

The High Cost of Carbon Pricing



Amid the growing enthusiasm for carbon border taxes, Western policymakers have largely ignored the negative impact on the world's poorest countries. For carbon-pricing policies to succeed, developed countries must show their commitment to shared prosperity by enabling knowledge-sharing and fostering equitable climate finance.

NEW DELHI – Carbon pricing is all the rage these days, at least in the developed world. But while global leaders and experts – most of them from rich countries – increasingly embrace the idea of putting the “right price” on carbon, the concept remains vague and ill-defined. Worse, its growing acceptance and increasingly protectionist bent may have the perverse effect of impeding efforts to decarbonize the global economy.

The idea of carbon pricing seems like a no-brainer. Meeting even the least ambitious climate goals requires decarbonizing developed and developing economies alike. Changing the relative prices of carbon-intensive activities would encourage investors to finance renewable sources of energy and the technological innovation needed to achieve net-zero emissions.

Fossil fuels account for most of the world's greenhouse-gas emissions, so hydrocarbons seem like a good place to start. But how? Should policymakers consider the relative price of fossil fuels, or production based on consuming them?

The two most commonly discussed forms of carbon pricing – cap-and-trade schemes and carbon taxes – are based on the carbon intensity of production. A cap-and-trade system is designed to limit greenhouse-gas emissions by dividing the total target

amount into allowances that can be traded among high and low emitters. While this supposedly establishes a market price for carbon dioxide emissions, it does not consider their negative social and environmental externalities. A carbon tax, by contrast, sets a price on carbon by taxing emissions-heavy activities.

But these two models reflect a very narrow (and possibly even distorted) view of how carbon should be priced into the economic system. A 2017 report by the High-Level Commission on Carbon Prices, chaired by Joseph E. Stiglitz and Nicholas Stern, provided a much more nuanced analysis. In addition to cap-and-trade and carbon taxes, the report recommended reducing or eliminating fossil-fuel subsidies and creating new financial incentives for low-carbon projects; offsetting the negative distributional impact of carbon pricing by using the proceeds to finance policies to protect poor and vulnerable populations; and complementary policies, such as investment in public transport and renewable power. Perhaps most important, the authors noted, countries must be able to choose instruments that fit their specific circumstances, resources, and needs.

Amid the growing enthusiasm for carbon pricing and border adjustment measures, policymakers and experts have largely ignored these points. The European Union's Carbon Border Adjustment Mechanism is a case in point. When the CBAM takes effect in October, it will impose a tax on carbon-intensive imports in order to "put a fair price on the carbon emitted during the production of carbon-intensive goods that are entering the EU" and to "encourage cleaner industrial production in non-EU countries" (emphasis added).

The CBAM will initially apply to imports of cement, iron and steel, aluminum, fertilizers, electricity, and hydrogen. At first, firms will simply have to report the (direct and indirect) emissions embedded in the goods they import. But, beginning in 2026, the EU will impose tariffs on these

emissions based on the weekly average auction price of cap-and-trade allowances.

The stated purpose of this measure is to eliminate so-called “carbon leakage” and ensure that the EU’s climate efforts are not undermined by production moving to countries with lower emission standards. Effectively, it protects European firms from competitors in such countries.

By taxing imports to the EU, the CBAM imposes on exporters in other countries the nearly impossible task of measuring emissions. Most developing countries (and many developed ones) lack granular data on firm-specific emissions, not to mention the ability to track the emissions of all the inputs used. Even if such data were available, the costs of collecting and analyzing it over time would be enormous. As the United Nations Conference on Trade and Development noted in 2021, the CBAM attempts “to impose on developing countries the environmental standards that developed countries are choosing.”

The EU wants to be viewed as a global leader on climate change, but it is difficult to see the CBAM as anything but a protectionist device. While the CBAM purports to encourage countries outside the bloc to reduce emissions by imposing their own carbon taxes, the EU has done nothing to help exporting countries attract new green investment or gain access to new technologies. In fact, it has persistently reneged on its (paltry) promises on climate finance and the commitments European leaders made as part of the 1992 Rio Agreement, restricting access to green technologies controlled by EU-based companies.

For decades, advanced economies have exported their emissions to developing countries by offshoring carbon-intensive production and then importing those goods. Now that greener technologies are available to (and largely controlled by) Western companies, developed countries promote reshoring

without sharing knowledge or finance, thereby undermining low- and middle-income countries' economic prospects and ability to achieve a green transition.

