The Blair Black Hole in global climate policy

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Abstract
Slow progress in reducing greenhouse gas emissions has led to comments that achievement of global climate change mitigation goals is unlikely, because it is too costly and difficult. It would be less costly and difficult if international trade in energy-intensive goods were a normal feature of the zero-carbon economy, as it has been in the fossil carbon economy. This is difficult when the US under President Trump has withdrawn from international cooperation on trade and climate change. Other countries remaining open and cooperative facilitates re-entry of the US into the global system and continued progress on agreed climate goals.
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I. Introduction

The costs of climate change have become more obvious in recent years. The costs will increase until the concentrations of greenhouse gases in the atmosphere stop increasing—that is, until we achieve net zero global emissions. The limited progress in reducing global emissions so far has led to commentary that the world will not achieve net zero in the foreseeable future. Perversely, the slow progress so far is used as an argument for reducing effort because net zero is too difficult and costly. Such views are placed in the public discussion without comparing the costs and difficulties of net zero with the costs of disruption to human life, economy, and society that rising temperatures are causing with increasing strength.

The technology and economics tell us that we can achieve net zero by 2050 at a cost that is amply justified by the damage that it avoids. But other barriers get in the way. Political pressures from vested interests from the old economy that have slowed progress seem to be intensifying. Technological change in the ways we share information has enhanced the role in policy-making of shocking ignorance and diminished that of carefully acquired knowledge. The dominant media influence on climate and energy in the US, UK, and Australia, the Fox Corporation and its sister company Newscorp, has doubled down on opposition to effective action with former Australian Prime Minister Tony Abbott on the Fox Corporation Board. It is a setback that the current US leadership rejects knowledge from atmospheric physics as comprehensively as knowledge from economics. It is a special challenge now that the new energy trade has to be developed at a time of official US distrust of and diminished participation in open international trade.

It is possible that humanity will fail comprehensively with climate change mitigation, and live and die with all of the consequences that follow.

But there are other, favourable developments for the achievement of net zero. Costs for some zero-carbon technologies have fallen so far that their adoption is expanding even in countries that are not correcting for market failures from carbon emissions and innovation. Gradual decarbonization in electricity generation and road transport can now be expected even in the absence of economically rational policy support. Research and development and the beginning of commercialization of new technologies for major industries thought to be 'hard to abate' are bringing net zero emissions within the reach of standard policies to correct market failures. Steel and liquid transport fuels are among the largest high-emitting industries in this position. China, with by far the largest national greenhouse gas emissions, and contributing a majority of emissions growth in the twenty-first century, looks as if it has passed peak emissions and begun the decline half a dozen years ahead of its Paris commitment. It helps the prospects for global net zero that China has emerged as a stunningly low-cost producer of many of the capital goods for the zero-carbon transition at a time when international macroeconomic imperatives favour high levels of Chinese investment abroad.

Not all countries have the renewable energy resources to use new zero-carbon technologies. It helps the prospects for net zero that we are starting to understand that the costs of removing emissions can be reduced in countries with poor relative endowments of renewable energy through international trade in zero-carbon goods.

Yet much of the discussion of decarbonization of the world economy proceeds as if most goods will be produced in the same places as now.

The request for a title for the lecture from which this paper developed came from the Oxford Martin Institute to me while I was reading a recent publication from the Tony Blair Institute for Global Change, 'The Climate Paradox: Why We Need to Reset Action on Climate Change'. The reset that the Institute has in mind is to shift away from timely achievement of net zero and the established technologies for getting there, towards investment in currently high-cost technologies including carbon capture and storage, mechanical direct air capture and storage, and new forms of nuclear. There is a case for continuing research and development effort on all of the technologies preferred by the Blair Institute. But to shift the emphasis away from lower-cost and more completely proven technologies is perverse. The Blair Institute publication has several large flaws. In the this paper, I concentrate on correcting one of them: the implicit premise that goods that are currently made from fossil carbon will continue to be produced in the same places where they are made now.

The costs of zero-carbon goods would be high and the material standard of living in the world as a whole diminished to a large and unnecessary extent if all industrial inputs and goods continued to be made where they are now in the zero-carbon world of the future.

