Party.

During his first term in Parliament (2015-17) Craig was actively engaged in shaping policy in Westminster. He was a member of: the Exiting the EU Select Committee, the Work and Pensions Select Committee and the European Scrutiny Select Committee.

At the European Referendum Craig was a Founding Member of Conservatives for Britain, becoming a leading Vote Leave campaigner and pushing his constituents struggles with the EU over live-animal exports. During the 2017-19 Parliament, Craig was outspoken on the Brexit process as a member of the Exiting the EU Select Committee.

Craig is also serving as: the Chairman of the All-Party Parliamentary Group (APPG) for Civic Societies; the Chairman of the APPG for Hungary; the Chairman of the APPG for Fair Fuel UK Motorists and Hauliers; and the Chairman of the APPG for Listed Properties.

NET ZERO – WHAT WILL IT COST AND WHY ARE WE DOING IT THIS WAY?

Net Zero is the biggest undertaking of the British state for a generation and a strange throwback to the command and control regimes of old. The plan is to end the use of fossil fuels, which currently meet 80% of our energy needs. Make no mistake, this requires a radical transformation of every part of the economy just as significant as any attempted before. Every gas boiler will need to be replaced, the freedoms, flexibility and affordability offered by petrol and diesel vehicles will have to be denied, and most industrial processes reimagined with the result that many high energy industries will simply cease to operate in the UK offshoring thousands of jobs. Let no one question the enormity of the project, nor the enormity of the cost. As yet there are no answers to the obvious question – who pays? We are already witnessing the folly of relying on renewables for base load supply, the winding down of gas storage capacity creating spikes on the spot price market and the resultant madness of a policy of relying on Russia for gas whilst simultaneously handing over billions of euros and pounds to a regime intent on investing in new weaponry to threaten us. The Net Zero strategy has closed down sources of domestic supply and enhanced energy security that a policy of responsible shale gas extraction could satisfy. Even on a faster or slower transition to a reduced carbon economy, traditional fossil fuels will be with us for some time to come. Surely

more sensible to have guaranteed security, supply and management of pricing over the trajectory of change?

It is clear that Parliament needs the best possible analysis of the potential costs so that we can take informed decisions about the way ahead. If the cost is likely to be punishingly high, we are going to need an escape route. Surely we cannot simply be obliged to pay any cost, however high and however painful?

The BEIS Secretary of State put it to me that Parliament had voted for Net Zero. In plain terms this is true under the Climate Change Act 2008 (2050 Target Amendment) Order 2019 {SI2019/1056}. This 250-word Statutory Instrument amended the previously ambitious 80% C02 reduction target by 2050 compared to the 1990 baseline, to the full 100%. The SI was laid before Parliament on 12th June 2019 and enjoyed a full 88 minutes of debate on 24th June 2019 and the House was not divided. That's as much my fault as anybody else but many attentions were elsewhere at the height of the Parliamentary Brexit battles at the tail end of the May administration.

I am determined to get answers about how much Net Zero might cost my constituents, so I examined some of the most high-profile cost estimates.

The Climate Change Act 2008 envisaged an independent body providing impartial scientific and technical advice to Parliament about how Britain could reduce its emissions. The Climate Change Committee (CCC), however, makes no bones about the fact it wants the government always to go further and faster, and to support

particular technologies. They have become a significant player in the political debate around Net Zero, often explicitly directing Government policy, while being totally unelected and unaccountable. Mainstream Media regurgitates its words sagely with little space offered to those who question its assumptions about the cost and feasibility of Net Zero.

When the legislation for Net Zero first came to Parliament, they assured ministers that the cost would be about £50bn per year in 2050, equivalent to 1-2% of GDP, and this was described as modest. It has subsequently needed an Information Tribunal to force them to reveal their underlying assumptions used in their forecasting. They have been found to be based on under-estimates of true costs, particularly on the cost of electric vehicles.

More recently, they have come up with a new estimate for the cost of Net Zero that details £1.4 trillion of capital spending that will be required to meet these ambitions. They were keen not to publicise this extraordinary number, and so discounted it with a range of speculative benefits that may or may not materialise. The reliability of the CCC to forecast and advise are proving threadbare at best and misleading at worst.

Finally the £1.4 trillion figure has been brought to public attention after the Office for Budget Responsibility (OBR) recycled the CCC figures for their fiscal risks report. The revelation that households are each facing a £50,000 bill over the next 30 years has caused, finally, an awakening in the media and public. I am worried that the true cost could be much higher still. I could cite the original estimates

underpinning HS2 as an analogy, but I won't.

Take for example, the prediction that the cost of decarbonising residential buildings would be £253 billion. This equates to around £10,000 to decarbonise each dwelling. We know that at present the most affordable alternative to a gas boiler, an air source heat pump, can cost around £11,000, and tens of thousands of pounds worth of energy efficiency improvement may be required on top of that. An independent report put the cost of decarbonising the UK's social housing sector alone at £103bn, or approximately £20,000 per household. If such costs are replicated across the entire housing stock, we are looking north of £500bn just for UK residential decarbonisation that is deemed responsible for just 0.14% of global CO2 output. Put another way, we are looking at a half trillion pound cost to eliminate CO2 that represents a little more than a month's worth of incremental increase in CO2 output of China's rapidly expanding coal-fired power station plans. This ignores other rapid expansion of coal power in India and Indonesia.

Air source heat pumps sadly fail to heat homes to the temperatures we are used to, cost more to run, work particularly poorly in winter, and require large water storage tanks. Talk of hydrogen boilers are all very well but questions remain as to the infrastructure requirements and the simple question of how we create the hydrogen in the first place? There is no technology to elegantly replace the gas boiler and I'm yet to find a constituent who assented to pay out £20,000 just to be colder and poorer. As I've said all along – offer me electricity at 4p per Kwh, the domestic gas unit price and I might get excited.

The pain doesn't stop there. The use of electric cars, which are already much more expensive than their petrol equivalents and have the obvious limitations of range and charging, are made more expensive if electricity prices rise to accommodate large amounts of additional offshore wind or expanded reliance on interconnectors from the continent supplying coal powered electricity.

There is little government planning to provide the millions of charging points, no thought as to the security or availability of supply of rare metals to make the batteries and even less thought as to the true CO2 cost of ore extraction, manufacture of the new cars, new batteries nor the nationwide upgrade to the electricity grid to supply. The batteries are largely unrecyclable without huge energy input and use of toxic solvents to break down the near impenetrable resins. The safety of these batteries, that can burn uncontrollably releasing a variety of noxious substances, has yet to be fully investigated and yet the prospect is for many square miles of grid level batteries to smooth notoriously unreliable renewable electricity supply.

This dash for electric cars has also perversely condemned the country, and particularly our congested cities, to more particulate pollution, not less. No engine manufacturer will invest further in the design and production of a better internal combustion engine offering enhanced power, better consumption, cleaner-burning and lower particulates. The 2019 engine is as good as it's ever going to get, which is a shame, as the 2035 engine would have been so much better across all measures. Natural market-driven technological improvements have been stopped for reasons that nobody can quantify, explain or justify. I got elected to make my constituents lives better, safer and more

free, not constrained and more expensive.

As ever, it will be the poor who suffer most from these delusions. It is they who will be forced off the roads, they who will do without their two weeks in the sun, they who will sit in the cold when they simply can't afford the electricity price rises. Fuel poverty, the reality of "heat or eat" is the dilemma we are going to put them in, and yet there is somehow an overwhelming Westminster consensus that this is the right thing to do. The lack of almost any interest in the cost of these policies to ordinary people is palpable.

The Interim Report for the Treasury's Net Zero Review adopts wholesale the figures from the Committee on Climate Change. Remarkably then, it appears that the Treasury's work on the cost of Net Zero, the "Net Zero Review", does not seem to include preparing its own actual cost estimate even though the Treasury will be in the driving seat on many of the key decisions. When it becomes clear that the electorate are not prepared to pay themselves for unknown and unwanted Net Zero technologies, it will be the Treasury on the hook for subsidies, support, tax rises, borrowing or cuts elsewhere to pay for these overblown ambitions.

We have been left in an abject position. No arm of government BEIS or the Treasury, are willing to do their own work looking at the cost of Net Zero, and neither is the OBR. Instead, the CCC, the loudest cheerleaders of the green lobby, is being allowed carte blanche to minimise and obscure the true cost of Net Zero.