In February, Republican US Senator Bill Cassidy said he would unveil an emissions tariff bill in the coming months, following similar proposals by Senate Democrats. Meanwhile, lawmakers on both sides of the Atlantic have done little to limit fossil-fuel production and trade – by far the biggest sources of CO₂ emissions. The CBAM does not cover trade in fossil fuels, and neither would the proposed tariffs in the United States. If decarbonization is the real goal, rather than protecting domestic industries, then regulation and reducing direct and indirect fossil-fuel subsidies are far more promising policies.

For carbon pricing to succeed, developed countries must demonstrate their commitment to shared prosperity by enabling knowledge-sharing and fostering equitable climate finance. If they continue to focus on border taxes on goods produced (mostly) in developing countries, their carbon-pricing efforts will fail. Worse, they will exacerbate global inequality and reinforce the perception that all their lofty rhetoric about the need for international cooperation to fight climate change is merely a fig leaf for cynical and self-serving policies.

Climate, ice sheets and sea level: The news is not good



PARIS – Parts of earth's ice sheets that could lift global oceans by metres will likely crumble with another 0.5 deg C of

warming, and are fragile in ways not previously understood, according to new research.

The risk, which will play out over centuries, may also be greater than expected for a significant portion of the world's population in coastal regions.

New research suggests that the number of people threatened by sea-level rise has been underestimated by tens of millions because of poorly interpreted satellite data and a lack of scientific resources in developing countries.

Ice sheets in Greenland and Antarctica have shed more than half a trillion tonnes annually since 2000 – six icy Olympic pools every second.

These kilometres-thick ice cubes have replaced glacier melt as the single biggest source of sea-level rise, which has accelerated three-fold over the last decades compared with most of the 20th century.

A 20cm increase since 1900 has boosted the destructive wallop of ocean storms made more powerful and wide-ranging by global warming, and is driving salt water into populous, low-lying agricultural deltas across Asia and Africa.

Up to now, climate models have underestimated how much ice sheets will add to future sea-level rise because they mostly looked at the one-way impact of rising air temperatures on the ice, and not the complicated interaction between atmosphere, oceans, ice sheet and ice shelves.

Using so-called active ice sheet models, scientists from South Korea and the United States projected how much ice sheets would raise global oceans by 2150 under three emissions scenarios: swift and deep cuts as called for by the United Nation's Intergovernmental Panel on Climate Change, current climate policies, and a steep increase in carbon pollution.

Looking only at a 2100 horizon is misleading, because oceans will continue to rise for hundreds of years no matter how quickly humanity draws down emissions.

If rising temperatures – up 1.2 deg C above pre-industrial levels so far – can be capped at 1.5 deg C, the additional impact of ice sheets will remain very small, they found.

Doomsday glacier

But under current policies, including national carbon-cutting pledges under the 2015 Paris Agreement, Greenland and Antarctica would add about half a metre to the global watermark.

And if emissions increase – from human or natural sources – under a “worst-case” scenario, enough ice would melt to lift oceans 1.4m.

Perhaps the most striking finding from the study, published this week in Nature Communications, was a red line for runaway ice sheet disintegration.

“Our model has a threshold between 1.5 deg C and 2 deg C of warming – with 1.8 deg C as a best estimate – for acceleration of ice loss and sea-level increase,” co-author Fabian Schloesser from the University of Hawaii told Agence France-Presse.

Scientists have long known that the West Antarctic and Greenland ice sheets – which together could lift oceans 13m – have “tipping points” beyond which complete disintegration is inevitable, whether in centuries or millennia. But pinpointing these temperature trip wires has remained elusive.

A pair of studies this week in Nature, meanwhile, showed that Antarctica’s Thwaites “doomsday glacier” – a slab the size of Britain sliding towards the sea – is fracturing in unsuspected ways.

Thwaites is one of the fastest moving glaciers on the continent, and has retreated 14km since the 1990s. Much of it is below sea level and susceptible to irreversible ice loss.

But exactly what is driving the march to the sea has been unclear for lack of data.

Misinterpreted data

An international expedition of British and US scientists drilled a hole the depth of two Eiffel towers (600m) through the thick tongue of ice Thwaites has pushed out over the Southern Ocean's Amundsen Sea.

Using sensors and an underwater robot, called Icefin, threaded through the hole, they examined the ice shelf's hidden underbelly.

There was less melting than expected in some places, but far more in others.

The stunned scientists discovered up-side-down staircase formations – like an underwater Escher drawing – with accelerated erosion, along with long fissures being forced open by sea water.

“Warm water is getting into the cracks, helping wear down the glacier at its weakest point,” said Dr Britney Schmidt, lead author of one of the studies and an associate professor at Cornell University in New York.