The costs of autarchic approaches to reducing emissions are highest in economies with large production of goods made from fossil carbon and poor opportunities for making them with net zero emissions from domestic resources. Today, these are the Northeast Asian and European economies. Together, these economies account for around half global carbon emissions and more than three-quarters of hard-to-abate industrial emissions.

New patterns of international trade in the zero-carbon economy can greatly reduce the costs of timely achievement of net zero in Northeast Asia, Europe, and other high-income economies with poor endowments of renewable energy resources. They can therefore facilitate achievement of net zero where many had thought it to be impossible.

II. Trade in the fossil carbon economy

The world was a long way into the industrial revolution before it was widely understood that foreign trade could remove fossil carbon constraints on industrial development. William Stanely Jevons is distinguished as co-founder of both neo-classical economics and quantitative meteorology. As a young assayer of gold in the Sydney mint during the first great Australian gold rush in the nineteenth century he had the leisure and intellectual capacity to find mathematical patterns in the variations over time in Australian rainfall.

Jevons was best known in his own times for his carefully argued book, *The Coal Question*, published in 1865 (Jevons, 1865). After applying his logical, dexterous, and creative mind to many future possibilities, Jevons cautioned that Britain's brilliant prosperity and geo-economic strength depended on its domestic coal resources. These were finite, and at contemporary rates of depletion would become a constraint on development sooner rather than later. He said:

> If we lavishly and boldly push forward in the creation . . . of our riches, it is hard to over-estimate the pitch of beneficial influence to which we may attain in the present. But . . . We have to make the momentous choice between brief greatness and longer continued mediocrity.

One and a half centuries later, we know that Britain lost its global economic and strategic pre-eminence. We know that the source of the loss was not depletion of its resources of fossil carbon. We now know that economies with almost no coal or gas or oil resources of their own attained high positions in the global industrial economy. Japan, the Republic of Korea, Taiwan, and Singapore are extreme examples. Economies without natural endowments of fossil carbon overcame their deficiencies through foreign trade.

It took several decades after the Second World War to build the institutions, the trust among businesses, governments, and people, and the physical infrastructure that underpin the immense early twenty-first-century trade in fossil carbon. Building the commercial arrangements took high levels of risky private investment, and effective public and private diplomacy sustained over long periods. Established commercial arrangements for the fossil carbon trade are now broadly suitable for the new energy trade. But they will need to be accompanied by changes in understanding about the nature of trade in energy, and new physical infrastructure for international trade.

The fossil carbon trade is immense. There have been times in the past half-century when the value of international trade in oil, coal, and methane gas has exceeded that of all other goods in international trade.

As we move to net zero, the old fossil carbon energy trade will decline and then die. The new energy trade will be very different in its countries of origin and composition. It will comprise mainly goods that are inputs into industrial processes—plus manufactured transport fuels. In a

world economy with net zero emissions, the scale of the new energy trade may be as large as or larger than that of the fossil carbon trade that it replaces.

III. The New Energy Trade

Foreign trade can do as much to ease constraints on industrial development and incomes growth in the zero-carbon economy as in the fossil carbon economy. But it will work its magic in very different ways. Systematically building international trade into our understanding of the transition to net zero transforms our expectations of costs. It resets our minds towards acceleration of application of known technologies, away from diversions into speculative solutions with low probability of large-scale success.

Here I commend and rely heavily on two recent publications from the Superpower Institute (Finighan, 2024; Burfurd *et al*., 2025). The Institute is a philanthropically financed Australian independent think tank. Its mission is to discover and expand knowledge of the role of international trade in zero-carbon goods in achieving timely net zero emissions at the lowest possible cost. If focuses especially on Australia as a source of zero-carbon industrial inputs and other goods, but the analysis illuminates opportunities for production and export of zero-carbon goods from other countries as well.

The New Energy Trade introduces a distinction familiar from standard international economics, between traded and non-traded goods.

Traded goods are those in which differences in production costs across countries are large compared with the costs of moving the products between countries. Countries compete to supply traded goods at lowest cost. Countries without a comparative advantage in some goods import them. Economically rewarding trade may be restricted by protection. This reduces the material standard of living in the country that lacks comparative advantage, and in the rest of the world.