The Government is fooling itself if it thinks we can go down the Net

Zero path without suffering an electoral calamity. We will look, quite rightly, like the privileged few taking the poor back to the lifestyles of the early 20th century. The optics of jetting from one international climate conference to the next to tell other people they should not be flying, driving or eating meat, is not one that will be sustainable when these policies really start to bite.

I can but guess the response by the public as they watch new coal fired power stations proliferate across the growth economies of the world and with it cheap energy while they huddle in the cold hoping for the promised heat output of their new heat pump and paying off the loan for the electric car they never really wanted.

We all want to leave the planet in a better condition than we found it. There are a multitude of measures that can make significant cuts to the UK's CO2 footprint which do not require such vast societal change. Less food miles, less reliance on single use plastics, ambitious re-forestation, more gas, insulation, new nuclear. We should pause for breath, inject some rational thinking and consider the alternatives before it's too late.

ALEXANDER STAFFORD MP

Alexander Stafford is the Conservative MP for Rother Valley. His election in December 2019 marked the first time the seat had been won by a non-Labour candidate since the constituency's creation in 1918. In Parliament, he champions the green recovery, having previously worked for WWF and Shell.

As a member of the BEIS Select Committee, chair of the ESG APPG, vice-chair of the Hydrogen APPG, and vice-chair of the Critical Minerals APPG, he is a leading voice for the role of hydrogen, green finance, ESG, and critical minerals in Britain's drive to reach net zero and to level up communities across the country.

CHAMPIONING AND WINNING THE TECH REVOLUTION

The United Kingdom is in the midst of an industrial revolution unlike anything we have seen since the Victorian era. However, this brave new world does not consist of steam-powered locomotives, coal-fired factories, and cast iron bridges, but instead green, innovative technologies designed and built in the UK to solve many of the world's most intractable economic, social, and environmental problems. We are global leaders in these new technologies, but to maintain our advantage we must act decisively in order to steal a march on foreign competitors and unlock the jobs and wealth that await us.

Indeed, the whole world is going low carbon in a bid to reap the rich economic rewards, with the French, the Germans, and the Chinese wasting no time in making the most of the huge economic opportunities presented by this pivot to green technology. It is important that the United Kingdom acts fast to get there first, so we can develop the technologies and financial models to export around the globe and turbocharge the British economy.

We can do this by committing Government funding and support, in partnership with the private sector, to innovative British green technologies and services. This will ensure business confidence and will lead to a flood of investment in the UK renewables sector, catapulting us ahead of the overseas competition and winning the

tech revolution for Britain. We have already mostly missed out on the financial benefits of electric batteries to China, and we cannot allow the same to happen again with future opportunities.

Britain's tech revolution revolves squarely around the technology needed for a low carbon future, which can unlock investment and rejuvenate moribund sectors of the economy. With renewables generating nearly 40% of our energy last year and providing 250,000 jobs, the UK must embrace a green future to ensure increased prosperity. This is evidenced by the clear link between 78% economic growth since 1990 and a 44% reduction in emissions in the same period.

There are some exciting examples of homegrown technologies of the future. UK hydrogen, for example, will not only transform our left behind communities but also bring a whole new wave of economic activity to these areas. As we attract more investment and the local hydrogen industry grows, more companies will want to take advantage of this infrastructure, creating manufacturing jobs, graduate jobs, and supply chain jobs alike. In turn, our regional towns stand to reap high economic returns that will rejuvenate the regional economy.

The UK has a very clear hydrogen advantage, because of expertise, home-grown companies, North Sea assets, and our developed infrastructure. We are also advantaged by our leading British companies in the sector, for example Wrightbus, which is building 3,000 hydrogen buses in the UK for use across the country by 2024—the equivalent of taking 107,000 cars off the road. In the boiler

sector, Worcester Bosch and Baxi are leading the way in producing the world's first hydrogen-ready boilers, which can run off either pure hydrogen gas or natural gas. The UK is also leading in terms of trialling potential uses for hydrogen technology, with H21 and H100 leading groundbreaking tests of 100% hydrogen in the gas grid. Incredibly, UK company Johnson Matthey is a global leader in fuel cell development and transport components, with its technology ending up in roughly a third of fuel cells globally – a staggering figure. Another great British company is ITM Power, based in South Yorkshire, next to my constituency. It is involved in most hydrogen transport products in the UK, and it has indicated that it wishes to open a large hydrogen refuelling station and a network across the country.

Overall, about 20 countries that collectively represent about 70% of global GDP have announced a hydrogen strategy or a road map as a key pillar of their decarbonisation ambitions. We have only to look to the race for dominance in the battery industry to see why we cannot allow ourselves to fall behind today. For instance, today there are 136 battery mega-factory plants in operation or being planned. Some 101 of those are in China, and eight are in the USA. China is opening almost one new mega-factory every single week. The UK has well and truly lost out in the battery industry, but we are still in the race for hydrogen, and we can still win.

The hydrogen economy will improve our energy security and resilience, which are critical in light of both the devastating pandemic and hostile Chinese and Russian relations. We have first-mover advantage, but other countries are waking up; we must be ahead of them. This is an opportunity for us to corner the hydrogen market in

the way that China has dominated the battery market. We can take a world lead on this, and we should—Britain is perfectly placed to do so.

Hydrogen is not the only race in which we are competing, however. The Government is waking up to the fact that the race for critical minerals security is the new great game. Urgent action must be taken now to safeguard the future prosperity of the United Kingdom and the west in the spheres of the economy, defence, and energy. There is a significant threat to our economy and our post-covid and post-Brexit recovery if we run out of the critical minerals needed to supply our low-carbon industries of the future. The UK's 10-point economic plan makes an assumption that the international supply of these minerals is sufficient to service every country's needs in our global race to avoid climate change. However, this is simply not the case.

Critical minerals are becoming more and more important by the day. Our renewables and telecommunications technology of the future requires an ever-increasing amount of critical minerals. Without them, our society just cannot function. With global demand at this scale, shortages present a real threat to our economy and to our society. In the past five years, we have seen the mass commercialisation of satellite and drone technology, led by British companies such as Blue Bear Systems, all of which rely on critical minerals. Likewise, advanced robotics for British manufacturing, which is crucial to my seat of Rother Valley in South Yorkshire and places across our country, require more than 40 different critical minerals.

The most visible everyday examples of the importance of critical minerals are mobile phones and electric cars. Our ultra-modern smartphones, boasting touchscreens, cameras and 5G, use a huge number of critical minerals, including potassium, tin, copper, tungsten and advanced aluminium. Electric vehicles are often hailed as the future of renewable transport, but they are key users of critical minerals. Each car on average uses 100 kg of copper, rare earth for the magnets and lithium, nickel, cobalt, manganese and graphite for the batteries. Many people are surprised to learn that a solar panel relies on 16 different minerals and metals.

An equally important part of the UK's renewables future is the wind turbine, with the Prime Minister boldly envisioning that we shall become the 'Saudi Arabia of wind power'. I share his enthusiasm for the role that wind can play in powering the UK and in reducing our carbon emissions, but to meet the Prime Minister's objective of having every home in the UK powered by wind turbines by 2030, experts indicate that we will need to increase our output of energy from 10 GW to 40 GW by 2030. That will require building a new wind turbine every single day until 2030. To achieve that, we need more than 26,000 tonnes of rare earths and more than 4 tonnes of copper. The UK Government must acknowledge that the construction of renewable energy technology is inextricably linked to the supply of critical minerals. We must take action accordingly to protect our energy sector and the generation of power.

Indeed, seven points in the Government's 10-point plan for the green recovery are dependent on a secure green supply of critical minerals. Herein lies the challenge for the United Kingdom. We are facing a

two-pronged threat. The first threat is that as demand rockets for the use of critical minerals in the technology of the future, there is a global shortage, which would affect our economy and livelihoods, our energy supply, our environmental agenda, our security and defence, and the way we live our lives.

The second threat is that posed by the stranglehold on the midstream of the supply chain by the People's Republic of China. Currently, we are totally dependent on China's good will, from processing and refining to beneficiation. For instance, China mines only 1% of the world's cobalt, but refines 65% of it. It mines 12% of the world's manganese but refines 97% of it, as well 89% of the world's graphite. China's absolute control of the critical mineral midstream is so strong that graphite from the UK is sent to China for beneficiation, and then bought back from China at the component section of the supply chain. Worryingly, of the 172 gigafactories being built in the world at this moment, 130 are in China.