A fourth study, published last week in the American Geophysical Union journal *Earth's Future*, found that rising oceans will destroy farmland, ruin water supplies and uproot millions of people sooner than thought.

“The time available to prepare for increased exposure to flooding may be considerably less than assumed to date,” Dutch researchers Ronald Vernimmen and Aljosja Hooijer concluded.

The new analysis shows that a given amount of sea-level rise – whether 30cm or 300cm – will devastate twice the area projected in most models to date.

Remarkably, a misinterpretation of data is mostly to blame: Radar measurements of coastal elevations used until recently, it turned out, often mistook tree canopy and rooftops for ground level, adding metres of elevation that were not in fact there.

Most vulnerable will be tens of millions of people in the coastal areas of Bangladesh, Pakistan, Egypt, Thailand, Nigeria and Vietnam.

Earlier research taking into account more accurate elevation readings found that areas currently home to 300 million people will be vulnerable by mid-century to flooding made worse by climate change, no matter how aggressively emissions are reduced. AFP

The global climate finance challenge



The world will not avoid dangerous levels of climate change without a significant increase in investment. This commentary presents three priorities for climate finance for the achievement of Paris targets and protection of the world's most vulnerable communities.

The dust has now settled after the United Nations climate change conference (COP27) in Egypt, but there are still many unanswered questions about how to finance emissions reductions

and adaptation. The world will not avoid dangerous levels of climate change without a significant increase in investment in developing countries. If these countries lock in dependency on fossil fuels and dirty technologies, they will be largest source of emissions growth in the coming decades.

Fortunately, such investment can not only reduce emissions and build resilience; it can also drive a new form of growth and development that is much more attractive than the dirty and destructive paths of the past. It is therefore in developed countries' own interests to help these countries accelerate the transition to sustainable, inclusive and resilient economies.

We were commissioned by the Egyptian COP27 Presidency and the British COP26 Presidency to conduct an independent analysis of the financing that developing countries (other than China) will need by 2030 in order to realize the goals outlined in the Paris climate agreement. Our report, published during the first week of COP27, concluded that these countries' annual investment in climate action needs to increase immediately, from about \$500 billion in 2019 to \$1 trillion by 2025 – and to \$2.4 trillion by 2030. That investment will not only deliver on the Paris Agreement; it will also drive this new form of growth and advance progress toward achieving the UN Sustainable Development Goals.

We identified three investment priorities for climate finance. First, financing should go toward accelerating the energy transformation, particularly the deployment of renewables, as this is essential to keeping the Paris Agreement's targets within reach.

Second, we need increased investments in resilience to protect lives and livelihoods – particularly among the world's poorest communities – against the increasingly devastating effects of climate change, as well as effective, properly-funded mechanisms for addressing Loss and Damage (defined as costs

that cannot be prevented by mitigation or adaptation).

And third, we urgently need to enhance biodiversity and conserve the ecosystems on which we all depend. Investments in nature represent vital contributions to both resilience-building and emissions reductions.

About half the financing for these investments could be met from domestic public and private sources in developing countries, and an additional \$1 trillion or so per year could come from outside sources. While public sources of finance, both internal and external, will be essential, the largest share can come from the private sector, which will invest in order to secure attractive returns from the growing market for zero-emissions and climate-resilient goods and services, provided that the risks can be reduced and managed.

A stronger partnership between the private and public sectors can unlock new investment opportunities, manage risk, reduce the cost of capital and mobilise the necessary financing at a much larger scale. But this funding must come from the right kinds of sources, such as philanthropic foundations, the International Monetary Fund's special drawing rights (the IMF's reserve asset), or the sale of carbon credits.

Furthermore, grants and low-interest loans by developed-country governments should increase from \$30 billion in 2019 to \$60 billion in 2025. This funding will represent only a small share of the overall sums required, and it should be carefully targeted at priorities that will not attract significant investments from the private sector. To put this in perspective, \$60 billion would represent only about 0.1% of developed countries' projected economic output in 2030, or about 0.7% of the \$9 trillion that rich countries allocated over the past two years to cope with COVID-19.

Finally, the World Bank and other multilateral development banks have a critical role to play in achieving the Paris

targets. Their annual investments in climate action will need to triple to \$180 billion by 2025, from about \$60 billion today, to realise co-financing with the private sector on the necessary scale, combined with support for public infrastructure.

The decision at COP27 to create new Loss and Damage funding arrangements recognises that additional investment by developed-country governments is needed to help developing countries to limit the harm from more frequent and severe extreme-weather events, rising sea levels, desertification and other climate-driven problems. All countries are already suffering Loss and Damage from climate change, but the social and economic consequences can be far more devastating for developing countries, which face not only repair and reconstruction costs but also severe reductions in economic output, employment and living standards.