Non-traded goods are those for which costs of movement between countries exceed differences in production costs. They are distinguished especially by high international transport costs.

Coal and oil are transported across the oceans at low cost compared with the value of the materials in their countries of origin. Methane gas is transported in liquefied form at moderate cost relative to value. In contrast, it costs a great deal to transport renewable energy and the hydrogen made from it across oceans—usually much more than value in their places of origin. Renewable electricity transported under the oceans by transmission lines will generally cost several times as much at its destination as in its place of generation. So will hydrogen made from renewable energy as an industrial input or a store of energy.

Ammonia carrying hydrogen is cheaper to transport across the oceans, but still expensive when the costs of conversion and recovery are considered. Ammonia will be an important carrier for hydrogen for some high-value uses. But it will not be a carrier for hydrogen as an input into much globally competitive industrial activity.

It follows that the building of a world economy with net zero emissions will involve major changes in the location of global production and trade. There will be transformative shifts in comparative advantage in production of energy, chemical inputs to industry, and industrial

output. Different commodities will enter international trade from different sources and with different destinations. This will transform location of manufacturing of iron for steel-making, aluminium and other metals, green transport fuels, urea and other manufactured chemicals. Comparative advantage in these commodities will be especially strong where relative abundance of renewable energy resources sits alongside relatively rich endowments of complementary resources—mineral oxides for iron, aluminium, and other metals production, and sustainably harvested biomass for transport fuels and other chemical manufactures.

Production of traded goods currently absorbs the majority of energy used in the global economy. The energy used in producing traded goods and services can be imported through embedding the energy in products.

A significant minority of goods and services that require electricity in their production are not traded internationally. These include the lighting and control of temperature for buildings, the charging of electric vehicles, and the use of energy in street lighting, health care, and construction.

A high proportion of non-traded goods and services requiring energy are powered by electricity. That electricity must be generated locally, whatever the domestic cost.

All economies have some resources for generating renewable energy domestically. Even the city-economies of Hong Kong and Singapore are home to some solar and wind power generation, albeit on a tiny scale relative to demand. The geographically larger economies of Japan, Korea, and Taiwan, while being better endowed with renewable energy resources than the city-economies, would also exhaust their capacity to generate low-cost renewable energy before they had met their requirements for non-traded energy.

The economies with the smallest domestic renewable energy resources relative to demand will only be able to meet their requirements for non-traded energy with some use of high-cost technologies: combustion of fossil carbon accompanied by carbon capture and storage; or nuclear (where the transport costs for the small requirements of enriched uranium oxide are trivially low); or combustion of imported bio-carbons or manufactured hydro-carbons; or combustion of fossil carbon accompanied by purchase from abroad of rights to use credits from capture and storage of carbon emissions; or import of renewable energy or green hydrogen and its derivatives. This will reduce domestic standards of living moderately in these high-income economies. Moderately, because the higher costs relate only to a small part of domestic expenditure.

Other countries will be able to meet their requirements of non-traded energy from domestic renewable resources. Whether and the extent to which they become importers or exporters of zero-carbon traded goods with embedded renewable energy depends on the scale of their high-quality renewable energy resources relative to domestic demand. Calculation of relative quantities identify Europe and China as less dependent on imports than Korea and Japan, but as major importers of goods embodying renewable energy. They have high levels of industrial activity and domestic expenditure relative to geographic area and renewable energy resources.

Analysis identifies major exporters of goods embodying renewable energy: Australia, in particular, and some countries in the Middle East and North Africa, and some lightly populated smaller countries on the west of continents in Mediterranean latitudes (Chile, Namibia) (Finighan, 2024). Canada and Russia have great geographic size relative to domestic energy

demand. Their high latitudes make solar expensive, but availability of wind generation with its intermittent supply backed up by hydro-electricity creates some opportunities for global competitiveness in renewable energy supply.

Canada is deeply integrated into a North American economy that as a whole is likely to be largely self-sufficient in zero-carbon energy as it is in fossil carbon. It is possible that disintegration of the North American economy under Trump policies may see Canada emerge as a substantial exporter of zero-carbon goods to the rest of the world. Russia's geo-strategic isolation limits opportunity—although not completely, as we have seen with fossil carbon trade.