It is estimated that by 2030 the world's demand for lithium will mean that global production is 1.4 million tonnes a year in deficit. Graphite will be 8 million tonnes in deficit, cobalt 800,000 tonnes in deficit, and nickel 400,000 tonnes in deficit. In terms of batteries, we currently need to import battery technology from the People's Republic of China, a country that owns 73% of the world's battery supply. If China controls the midstream of those minerals and is building over three times more gigafactories than the rest of the world put together, it is only logical that China will serve its industrial requirements before the rest of the world, and before the United Kingdom. Indeed, China has openly discussed the potential of cutting off the supply of rare

earths or rare-earth components to the United States, critical for the US defence sector.

Thus, it is key that we relocate to the UK other steps in the supply chain, particularly in the midstream. The domestication of the critical mineral stream and investment in the circular economy is crucial. We are lucky to have in the sector leading British companies such as the Materials Processing Institute, Less Common Metals, TechMet, and Technical Critical Minerals. This innovative midstream could include recycling, repair, and remanufacturing of rare earths which could create over half a million jobs across the UK, outside of London and the South East. Cutting-edge critical mineral processing hubs in our left behind areas, creating synergies with the hydrogen hubs, will not only safeguard existing jobs but create thousands more, providing well-paid employment for generations to come and injecting much needed investment into our high streets in industrial towns.

Furthermore, the UK has an opportunity to take the lead on developing an overarching Five Eyes strategy that will safeguard our prosperity and security for decades to come. It is quite possible that we can work with our mining counterparts to host the midstream and downstream parts of the supply chain, creating a supply chain balance across the Five Eyes alliance.

Hydrogen and the processing of critical minerals are just two examples of exciting new British technology which will allow us to triumph in this industrial revolution exactly as we did two hundred years ago. However, there are so many more technologies which Britain is pioneering, from floating wind turbines and sustainable

aviation fuel to Rolls Royce's small modular reactors for nuclear power generation and wave energy. It truly is an exciting time for British industry and the British economy.

The economic effects of these new technologies will not just be felt in these local communities, however, but also in terms of a supercharged UK plc. We are currently world leaders in low-carbon technology, green finance, and renewables expertise which we can export around the globe, and in this post-Brexit era, the opportunities for British companies are limitless. If we do indeed succeed in winning the tech revolution, the British economy will reap the bountiful dividends.

Despite our impressive progress, if we are to be sure of winning the tech revolution for Britain and claiming the potential economic benefits, we must champion our innovative sectors by going harder and faster than ever before. With COP26 coming up on home turf, we must seize this opportunity to steal a march on the competition and become the preeminent world leaders in innovative technologies. I contend that we must adopt a strategy for the tech revolution modelled on our coronavirus vaccine procurement policy. The Government and private investors must back lots of promising projects, with an appreciation that some will be successful and some will not work out. This is how we will stimulate innovation and guarantee a plethora of new world-leading British companies. I am in discussions with Ministers regarding this very point and I have no doubt that they will take the required action.

This Government has pledged to place green, innovative

technologies at the heart of its policy agenda. This emphasis will help us to build back better from the pandemic and to take advantage of our Brexit freedoms, by fuelling huge economic growth, levelling up across the Union with jobs and wealth, and accelerating our progress to net zero. In a brave new decade with many unknowns, we do know that using innovative technology to decarbonise our economy is important for environmental, economic, security and health reasons. Government has recognised the importance of championing the tech revolution, and now our fantastic UK innovators and industry must use their expertise and skill to win it for us for the next fifty years.

MARK BENTLEY

MB

Mark Bentley became US strategy consulting firm Putnam, Hayes & Bartlett Inc.'s youngest ever partner in 1988. Identified as one of Europe's '30 Under 30' Leaders, he advised on numerous privatisations, regulatory frameworks and industry restructurings.

Mark worked closely with Sir Alan Walters, economic adviser to Margaret Thatcher, and was recruited by Professor Tom Copeland to join McKinsey & Company. In 1996 he became an investment banker, holding senior roles at Lehman Brothers, JPMorgan Chase, HSBC, hedge fund CQS, Greenhill & Co., and latterly as a Senior Adviser to Guggenheim Partners, establishing the London Office.

He has led or participated in M&A and financing transactions with an aggregate value in excess of US$500 billion.

Mark was educated at University College, London, LLB (1st Class Honours), and at New College, Oxford, (BCL)

THE TRAGEDY OF THE COMMONS REVISITED

COP 26 takes place in the father of political economy Adam Smith's home city. So perhaps it's time to revisit market-based solutions to the climate problem to see if we could deliver the carbon emissions outcome we desire at a lower cost. We reach far too quickly for centrally planned, mandated policy options, and have been rather half-hearted in using the price mechanism. The recent regulatory failure in domestic retail markets due to the ill-considered price cap should raise the question whether market-destroying policies can ever deliver effective solutions. The costs of the price cap fiasco will be recovered through the distribution component of every household energy bill; in effect, a tax on the poor.

Smith would recognise the problem's political component, and the natural attraction politicians have to centrally planned initiatives: just look how many windmills we've built! Governments are subjected to considerable lobbying from advocates of new solutions to meet the carbon emissions challenge, if only the right method can be provided for the public purse to meet the cost. As Smith pointed out, starting with well-intentioned reasons, the conversation [often] "ends in a conspiracy against the public, or in some contrivance to raise prices." So, what might we gain from refocusing on market-based approaches?

To answer this, we can draw on the work of three of Smith's

intellectual descendants: William Forster LLoyd (extended by Garrett Hardin); Friedrich Hayek; and Ronald Coase. Lloyd's 1830s seminal work on the economics of property rights, examined the over-grazing of common land, and the Tragedy of the Commons, showed how unfettered access to a 'common' resource leads to overgrazing, degradation in soil and land quality. There is an incentive to over-graze and, without property rights, no-one is incentivised to improve the land's quality. The atmosphere is our largest and most complex 'common', polluted freely and without restraint. Establishing property rights regarding its use, and the price mechanism such that this use is properly valued, would be an important start. Without a price for carbon emissions, it is impossible to choose the more economically efficient outcome as between say, producing a ton of steel versus producing a ton of sodium; or sending a plane full of tourists to Spain. The price mechanism in 'cap and trade' systems aims to ensure real preferences in demand and supply are properly captured. In complicated multivariant situations, this is the only route to efficient decision-making.

Following Brexit, the UK was free to determine its own Emissions Trading Scheme, and it chose to allocate permits partly by fiat and also by auction. The government sets an emissions 'cap', the maximum total amount of emissions to be released per year, reducing over time, in line with the UK's net-zero emissions target. The cap is divided into emissions permits, which allow businesses to emit a fixed amount. Emissions permits are required by approximately 1,000 energy intensive businesses, particularly the power generation sector and aviation (similar to the EU ETS). Almost inexplicably, the UK ETS is nowhere near comprehensive enough to deliver a proper carbon

price. In the Energy White Paper, the government has "committed to exploring expanding the UK ETS to the two thirds of uncovered emissions". If we are serious about solving the carbon emissions problem, ensuring a properly determined carbon price should surely be at the top of the list? UK ETS applies only to particular sectors and provides grandfathered free rights to some but not others. Much of the design of UK ETS is focused on providing 'floor' prices, which raises the question: why? We don't have a need for a minimum price for bread.

If we had a functioning carbon price, markets in close substitutes could develop, including in carbon capture and storage, very necessary services if net zero is to be achieved by 2050. For example, agriculture, currently a huge emitter, with the right price incentives could become a principal source of sequestration. Expected future prices are equally important, yet unlike the market in hydrocarbons, there is no effective current or future price mechanism. The proper price equilibrium in the market for carbon emissions would presumably do so by reference to the long-run marginal cost of carbon capture and storage, which would serve as a cap on long-term carbon emissions prices.

Our second 'Smithian', Friedrich Hayek provides ample caution against reliance on central planning which, he cogently argued can only ever deliver inefficient, inferior solutions. The experience of centrally planned economies in the twentieth century, particularly their environmental quality, bears out Hayek's observations. Furthermore, policies justified either by fallacious 'moral' argument, or diluted Marxist exhortation -- that the only solutions lie in the

abandonment of capitalism, individual choices and consumption, and the surrender of individuals' freedom (all for the greater good, obviously) -- are only ever likely to deliver 'environmental poverty'.

Hayek argued that central planners can never allocate society's resources efficiently even for the very purposes they wish to achieve. The burden of these inefficiencies inevitably falls more heavily on the less well-off. Without the price system, individual choices and preferences, which also change over time, are not reflected in the solution; any efficient planning requires the information that only the price system provides. Hayek would also argue that there is a moral dimension to preferring markets over central planning; we should not remove individuals' moral responsibility to future generations by virtue of a 'grand plan'.