Loss and Damage also increases the risk that people in vulnerable and highly exposed parts of developing countries will be forced to migrate, further jeopardising social and political stability. If poor countries can become more resilient to climate impacts, and can recover from them more quickly and effectively, they will be able to invest more in low-carbon development and they will pose less of a risk to regional and global security and stability. Again, while developing countries have long argued, with justification, that rich countries should provide separate financing to developing countries as compensation for the Loss and Damage related to past emissions, doing so is also in rich countries' interest.

The 2020s are the crucial decade in the fight against climate change. Further delay would be profoundly dangerous. But all countries will need to advance the transition to carbon neutrality. The rich world must not only do much more to reduce its own emissions. It must also generate the financing needed to help others and to protect the world's poorer

countries from a problem they did not create.

Green power is the first domino



As world leaders convene at the UN Climate Change Conference (COP27), it is obvious to all that bolder action is needed to avert disaster. The UN warns that global efforts to reduce greenhouse-gas (GHG) emissions remain insufficient to limit temperature increases to 1.5C, relative to pre-industrial levels.

To meet this target, decarbonising the power sector is critical. Electricity accounts for about 25% of the world's GHG emissions, and it also will play a critical role in decarbonising other sectors, such as buildings, transportation, and manufacturing. The challenge, then, is to achieve “24/7 carbon-free energy” (24/7 CFE): the total elimination of carbon from the electricity sector – at every hour of every day, in every grid around the world.

Research in the United States and Europe has shown that 24/7 CFE strategies have a greater impact on the decarbonisation of electricity systems than the current practice of purchasing electricity from renewable sources to match annual consumption patterns. Recent International Energy Agency modelling for India and Indonesia shows that hourly matching strategies lead to more diverse technology portfolios, with the clean, dispatchable generation and storage needed for net-zero transitions in the power sector. Critically, this approach helps electricity systems shift away from fossil fuels by accelerating uptake of the full suite of carbon-free technologies needed to deliver around-the-clock clean power.

Decarbonising energy systems worldwide is possible, but it will require collective action to accelerate the development and deployment of advanced clean-energy technologies. New investments, supportive public policies, and partnerships among stakeholders are all part of the solution. That is why the UN, Sustainable Energy for All (SEforALL), Google, and a diverse group of signatories launched the 24/7 CFE Compact in 2021. The compact represents a growing global community of stakeholders that are committed to providing the support, tools, and partnerships needed to make 24/7 CFE a reality everywhere.

Among the most recent to join the 24/7 CFE Compact is the Scottish government. "Scotland was the first country in the United Kingdom to declare a climate emergency, and indeed among the first in the world to recognise the importance of taking immediate and bold action," notes Scottish First Minister Nicola Sturgeon. "Governments must hold themselves to account in limiting global temperature rise to 1.5C. We are committed to putting accountability at the centre of all that we do. Our position is clear that unlimited extraction of fossil fuels is not consistent with our climate obligations."

Similarly, just last month, Google and C40, a network of almost 100 cities, launched a first-of-its-kind 24/7 CFE programme focusing on regional electricity grids. With urban areas accounting for over half the world's population and more than 70% of global carbon dioxide emissions, cities have a critical role to play in driving the changes needed to tackle the climate crisis.

Developing and emerging economies will need more energy to bridge energy-access gaps, and to support economic growth and development. But as capacity expands, it must be clean. A 24/7 CFE approach can serve both purposes, providing both greater access and cleaner energy. We therefore must move faster to make 24/7 CFE cheaper and more accessible globally. According to the latest IEA data, the number of people living without electricity will rise by almost 20mn in 2022, reaching nearly 775mn. Most of that increase will be in Sub-Saharan Africa,

where the size of the cohort lacking access has nearly returned to its 2013 peak.

The world cannot achieve net-zero emissions without first ensuring universal electricity access. That will require annual investments of at least \$30bn – two-thirds of which will need to go to Sub-Saharan Africa – between now and 2030. Fortunately, not only is 24/7 CFE a moral imperative, but it also represents the most cost-effective option for connecting underserved populations.

Many of these populations will otherwise continue to rely on dirtier sources of energy. Small island developing states such as Nauru, Palau, the Bahamas, and Trinidad and Tobago, for example, all have electricity grids that depend heavily on inefficient, carbon-intensive technologies such as diesel generators. These countries' experience shows why 24/7 CFE must not be framed merely as a European or North American issue. It is a global one, and it has become increasingly urgent for developing countries on the front lines of climate change.