Finighan (2024) estimates that use of economic opportunity could see exports of zero-carbon goods from Australia directly reduce global emissions by 7–10 per cent. The upper end of this range is not much below the contribution that would be made by the US reducing its emissions to zero. The contribution to the global abatement effort is more important than the 7–10 per cent suggests, as the trade removes the need for domestic production of energy-intensive goods that are particularly hard to abate in Northeast Asia and Europe. The quantitative economics suggest that Australia is likely to be the largest single country exporter, but others together could contribute much more than Australia alone.

In this early stage of global decarbonization, the comparative disadvantage of densely populated highly industrialized countries in energy-intensive goods is obscured by the small scale of their output of renewable energy. Current average costs of renewable energy in China and India, for example, are low by world standards. These large countries have some high-value renewable energy resources. But these are of modest scale relative to energy demand. The highest-quality renewable energy resources tend to be used first. China and India are now operating at the lower reaches of their supply curves for renewable energy, using only the highest-value resources. Costs will rise as output increases and lower-quality renewable energy resources are brought into use. Marginal costs, which determine comparative advantage in international trade, will rise to well above those in the lowest-cost global suppliers as production expands.

Northeast Asia and Europe and other regions with relatively poor renewable energy resources can remain globally competitive in high-value manufactures. But they can remain competitive in these products only if the value in areas in which they are globally competitive is added to industrial inputs produced in countries with advantages in renewable energy generation.

Burfurd *et al*. (2025) take a close look at the role of international trade in decarbonization of the industry with the largest total emissions, iron and steel. Iron and steel production contributes over 8 per cent of global emissions. Over 7 percentage points come from the use of carbon from coal for reduction of iron ore into iron metal in the blast furnace prior to conversion into steel. About 4 percentage points of global emissions come from conversion of ore mined in Australia into iron metal, mostly in Northeast Asia.

The technologies are available for production of iron and steel with near-zero emissions. Recycling of steel through an electric arc furnace contributes nearly a third of global steel production. The recycled steel products can be produced with zero emissions if the electricity powering the electric arc is drawn from renewable sources. The scrap proportion will grow with the ageing of the capital stock in China and other latecomers to modern industrial development. However, large quantities of primary iron will still be required in China, and

proportionately larger quantities in countries including India that are growing rapidly at earlier stages of development.

Zero-emissions primary iron and steel can be made by feeding newly processed zero-emissions iron metal into the electric arc furnace. Natural gas is currently used to produce about 130 million tonnes per annum of primary iron for electric arc steel-making. Green hydrogen can replace the natural gas for zero-emissions iron production. The main cost of the green iron-making is investment in renewable energy for production of hydrogen.

The decarbonization of global steel production can proceed with currently known technology through increased use of green hydrogen in iron production alongside increased recycling of scrap. This can be accompanied by use of zero-carbon electricity for steel-making in electric arc furnaces. Burfurd *et al*. show that use of standard approaches to correcting market failures would make zero-carbon steel-making competitive now with the high-emissions alternatives in locations favoured by the lowest-cost renewable electricity. These places can meet the world's requirements for zero-carbon iron.

IV. Policy for global net zero

Some decarbonization will now proceed simply because technological improvement has reduced the costs of zero-carbon technologies below those of the high-emissions alternatives. We have noted that this holds for electricity in regions with good endowments of renewable energy resources. It is becoming the case with electric motor vehicles.

The phenomenal reductions in the costs of wind and solar electricity generation and battery storage of power over the past two decades have generated optimism that technological improvement will make the zero-carbon alternatives competitive with all or many established carbon-intensive processes once the new approaches are being deployed at scale. However, there is no law of physics, engineering, or economics that says that other industries will see similar cost reductions to renewable power generation and storage. We can expect to achieve net zero emissions across the whole economy only if policies are in place in all globally significant economies to correct two market failures in the old economy. A correction is required to bring the private costs of operating businesses that generate greenhouse gas emissions into line with the social costs that include the costs that carbon emissions impose on others. And a correction is required to reward businesses which innovate in emissions-reducing technologies for the benefits that they confer on others, and which cannot be captured by the innovating businesses themselves.