Our third Smithian is Ronald Coase, whose paper The Problem of Social Cost (1960) is among the most cited articles in economics. Efficient consumption decisions depend on prices being correct, reflecting the full cost of consumption and production. In the case of energy consumption, this requires the inclusion of a price for carbon; following this, investment decisions around appropriate solutions can be made by individuals and firms. We need efficient production and consumption decisions.

Coase's work cautions against our simply 'exporting' our pollution. Trying to 'nationalise' pollution simply adds descriptive inaccuracy to economic inefficiency: pointing accusatory fingers at China or India as 'maximum emitters' when the majority of their industrial output is consumed around the globe, is insensible. We need to ensure that those solutions which can be brought to bear are not

prevented by artificial barriers, including making sure that intellectual property rights are properly respected. If the answer is ensuring the best technologies are available, we need to ensure the intellectual property in these products and technologies are properly respected by the recipients/users: proprietary technology will not be deployed if it can be stolen. Intellectual property matters as much for generation technology owners, and carbon capture and storage technologies, as it does for sunglasses or handbags.

What might Smith and his descendants recommend COP 26 participants focus on? Here are some possibles:

1. Put a proper price on the environment and focus on getting emissions markets functioning properly; if in doubt, pick a market-based solution; don't try and pick winners.

2. Let markets do what they do best: price risk.

3. Resist the superficial attraction of carbon taxes; these represent a fixed emissions price, which could easily see emissions rise.

4. Respect intellectual property; the best solutions won't be available unless people do.

5. Recognise that the carbon emission debate has 'crowded out' a great number of other environmental issues, including other emissions, clean water, soil pollutants, micro particles and many other environmental catastrophes.

MICHAEL HEWITT

MH

Michael Hewitt (Rear Admiral - RET.) retired from active duty on 1 January 2014, after 31 years of service in the U.S. Navy. A career naval aviator, RDML Hewitt distinguished himself across a diverse spectrum of defense-related competencies. He is recognized as one of the department's leading experts in strategy-totask advancing asymmetric warfare, nonkinetic warfare, and sensitive collaboration within the Department of Defense, Interagency, and National Security Staff. Upon his retirement from the military, RDML Hewitt founded HSH Analytics, a company dedicated to providing unmatched expertise in special access program operational employment, future war-fighting scenario development, and emerging technologies aligned to asymmetric warfare.

In2016 RDML Hewitt co-founded and is the CEO of International Peace, Power and Prosperity (IP3). IP3 and its affiliate Allied Nuclear Partners (ANP) is a global nuclear energy adviser, a start-up that helps foreign governments procure nuclear technology from American and commercially driven international companies, tailors financing and helps countries start nuclear energy programs.

In addition, RDML Hewitt is an advisor for several corporate entities involved in cyber defense, countering weapons of mass destruction, commercial capabilities for USG equirements, and high tech firms supporting advanced warfare concepts.

IP3 PERSPECTIVE ON COP26

This year's COP26 will convene in Glasgow, Scotland under the theme of "Uniting the World to Tackle Climate Change" for the purpose of "bringing parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change". While carbon reduction goals will be discussed among representatives of the 190-plus countries in attendance, there will also be undercurrents and opportunities that warrant attention.

Energy powers a nation's economy, determines the quality of life of its citizens, mobilizes its military, and determines its capacity to respond to national security threats. Energy has underpinned the rules-based liberal international order established and upheld by the Western alliance system since WWII. And for decades abundant, reliable and affordable fossil fuels have been the dominant resources. Resources that countries have leveraged in economic, military and geopolitical competition and that currently meet 83% of global energy demand.

The main stage of COP26 will be dedicated to carbon reduction and climate change impacts, but its deliberations have deeper implications as to how energy-deprived nations, and nations most vulnerable to climate change, will grow, develop and industrialize their economies under carbon constraints. This is daunting given the economic and population scale at which a zero-carbon energy economy would be required today.

More fundamentally, COP26 is about trying to restructure the

world's leading economies and greatest powers to meet a single objective—a lower carbon future. This translates to transitions in the industrial bases of the world's economies, the energy resources and technologies comprising those industrial bases and the subsequent geopolitical relationships that will unfold around new energy interdependencies. Transitions in the industrial bases of great power competitors should not be dismissed or overlooked as such transitions represent shifts in energy technologies and innovation capacity—transitions that may favor authoritarian nations over democratic nations.

Less apparent, but nonetheless critical, COP26 will be, by proxy, a deliberation of how the Western Alliance system organizes itself around three ubiquitous 21st century global threats: climate change, unprecedented demand for reliable energy and great power competitors looking to disrupt and draw to an end the liberal international order as we know it. As such, allied nations cannot preclude from their climate deliberations the possibility that Russia will weaponize its energy resources or that China will weaponize climate diplomacy for geopolitical gain.

To what extent the global economy can transition away from fossil fuels is debatable, therefore any efforts to do so must be strategic and principled around the realistic challenges of the 21st century. Less debatable is that any and all deliberations oriented toward such a transition represent an unprecedented task for the nations of the world, although COP26 won't be the first such attempt.
The Paris Agreement, the outcome of COP21, hasn't generated the results hoped for. While individual countries developed Nationally

Determined Contributions (NDC) for carbon reduction, the combined outcome of the 190-plus individual NDCs fell short of the overall objective as carbon emissions and fossil fuel consumption increased from 2016-2019 and are poised to continue increasing post-pandemic. As such, individual efforts didn't result in the whole being greater than the sum of the parts. However, the Paris Agreement hasn't fallen short because it lacked goals, objectives and pledges, or even a sense of urgency. It has fallen short because it lacked coordinated leadership and a pragmatic strategy for matching ends (carbon reduction, increased energy demands and economic development) with means (reliable energy low-carbon energy technologies and affordable financing for those technologies).

COP26 represents a new opportunity—an opportunity for allied nations to step forward and project leadership. And that leadership should begin with nuclear power and new public-private partnerships.

Allied Nuclear Partnerships: A Strategic Response to 21st Century Challenges

In 2019, nine countries accounted for 79% of global solar-powered generation. These countries also represent 63% of global GDP. More fundamentally, these countries have an established baseload of fossil fuels and nuclear power ranging from 56%-82% of their respective energy portfolios. The same holds true for global wind-powered generation. Meaning, the primary renewable energy options of solar and wind are growing in wealthier countries that have an established baseload of power generation on which renewables can be added.

The point being, renewables don't, and can't, precede baseload. And emerging economies understand full well there is no precedent for industrialization without reliable, affordable and abundant baseload power. Which is why coal and natural gas have dominated power generation for decades. In the multiples challenge of climate change, economic development, increasing global energy demands and great power competition, renewable energy technologies aren't capable of serving on the front lines of battle. Rather, nuclear must lead—renewables can follow. Great power competitors China and Russia understand this as well, which is why they have pursued global leadership in nuclear construction projects—a position they currently hold.

For global security reasons, this must change, and COP26 can serve as a platform to facilitate that change by way of leadership frameworks already in place. NATO, the Quadrilateral Security Dialogue and Five Eyes provide time-honored and proven security-oriented structures for dialogue and strategic planning that should be leveraged to meet the complex global challenges embedded in climate change. And threaded through these frameworks are the US and the UK whose special relationship has endured for over seventy-five years and proven invaluable in the security of nations over that time.

The recent trilateral security partnership (AUKUS) between Australia, the UK and the US exemplifies the trust and cooperation among three great friends of freedom—cooperation around the exchange of science and technology with the intent to "reinforce Britain's place at the leading edge of science and technology" and "deliver a safer and more secure" Indo-Pacific region "that ultimately benefits all" and

enhances the contribution of a "growing network of partnerships in the Indo-Pacific regions", including ANZUS, ASEAN, the Quad, Five Eyes". The US, Australia, India and Japan recently convened the first-ever in-person Leaders' Summit of "the Quad" to recommit their partnership in a "region that is a bedrock of our shared security and prosperity—a free and open Indo-Pacific". In addition, the UK and the US are being asked to engage in strategic conversations with the Three Seas Initiative (3SI)—a regional effort in Europe to expand cross-border energy, transportation and digital infrastructure. 3SI is increasingly interested in the development of civilian nuclear power as a means for reliable, zero-carbon baseload power and as a means for reducing dependency on Russian energy. In all, these represent emerging collaborations around nuclear power, climate change and energy security and innovation. Of these, nuclear power is central.