We will not get to net zero without governments introducing an appropriate combination of the following measures:

- collecting taxes from businesses equal to the cost that they impose on others by emitting carbon dioxide and other greenhouse gases, or
- providing equivalent subsidies to zero-carbon competitors with high-emissions activities, or
- banning activities with greenhouse gas emissions.

Carbon pricing and subsidies are generally more cost-effective than bans on activities that give rise to emissions. Carbon pricing has the advantage over subsidization of zero-emissions

competitors that it strengthens rather than weakens the public finances. The Biden administration's Inflation Reduction Act provided massive subsidies which were effective in promoting the zero-carbon transition, but increased budget deficits.

There has been much discussion of carbon pricing and alternative means of providing incentives for transition for achievement of net zero. I say here only that there is no prospect of achieving net zero in the world as a whole without carbon pricing or subsidization or regulatory alternatives. Voluntary action can help. But it will be no more effective in securing the complete public interest in net zero than voluntary taxation would be in securing optimal levels of funding for defence.

We will not get to net zero by 2050 or any date soon after that without governments providing fiscal support for innovation in the zero-carbon technologies. This is because the private investors who introduce the new technologies generate knowledge and other valuable outputs which they can only partially capture for themselves. Many governments over the past two decades have moved to correct this market failure, leading to rapid technological improvement in many areas. Some western governments argue that Chinese support for innovation has been excessive, and has generated an unfair advantage in international trade. The Chinese support for innovation has been very helpful to the global mitigation effort and to the prospects for timely achievement of net zero emissions in the world as a whole. More recently, many governments which have done less to support innovation in the zero-carbon technologies are increasing their own efforts, and some are reducing their calls for reduced efforts by China.

Low-cost and timely achievement of net zero emissions requires open international trade. Open trade has come under increasing attack in recent years, culminating in the Trump administration's comprehensive withdrawal from the open, rules-based international trading system.

V. The Trump impediment

Open international trade in goods and services has underpinned nearly 8 decades of rising and widely distributed global prosperity. It was lightly governed within an international system built around the General Agreement on Tariffs and Trade (GATT) and from 1995 the World Trade Organization (WTO), with a strong and self-confident United States playing an important leadership role. This system saw the rapid reconstruction of Europe and Japan after the devastation of the Second World War, the achievement of unprecedented levels of sustained prosperity in the old developed economies, and the extension of modern economic development and rapid growth in output and incomes to more and more of the developing world. It reached its highest achievement in the first decade of this century. This was a period in which:

- China entered the WTO and the longest strongest episode of economic growth that the world has ever seen in an economy of substantial size; and
- the newly industrialized economies in East Asia entrenched themselves as developed, high-income countries; and
- Southeast Asia recovered from the Asian financial crisis at the end of the twentieth century, returned to strong growth, and Indonesia made a success of democratization in the world's fourth most populous country; and
- rapid economic growth was entrenched in India and Bangladesh; and

- sustained growth in output and incomes began in much of Africa for the first time since Independence.

Seventeen years ago, I described the early years of the twenty first century as the Platinum Age of global development (Garnaut, 2008a,b).

The political foundations for the open trading system frayed in the aftermath of the Global Financial Crisis in 2007–8. In the US, where the fraying was most severe and consequential, it was driven by

- resentment over the association of large-scale immigration of unskilled workers with the 'globalization' of which open trade was part;
- long stagnation of labour disposable incomes contrasting with buoyant corporate profits; and
- the geo-strategic challenge associated with China becoming the world's largest economy in purchasing power and the largest trading partner for most countries.

Neither of the first two drivers was a necessary consequence of global development within an open trading system. They were less severe and politically less influential in developed countries that maintained policies to secure more equitable domestic income distribution. Those policies are available to US governments, including to future contestants for political power in the US.

The third driver was not necessarily a valid cause for large restriction of trade. To the extent that it was a matter for concern, the protectionist response was counterproductive, as it accelerated US relative decline as a trading partner for all other countries. US National Security Adviser in the Biden government, Jake Sullivan, identified 'small yard, high fence' as a principle for restricting trade in areas in which open trade carried legitimate security concerns. So far, the 'small yard' dimension of the principle has been honoured mainly in the breach.

The fraying in the United States culminated in the Trump government's unilateral announcement of large tariffs on all trading partners on 'Liberation Day', 2 April 2025.

The US withdrawal from the open trading system followed announcements of withdrawal from the Paris Agreement on climate change mitigation and from deliberate efforts to reduce domestic carbon emissions.

There are three big reasons why we should do all we can to maintain as much as we can of the open trading system after the Trump government's withdrawal. Open trade is important to the continuation of global development. It is important to success with climate change mitigation. And by keeping the open trading system and the global climate effort alive and productive, we make it much more likely that the US will return in response to the inevitable economic failure of the Trump policies.

Much can be done by the rest of us without the US on both open trade and climate if we choose to do it.

The rest of the world is now large enough to sustain internationally-oriented economic growth in the absence of the United States. The volume of global imports without the United States is now several times larger than the total including the US when China and Southeast Asia

embarked upon their strong internationally-oriented growth in the 1980s. If the rest of the world remains as open as it is now to non-discriminatory trade, trade within the rest of the world can support the continuation of modern economic development and its extension throughout the world.

On climate, the US has made large contributions to the science of atmospheric physics and to early-stage innovation in zero-carbon technologies, as well as to the global effort to reduce emissions. Relegation of science in US priorities requires others to fill the gap. Emigration of leading scientists will contribute human resources to scientific and technological research in the rest of the world, but will be effective only with increased funding for science in other countries.

The US now contributes a bit more than one-eighth of total global greenhouse gas emissions. US emissions are falling with the growth of renewable energy and decline of coal generation, encouraged by new fiscal incentives from the Biden administration, and improvements in zero-emissions technologies. This momentum is being broken by Trump-sponsored legislation, despite it being disproportionately strong in Texas and other states that have provided electoral and legislative support for President Trump. The withdrawal of the United States from deliberate efforts to reduce emissions is not crucially important to the global mitigation effort over the next half dozen years. But global achievement of net zero by 2050 or any early date requires a return of US participation not long after that.

Nor is US withdrawal from cooperative climate action and open international trade necessarily a large setback for growth in trade in zero-carbon goods. The US has large domestic demand for fossil carbon now, and similarly large renewable energy resources for meeting it from locally produced zero-carbon goods. It was always going to be broadly self-sufficient in energy-intensive goods and related industrial inputs in the zero-carbon world, as it has been in the world of fossil carbon energy.

The biggest danger from US withdrawal from global cooperation on trade and climate is that its actions and rhetoric will influence others in the same direction. Irwin's authoritative history of US trade policy tells us that much of the damage from US protection policies in the 1930s was its influence on other countries' policies, through retaliation or emulation (Irwin, 2017). There is a danger that others will follow the US into greater protection or withdrawal from climate action. So far that is not happening. There are some early signs of an opposite tendency.

The challenge is for us to keep the open trading system and the cooperative global effort on climate alive for the time being without the United States. Success requires as many countries as possible to avoid new trade discrimination against each other. It requires us to open our markets wider to each other wherever that is possible. It is better if we avoid new barriers to trade with the US itself in response to increases in its own restrictions on trade with us. We should do what we can to keep alive the WTO and its contribution to an open trading system. We should do what we can to keep alive and make progress with the UN framework for cooperation on climate change.

There is merit in formal cooperation among like-minded countries seeking to maintain a rules-based open trading system and a cooperative international climate system in the absence of the US. Canada has articulated interest in such cooperation. There have been statements compatible with this idea from the ASEAN countries, Japan, the Republic of Korea, the

People's Republic of China, Australia, New Zealand, the UK, the European Union and some of its members, and Scandinavian countries.

Do this and we can maintain and increase momentum in global development. Do this and we can make substantial progress in global climate change mitigation. Do this and we increase the chances that the US will rejoin the global effort on climate change mitigation in time to achieve the goals that all of us agreed in Paris.

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