With COP26 being held in Scotland, the UK has both the opportunity and global platform to step forward and reassert itself as a global leader in advanced nuclear power technology—specifically, small modular reactors (SMR). And the US should stand shoulder-to-shoulder with its long-time ally in this effort. SMRs are recognized across the world as the future of civilian nuclear technology, offering a reduction in construction costs and construction time, versatility in applications including power generation, desalination, process heat, district heating and hybrid nuclear-hydrogen applications. The benefits of SMRs are very promising for energy-starved regions of the world looking to industrialize their economies under carbon constraints.

However, the promise of SMR technology deployment will be

realized only if there's a demand for SMRs that can attract private capital to provide affordable debt and equity financing to fund new projects—domestically and internationally. Currently, there's a perceived risk to investment in nuclear projects as the history of nuclear power development has been dominated by large nuclear power projects hampered by high capital costs, long construction periods and long-term investment horizons. While SMRs offer a new investment opportunity, governments can serve a critical role in de-risking the investment environment by ordering and standing by the deployment of SMR fleets. This would essentially prime the nuclear SMR pipeline and send a positive and emphatic signal of support for advanced nuclear while in the process creating a definite foundation for exporting SMRs within the aforementioned allied community structures—including emerging economies. The UK has an opportunity to deploy such a fleet approach for SMRs as indicated by recent efforts in that space by Rolls-Royce. This "fleet approach" demand would be a tangible signal that the UK government is moving beyond climate change rhetoric with substantive and aggressive policy action. If brokered properly, this will be welcome news for energy-deprived economies looking for responsible, democratic partners in the development of reliable zero-carbon energy infrastructure, rather than having to become entangled with authoritarian powers.

Allied nations of the world find themselves in a 21st century perfect storm as the impacts of climate change are calling for low-carbon technologies, ever-increasing energy demand in emerging economies is calling for reliable baseload power and the gradual transfer of leadership to authoritarian great power competitors in

nuclear construction is signaling a security threat around the most critical energy technology in the world. And the strategic pathway through this storm is the Western Alliance system of nations. As such, COP26 carbon reduction deliberations should, on principle, be anchored to not only reducing carbon emissions, but also improving the capacity of Western allies to outcompete China and Russia in the deployment of low- and zero-carbon energy infrastructure—specifically, nuclear power.

MINISTER CHANG TZI-CHIN

CT

Minister Chang Tzi-chin

Environmental Protection
Administration

Republic of China (Taiwan)

A VIEW FROM TAIWAN

As the COVID-19 pandemic ravages the world, carbon dioxide concentrations in the atmosphere keep setting record highs. The Working Group I contribution to the Sixth Assessment Report published by the Intergovernmental Panel on Climate Change in August 2021 strongly confirmed that human activity has furthered the warming of the atmosphere, oceans, and land. The atmosphere, oceans, cryosphere, and biosphere have all undergone broad and rapid changes. The weather in 2021 has also been unstable, as can be seen by the winter storm in the US state of Texas that severely damaged the energy system and the record-setting temperatures of nearly 50 degrees Celsius on the North American west coast. By the same token, Western Europe and China have suffered from heavy rains. In addition, Taiwan experienced its worst drought in more than 50 years, which was followed by abnormally heavy rainfall. One can clearly see how climate change has profoundly affected the whole world. Therefore, the 26th Session of the Conference of the Parties (COP26) under the United Nations Framework Convention on Climate Change (UNFCCC) taking place in Glasgow, United Kingdom, this November, has created a sense of urgency and motivated stakeholders to exert even greater efforts to significantly slow global warming and climate change.

With extreme weather events challenging the entire globe today, the United Nations calls on all countries to implement the Paris Agreement and take more proactive steps. As a responsible member of the international community, Taiwan is also eager to contribute

but, due to external political factors, is only able to attend COP sessions as a nongovernmental organization observer. However, Taiwan is still firmly committed to combating climate change. Indeed, building on the Paris Agreement and aiming for net-zero emissions by 2050, Taiwan strives to do its part, as well as continuing to assist other countries with the challenges arising from climate change. President Tsai Ing-wen declared on this year's Earth Day (April 22) that realizing net-zero emissions by 2050 is the goal of the world, including Taiwan. She also unveiled clear greenhouse gas emission targets for Taiwan. At the 33rd meeting of the National Council for Sustainable Development, Premier Su Tseng-chang announced the inclusion of the 2050 net-zero emission target in the amendment bill for the Greenhouse Gas Reduction and Management Act, demonstrating Taiwan's determination to actively reduce carbon emissions. More and stronger management mechanisms and incentive systems will be introduced with other vital amendments so as to enhance governance efficiency, introduce carbon pricing mechanisms, and adapt strategies for climate change. Such measures aim to encourage private investment in research and development, as well as public participation in the sustainable development of Taiwan.

Taiwan has established long-term reduction targets and is planning a practical path to attain 2050 net-zero emissions. The Executive Yuan has coordinated relevant ministries and agencies, convened a working group on paths to net-zero emissions, and sought professional consultation from Academia Sinica and the Industrial Technology Research Institute. Four working groups have been formed to focus on the areas of decarbonized energy, industry and energy efficiency, green transportation and vehicle electrification,

and carbon-negative technology so as to carry out interministerial technical assessments. With respect to energy and industrial policies, short-, medium-, and long-term markers for 2030, 2040, and 2050 will be set on the path toward net-zero emissions. In addition, the Environmental Protection Administration (EPA) and other relevant ministries and agencies have launched a public consultation on visions for 2050 to facilitate social dialogue on critical issues such as agricultural and forestry carbon sinks, net-zero buildings, green transportation, low-carbon industries, economic instruments, and just transformation. With diverse participation from all sectors and research and development investment in innovative technology, Taiwan will seek the most suitable climate governance path for its sustainable development.

The COVID-19 pandemic has shown that Taiwan's industries are an extremely reliable and significant partner in the global supply chain. Countries worldwide have successively proposed new goals on net-zero emissions to bring about a net-zero economy. The Taiwan government aims to formulate a clear and comprehensive carbon reduction path and green growth strategy. Cooperation with private enterprises plays a critical role in these efforts. The Taiwan Climate Alliance, formed by eight ICT companies, has set the goal of using renewable energy in 100 percent of their manufacturing processes by 2050 and will lead other manufacturers in the supply chain to jointly reach this target. In addition, the Taiwan Alliance for Net Zero Emission, formed by traditional manufacturing, technology, finance, and service industries, seeks to attain net-zero carbon emissions at office sites by 2030 and at production sites by 2050. To support the climate actions of enterprises and other actors in the private sector,

the Taiwan government has implemented financial mechanisms such as green financing and green bonds, thus creating a virtuous circle in the investment and industrial pursuit of sustainable development.

Taiwan, situated in a region highly vulnerable to the effects of climate change, has long been actively engaged in policy formulation, energy transformation, industrial innovation, and environmental sustainability in response to climate change. It hopes to actively construct a sustainable green homeland from the facets of supply, manufacturing, demand, and environmental protection. Taiwan is also willing to share its experiences and capabilities with the international community to overcome this crisis.

The spirit of cooperating and working together remains key to accelerating and extending global efforts. Therefore, through collaboration between the public and private sectors, Taiwan has demonstrated a great willingness to share its technologies, resources, and expertise with the world. To date, however, for purely political reasons, Taiwan is still being excluded from international organizations. As the world's 21st-largest economy, Taiwan plays a major role in both the stability and prosperity of the Indo-Pacific region, as well as the global economic and trading system. Like other countries, Taiwan has a responsibility to help mitigate the effects of climate change and should not be excluded from the UNFCCC. Taiwan's lack of access to UNFCCC meetings and mechanisms and its exclusion from international frameworks have weakened its ability to formulate adaptation strategies in response to the challenges posed by global warming and climate change. It also makes the international community harder to exchange information with Taiwan

and learn from its experiences. Until Taiwan can participate, there will continue to be a gap in the world's net-zero emissions coalition and global climate action initiatives will continue to be undermined.

Although Taiwan is not a member of the United Nations, it will always seek to be a model citizen for the international community. Taiwan will continue to work with all other countries to foster a global net-zero emissions future and a more resilient living environment for coming generations and to realize intergenerational justice. However, responding to climate change requires solidarity and courage. It is neither appropriate nor justifiable to restrict Taiwan's participation in the UNFCCC to the very limited quota of NGO participants permitted to attend COP sessions. For the UNFCCC to be effective, Taiwan must be afforded opportunities to participate in global mechanisms, negotiations, and activities that promote the implementation of the Paris Agreement. Taiwan exhorts all parties to look beyond political considerations and support Taiwan's professional, pragmatic, and meaningful participation in the UNFCCC. Let Taiwan help do its part in the global fight against climate change and for a greener future.

JASON MANN

JM

Jason Mann leads FTI Consulting's Regulated Industries and Energy Markets group. With 25 years' experience of working in energy markets, Jason has worked extensively in the British energy market from the commencement of the liberalisation process to the current day. He has worked closely with regulated companies such as National Grid, the energy market regulator, Ofgem and wholesale market participants on the design and operation of the wholesale gas and power market.

He also has extensive experience of network regulation and tariff setting – being closely involved since the 1990s in the development of regulatory regimes for gas and electricity networks.

Jason is a leading advisor on the development and operation of cross border electricity transmission assets (known as interconnectors) – having advised more than 20 different projects throughout Europe, Australia and Southern Africa on a range of market, regulatory and valuation issues.

THE ENERGY TRANSITION: MARKET-BASED OR CENTRALLY PLANNED?

The transition to net zero carbon emissions by 2050 – which is now enshrined in legislation[1] – will require a radical transformation of society and how it produces, transports, stores and consumes energy. Ideas on how to achieve this transition are emerging continually. Onshore wind, offshore wind, carbon capture and storage, "blue" hydrogen, "green" hydrogen, tidal power, large scale nuclear power stations, small modular nuclear reactors, biomass generation, large scale solar, rooftop solar, long distance electricity cables to neighbouring countries, [2] mega-distance electricity cables to the Sahara[3] – the list goes on.

While the range of technologies is varied and wide – there is one common theme. Nearly all of these technologies have high upfront costs and, to deliver net zero, costs are likely to be much higher than if we were to continue to use fossil fuels to meet our energy needs. , [4] [5] As a result, there is a need for intervention in the energy market to foster the adoption of new technologies. Otherwise, current practices would continue.

1 BEIS (2019), UK becomes first major economy to pass net zero emissions law

2 https://www.ft.com/content/399c1c37-3f7a-4770-af13-66741df01135

3 https://www.ft.com/content/d3b8947a-bdb1-445e-80f7-a19b51dd977d

4 A recent report by the International Energy Agency (IEA) estimated that to reach net zero emissions by 2050, annual clean energy investment worldwide would need to more than triple by 2030 to around USD 4 trillion

5 Of course, the benefit the new technologies needed to deliver net zero is that the even higher costs of climate change are mitigated.

Given interventions are needed, the next question is: how does society decide which interventions to support? Among many things, enter the concept of "whole system thinking". This phrase is used extensively in UK government and regulatory circles and has made several appearances in recent policy documents. [6] In some ways, it is an innocuous phrase – who could possibly be opposed to such a sensible idea as thinking about the energy system as a whole rather than focusing on its constituent elements? Why would we not want to do this?

But what the government and policy makers mean by "whole system thinking" is not clear. Rather it appears to be at risk of increasingly being used as a platitude that means different things to different constituencies. However, it is easy to envisage a drift from whole system thinking to whole system planning. Hence, a new question emerges in terms of what we mean by "whole system planning" – does it mean that in order to achieve net zero, we adopt a model of central planning for the energy transition? Or does it mean that we set up the framework and institutions to allow the market to deliver?

The current trajectory appears very much weighted towards the former – a centrally planned roll-out of the energy transition. Choices will need to be made about which technologies to adopt and where they will be sited. This is not a new trajectory – for example, the Electricity Market Reform (EMR) that began development in 2010 started down this path, but the extent of central intervention appears

6 See, for example: Smart Systems and Flexibility Plan 2021; BEIS Consultation on a UK Low Carbon Hydrogen Standard, advice to the Prime Minister on using a whole systems approach to deliver net zero

to be increasing.[7] In short order, we run the risk of creating an environmentally-friendly version of the post-war centrally planned energy systems.

A return to statist planning and centralised intervention seems somewhat contrary to the traditional ethos of the currently ruling Conservative Party. More generally, the global consensus since the early 1990s has been for the liberalisation of energy markets and the introduction of competition in wholesale and (in many cases) retail parts of the value chain together with the introduction of regulation of networks that have historically been considered natural monopolies.

The government therefore appears to face a dilemma. Does it seek to achieve a net zero society by reverting to the command-and-control era of energy production as per the post-war era or, instead, primarily through the market? Both approaches have supporters and both approaches have failings – although one might observe that historically centrally-planned systems of the pre-liberalisation era had several drawbacks and detractors.

In practice, of course, it is not a binary choice – co-ordination and a degree of centralisation will inevitably be required as we transition to Net Zero.

7 For example, according to DECC's EMR White Paper in 2011, one of the objectives was to "lead to competition within and between different low-carbon generation technologies for their appropriate role in the energy mix". However, technology-specific decisions where subsequently made. When implemented, different technologies were placed into different auction "pots" depending on the stage of development. Subsequently, in 2017, the Government removed "Pot 1" technologies, which included onshore wind among other more established technologies. Separately, nuclear power is procured bilaterally with the Government.

However, if we are to step back from an increasingly centrally planned roll-out of net zero and consider using market-based approaches to deliver the energy transition, then one obvious issue arises. Is the way in which the energy market currently works suitable for delivering net zero? Put another way, if we want to use market prices to signal the correct path to net zero, are we sure we have got the right market prices to provide the right signals?

In this regard, concerns might be justified. Of course, the biggest price problem is that there is no consistent method for pricing carbon, either nationally or globally, and much political attention has been, and no doubt will continue to be, expended in developing the carbon price regime and, potentially, a regime of carbon tariffs levied on those economies that do not adopt a such a system.
However, some price problems may well be easier to fix and are also closer to home. In particular, the design of the wholesale electricity market in Great Britain is appearing increasingly out-dated. Introduced in the late 1990s, the design of the market was intended principally to allow large thermal generators (such as coal and gas plants) to compete to sell power in a market to retailers. In this way, the most economic plant would compete hour to hour to deliver the lowest cost energy to end users. Over the longer term, the price signals would encourage market participants to invest in new generation facilities.

One particular feature of the design of the market is that, at any point in time, there is a single price for electricity in the wholesale market. A generator located in the north of Scotland is therefore exposed to the same wholesale price as one located on the south coast of

England. This was considered a sensible design feature when the market was originally designed, as it allowed generators, regardless of location, to compete on a like-for-like basis and allow a "liquid" national market in electricity to emerge.

There is, however, a drawback to this approach – the wholesale electricity market, by design, ignores the technical limitations of the electricity transmission grid. This means that sometimes a situation arises in which the generators that are successful in selling in the wholesale market cannot actually deliver the electricity they have sold because of bottlenecks in the transmission network. Therefore, the designers of the electricity market also developed a complex set of mechanisms to allow the system operator of the transmission network to intervene in the market to resolve the bottlenecks in the transmission system. Broadly speaking, the mechanism works by asking specific generators in certain locations on the grid to either 'turn on' or 'turn off' their generation, and paying them what are known as "constraint payments" to do so. The cost of these payments is recovered in a charge that is essentially smeared across all customers.[8]

Whilst charges for using the transmission network have historically varied by location, one implication of this approach is that, when making decisions about where to locate, a new generating unit (or indeed large customer) does not need to consider whether it will increase the frequency of bottlenecks on the transmission network and, in so doing, increase the cost of constraints – the cost of which

8 The electricity system operator recovers the cost of resolving these constraints through Balancing Services Use of System ("BSUoS") charges. These charges are currently levied on generators and final demand i.e. customers or consumers.

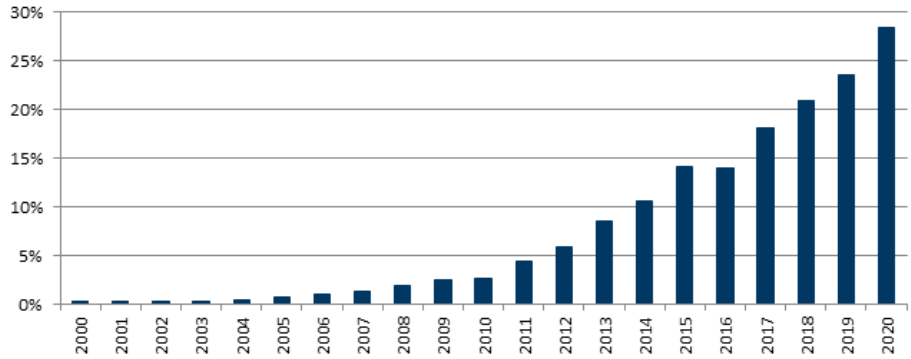
is recovered from customers. Rather the price it receives (or pays) for electricity in the wholesale market is the same at any point in time and at any location. [9]

To this day, the design of the wholesale electricity market has changed little from this approach that was conceived in the early 1990s. Yet, the way in which electricity has been produced has changed radically. For instance, renewables generation (from solar and wind generators) accounted for approximately 28% of total electricity generated in 2020 compared to less than 5% in 2010, as illustrated in the figure below. [10]

9 It is worth noting that policymakers were aware of this issue at the time when the market was designed, and so developed a complex system of tariffs for recovering the cost of the electricity transmission network – that sought to differentiate charges depending on location. Hence, electricity generators in the north of Britain (where there has historically been a surplus of generation relative to demand) face higher electricity transmission charges than generators located in the south. The intention behind this approach was that it would send some kind of signal to users of the network. Over the last 20 years there have been numerous attempts to reform transmission charging often with the aim of improving the accuracy of the signals to market participants. Further changes were necessitated to comply with the prevailing EU regulations at the time. While there have been some changes, there is an ongoing sense that the current charging regime is no longer fit for purpose. Indeed, Ofgem have recently announced the latest review in a "Call for Evidence" to re-examine the approach to transmission charging. https://www.ofgem.gov.uk/publications/tnuos-reform-call-evidence

10 BEIS (2021), UK Energy in Brief.

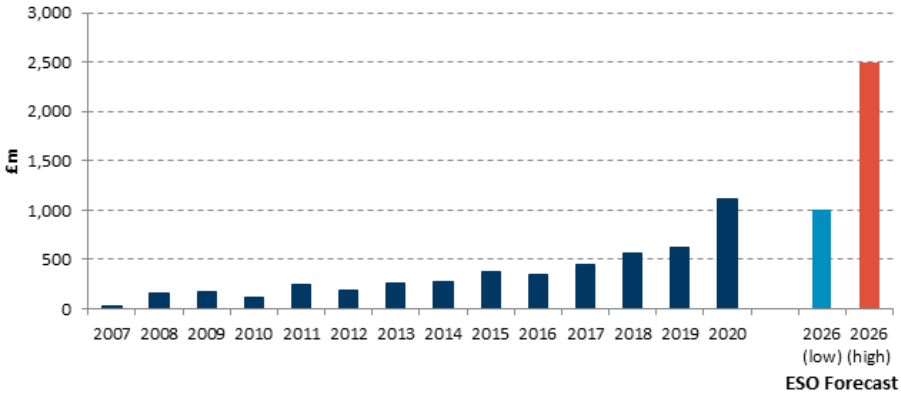
Figure 1: Share of wind and solar generation as a percentage of total electricity generated in the UK



At the same time, the level of constraint payments made by the system operator has grown materially, from less than £100m in 2007 to over £1bn per year more recently.[11] Moreover, as shown below, National Grid system operator anticipates that these costs may well increase to over £2 billion per year by the middle of this decade.[12] This increase in the cost of transmission constraints has occurred despite a doubling of the transmission network asset value in the same time period for England and Wales. [13]

11 FTI analysis using data from National Grid system operator publications.
12 ESO (2021), Modelled Constraint Costs – NOA 2020/21.
13 FTI analysis using data from Ofgem's TPCR and RIIO publications.

Figure 2: Annual transmission constraint costs



The cause of this is obvious – new generators choosing where to locate go where it is windy or sunny – with little consideration of the impact on the transmission network. After all, the design of the wholesale electricity market intended for the system operator to worry about this problem, not the generator.

However, we know a better way to solve the problem of bottlenecks on energy networks – this is to adopt a different design of the electricity market that incorporates a locational price in the wholesale electricity price. It has worked well in other jurisdictions and means that wholesale prices vary by location. Wholesale electricity prices are low in parts of the system where there is "too much" generation and high where there is "too little". Over the longer term, this encourages siting decisions of generators and large consumers that minimise the strain on the transmission network and, in so doing, reduce the costs

of the transmission network while also potentially eliminating the need for constraint payments for generators. Many electricity markets around the world, albeit not European markets, have adopted this approach – notably those in North America, Singapore and in New Zealand.

Overall, if GB policy makers are to step back from an increasingly centrally-planned roll-out of net zero– which may well be the end destination of the "whole system thinking" approach – they need to make sure Britain has a market that sends the right signals to users. In this respect, the current design of the electricity market looks set to fall short and risks layering on significant extra cost onto GB consumers who already face a significant bill to fund the energy transition. In this context,, BEIS and Ofgem should grasp the nettle of wholesale electricity market reform, and consider allowing wholesale prices to vary by location to ensure that it is the market as far as is possible – not central planners – that helps to determine the best, and most cost efficient, way of delivering net zero.

LIAM FOX MP

The Rt Hon Dr Liam Fox MP has been Member of Parliament for North Somerset since 1992. Dr Fox held several roles in John Major's Government, including as a Foreign & Commonwealth Office Minister. Between 1997 and 2010, he held several roles on the Conservative Party Opposition Front Bench such as Constitutional Affairs Spokesman, Shadow Health Secretary, Conservative Party Chairman, Shadow Foreign Secretary and Shadow Defence Secretary. Dr Fox served as Secretary of State for Defence in David Cameron's Government from May 2010 until October 2011.

Between July 2016 and July 2019, he served in Theresa May's Government as Secretary of State for International Trade and President of the Board of Trade.

As International Trade Secretary he was tasked with creating the UK's first Independent Trade Policy for forty years post-Brexit. Before entering politics, Dr Fox worked as an NHS doctor and then as a family GP. He is also a former Civilian Army Medical Officer and Divisional Surgeon with St John Ambulance. In 2012, he founded the military charity 'Give Us Time'.

THE CASE FOR A CARBON BORDER TAX

In looking at the current picture of global greenhouse gas emissions, there are two perspectives that are useful.

The first is to look at which countries produce the most. Today, 17 countries are each responsible for producing more than 1% of the world's CO2 emissions. Of the top 6, China produces 27.9%, followed by the United States on 14.5% with India on 7.2%, Russia 4.6%, Japan 3% and Iran 2.14%.

11 countries produce between 1% and 2% ranging from Germany's 1.93% all the way down to the UK's 1.01%.

Another way to look at it is to examine which countries are increasing the production of CO2 and which ones are reducing it.
Between 2009 and 2019 we have seen some big reductions in a number of countries.

The US has reduced by 3.75%, Japan by 4.82%, Germany by 11.14%, France by 15.2% with the UK top with 25.1%.

By contrast, Canada has increased by 6.3%, Russia by 9.7%, South Korea by 20.5%, Turkey 28.6%, China 31%, Brazil 33%, Indonesia 38% and India 62%.

Global problems need global solutions

Any attempt to deal with the situation must accept the basic premise that this is a global problem and global problems require global solutions.

If we are to deal effectively with the challenge, we need to establish policies and mechanisms that will encourage a shift away from CO2 production in those countries who are contributing most to the global problem.

With a huge reduction in UK emissions in recent years there is little point in introducing domestic measures that will overstress our economy and our society while others continue to increase their emissions.

There is no point in damaging the competitiveness of economies such as the UK, while other countries maintain their competitive edge at a cost to the global climate.

I believe that using market mechanisms offers the best solution, but what if agreement on carbon pricing is not agreed at COP26? Then, the case for a carbon border adjustment mechanism in some form (such as a carbon border tax) becomes a real possibility.

Western countries do not want to see their own companies moving their manufacturing to places like China or India because of their less stringent environmental rules and consequent lower costs.

President Biden's administration certainly listed carbon border adjustments as part of its 2021 Trade Agenda. For the Biden administration such a mechanism would allow the US to be simultaneously tough on countries like China while emphasising their environmental credentials. It will be highly tempting with a politically split Congress and mid-term elections already looming.

The EU is also committed to a carbon border adjustment mechanism as part of its Green Deal agenda.

What is a carbon border tax?

A CBT is simply a charge on carbon emissions attributed to imported goods that have not been carbon-taxed at source.

The aim is to put an additional price on imports from countries where it is cheaper to pollute and level the playing field for domestic industries that produce goods with lower levels of greenhouse gas emissions.

Countries such as the UK, or those in the EU, argue that producers in their own countries who have already applied measures to reduce emissions, through carbon pricing, are handing foreign suppliers who do not bear these costs an advantage.

Over time, they argue, it will shift production to low cost, high emission countries. This will have the net effect of punishing our own industries and jobs and damaging our international competitiveness

yet doing little to limit global emissions.

It is useful to distinguish between a National Carbon Tax and a CBT.

A National Carbon Tax is a fee that a government imposes to encourage reduced greenhouse emissions, but which can increase costs for household consumers and businesses alike.

By contrast, a CBT (or Tariff) is able to protect a country's national manufacturers, while motivating them to adhere to green regulations.

Many EU companies complain at having been at a cost disadvantage as they have been paying for carbon emissions since 2005 under the EU's Emissions Trading System.

Obviously, this includes UK companies while we were in the European Union. A CBT can therefore lead to a rebalancing against importers from those nations with more lax environmental standards.

It can also be argued that a Carbon Border Tax can improve domestic support for climate change policies by securing the buy-in of local industry for deeper decarbonisation policies.

In recent months there has been growing pressure on the European Union to hasten the process as record prices for carbon dioxide allowances have raised the cost of polluting in the bloc far above any other region.

Carbon prices in the EU's flagship Emissions Trading System, a key part of the plan to cut emissions by 55 per cent by 2030, are close to €50 a tonne — more than double their pre-pandemic level.

Many across industry argue that pricing of this level is counter-productive as it can starve companies of funds to invest in decarbonisation.

Steel producers estimate that the EU carbon price is now costing them approximately €95 per tonne of steel produced (the production of one tonne, on average, emits two tonnes of CO2).

That is almost 10 per cent of the current steel price of close to €1,000 a tonne. This clearly inhibits the national and global competitiveness of companies that fall within the regime.

So, what effect would a CBT have on the steel sector?

The answer is that it would have different impacts on steel imports depending on the country of origin.

For example, Chinese steel manufacturers primarily use blast furnaces and basic oxygen furnaces emitting about 2 metric tons of CO2 equivalent per metric ton of steel produced, while Turkish companies mainly use electric arc furnaces emitting 1 metric ton of CO2 equivalent per metric ton of steel produced.

A CBT would then differentially affect Chinese and Turkish steel exports.

What are the problems?

The principles of a CBT are, therefore, relatively straightforward but, as ever, there are complex practical issues to be resolved.

- Which countries and which industries should be covered and on what basis?

- How do we measure emissions and how do we ensure that there is sufficient verification to avoid cheating?

- How do we determine equivalence between systems that have different carbon pricing mechanisms and levels?

- How do we set an appropriate level for a CBT?

- How do we ensure that any measures are in line with existing World Trade Organisation obligations?

And, how do we ensure that we do not disproportionately affect developing countries and undermine our own development agenda?

Developing countries have argued that such a policy runs counter to the Paris Agreement's bottom-up, Nationally Determined Contributions (NDCs). Emerging economies such as Brazil, South Africa, India and China, have already criticised the unpublished EU plan as "discriminatory" and unfair to developing nations.

Working out which countries are subject to the tax requires some

way of balancing differing carbon regimes, something that Jonathan Pershing, a member of the US climate envoy's team has warned will be "extremely complicated".

The early discussions between the United States and the European Union were a good example of some of the practical challenges. The United States does not have a harmonised carbon price, because it chose not to implement a emissions trading scheme at a Federal level. It is pretty inconceivable that President Biden would get bipartisan congressional support for imposing one especially in the current political climate. Jonathan Pershing has pointed out that the US does "have substantial and rigorous investments and regulatory programmes, but those are somewhat harder to compare and contrast".

Whether there is a direct price like an Emissions Trading Scheme (ETS), or a direct carbon tax, or a regulatory measure, mechanisms will need to be found to weigh them against one another if equivalence regimes are to be established.

When it comes to compliance with international rules, any scheme that a country or trading bloc chooses to implement will need to apply to every other country that imports goods into that country or bloc in order to be compatible with World Trade Organisation (WTO) obligations but there may well be room to exempt some of the world's poorest nations.

On the issue of setting an appropriate price, Nikos Tsafos, a senior fellow with the Energy and National Security Program at the Center

for Strategic and International Studies in Washington, D.C. talks about finding a sweet spot.

"Set the carbon price too high", he said "and you splinter the world trading system - one world becomes low carbon, another becomes high carbon, with limited trade between them. Set the price too low and it becomes a modest cost that is absorbed into final prices without much decarbonization impact. The price, therefore, must be just right: it should allow the most technologically advanced firms in emerging economies to be competitive and incentivize the rest to invest in lower-carbon approaches. Otherwise, whatever gains are made inside the low-carbon bloc will be offset by what happens outside of it".

How any exporting country would be affected by a CBT will be dependent on the economic sectors within the scope of the tax, the level of fossil fuels used in the industries of the exporting country, the proportion of its exports going to the CBT jurisdiction and the proportion of high emission products in its overall export mix.

This will be of particular importance to developing countries. Of course, many of these will not export either large volumes or proportions of energy intensive products.

For example, over 90% of exports from East African Community (EAC) countries are primary products, 81% of which are agricultural products and 8% fishery products.

These products are currently exempted from the European Emissions

Trading System and they might reasonably expect exemption, at least in the short term, from any CBT imposed by countries such as the UK or trading blocs such as the EU.One sector which is likely to prove problematic is the textile industry which has a substantial greenhouse gas footprint contributing around 10% of global emissions.

While clearly there would be a strong incentive to see these reduced, many of the textile exporters are amongst the world's poorest countries.

It is certainly unavoidable that the CBT will result in the reshaping of global trade policy, but this needs to be seen against the backdrop of other changes.

Energy transition itself will benefit those with good solar and wind resources while it will disadvantage those producing coal and oil.

Just as with these wider changes, the development of CBTs will need to be accompanied by policies that help poorer nations transition to a new global environment.

The obligation of developed countries, then, is to accompany it with fair transition policies.

It is possible that a carbon border adjustment could positively shape the development path of these countries going forward.

With the cost of clean energy dropping dramatically, the right

support from developed countries could help these countries leapfrog those with legacy assets.
For the UK, re-orientating our development funding towards those countries whose development is based on clean energy clearly makes sense from a climate perspective as well as offering export opportunities to UK businesses in the sector.

The alternative is to fund those who may be using, for example, Chinese built, coal fired power stations, undermining our own climate objectives with our own taxpayers' money.

I do not, incidentally, believe that Whitehall would not be capable of producing such an outcome, which is why there needs to be a substantial re-engineering of the mechanics of government if Global Britain is to be more than a worthy aspiration.It is worth making a special mention of China, the world's second biggest economy and the driver of much of recent global economic growth.
China's continuing reliance on non-renewable energy to power its economy leaves it particularly vulnerable in this matter.

For example, given that China produces steel with blast furnaces that release a large amount of carbon, as already mentioned, it will have to pay an additional layer of CBT, which will increase its costs and its market price.

This will obviously reduce the competitiveness of steel produced in China, compared to steel from other countries that is made in more carbon-efficient mills.

While this will be welcome to domestic steel producers here, it has already provoked a strong reaction in Bejing with the government there declaring that "We need to prevent unilateralism and protectionism from hurting global growth expectations and the will of countries to combat climate change together".

Beijing also claims that the new tax would violate the core principle of the Paris Agreement , which is that richer countries should bear greater responsibility for cutting emissions.

China, as one of the most influential countries in the world right now, and as the largest greenhouse gas producer, plays a crucial role in tackling climate change.

We cannot afford to lose China in the fight against the climate crisis.

BUT… the UK, EU and US play a more substantial role in China's economy than the other way around, as we purchase more goods from China than China does from us. China might, therefore, be forced to tolerate such a plan.

Geopolitical effects

There may also be other geopolitical consequences of following such a policy approach.

One could be the impact on the crude oil market. It could become cheaper for example, for chemical producers (particularly in Europe) to import more oil from Saudi Arabia and less from Russia, as the

Saudi extraction methods have a much lower carbon footprint than the Russians.

This may actually have a political attraction to a number of countries though it does leave Germany in a difficult position where its selfish commitment to Nordstream 2 is undiminished despite opposition from EU and NATO partners.

As a passionate free-trader, I have wrestled with the wider consequences of following a CBT policy.

But, as I often repeated as International Trade Secretary, Free Trade does not and has never meant a free-for-all.

Ricardo's comparative advantage still has plenty of room for expression given the range of divergences in the global economy including labour rates and the built-in welfare costs of the developed economies.

But, if we believe that the need to deal with climate change is an imperative, and I believe it is, then we must find and apply global solutions to this most global problem.

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