Implementing 24/7 CFE strategies globally will require not only funding but also measures to scale up the deployment of advanced technologies, to create more favourable market conditions, and to share best practices and data. If we can fully decarbonise our grids, the rest of the green transition should become cheaper and easier.

The 24/7 CFE Compact provides an opportunity to drive the much-needed policy change, investment, and research in this crucial next phase of climate action. We invite all governments, companies, and organisations to join us and help chart a more sustainable path toward a net-zero future. – Project Syndicate

COP27: Financing for climate damages gets a foot in the door



AFP/Sharm El-Sheikh

UN climate negotiations yesterday offered a sliver of hope and “solidarity” for developing countries battered by increasingly costly impacts of global warming, in agreeing to discuss the thorny issue of money for “loss and damage”.

Countries least responsible for planet-heating emissions – but hardest hit by an onslaught of weather extremes – have been ramping up the pressure on wealthy polluting nations to provide financial help for accelerating damages.

But in a sign of how contentious the issue is among richer nations fearful of open-ended climate liability, the issue was only added to the formal agenda to the UN’s COP27 climate summit in the Egyptian resort town of Sharm el-Sheikh after two days of last-ditch negotiations.

This “reflects a sense of solidarity and empathy for the suffering of the victims of climate induced disasters,” Egypt’s Sameh Shoukry, the COP27 president, said to applause.

At last year’s UN summit in Glasgow, the European Union and the United States rejected calls for a separate financial mechanism.

Instead, negotiators agreed to start a “dialogue” extending through 2024 on financial compensation.

The issue has grown ever more urgent in recent months as nations were slammed by a crescendo of disasters, such as the massive flooding that put a third of Pakistan under water in August.

Senegal’s Madeleine Diouf Sarr, who represents the Least Developed Countries negotiating bloc, said climate action across the board had been far too slow.

"Lives are being lost. Climate change is causing irreversible loss and damage, and our people carry the greatest cost," she said, adding that an agreement on funding arrangements must be reached in Egypt.

Appeals for more money are bolstered by a field known as event attribution science, which now makes it possible to measure how much global warming increases the likelihood or intensity of an individual cyclone, heat wave, drought or heavy rain event.

"Today, countries cleared an historic first hurdle toward acknowledging and answering the call for financing to address increasingly severe losses and damages," said Anil Dasgupta, head of the World Resources Institute, a climate policy think tank.

But he said that getting negotiators to agree to discuss the issue was only an initial step.

"We still have a marathon ahead of us before countries iron out a formal decision on this central issue for COP27," he said.

Wrangling over loss and damage has unfolded against the backdrop of an unmet promise by rich nations to provide \$100bn a year starting in 2020 to help the developing world green their economies and anticipate future impacts, called "adaptation" in UN climate lingo.

That funding goal is still \$17bn short. Rich nations have vowed to hit the target by the end of 2023, but observers say the issue has severely undermined trust.

The UN Environment Programme has said the goal – first set in 2009 – has not kept up with reality, and estimates that funding to build resilience to future climate threats should be up to 10 times higher.

Meanwhile, countries are far off track to reach the Paris deal goal of limiting global warming to 1.5 degrees Celsius.

The UN says the world is currently heading to 2.8C of warming, or a still-catastrophic 2.4C even if all national pledges under the Paris treaty are fulfilled.

Depending on how deeply the world slashes carbon pollution,

loss and damage from climate change could cost developing countries \$290-580bn a year by 2030, reaching \$1-1.8tn in 2050, according to the Grantham Research Institute on Climate Change and the Environment in London.

The World Bank has estimated the Pakistan floods alone caused \$30bn in damages and economic loss. Millions of people were displaced and two million homes destroyed.

Simon Stiell, the UN's climate change executive secretary, said vulnerable countries are "tired" and "frustrated".

"Here in Sharm el-Sheikh we have a duty to speed up our international efforts and turn words into action to catch up with their lived experience," he said.

Up to now, poor countries have had scant leverage in the UN wrangle over money. But as climate damages multiply, patience is wearing thin.

The AOSIS negotiating block of small island nations told AFP that they would like to see the details for a dedicated loss-and-damage fund worked out within a year.

"There's not enough support for us to even to begin to prepare for the loss and damage that we are expected to face," said AOSIS lead negotiator on climate finance Michai Robertson.

China is doubling down on coal despite its green ambitions



Bloomberg / Beijing

China is building a vast array of new coal-fired power stations, potentially more than the operating capacity of the

US, even though it knows the plants will probably never be fully used.

The puzzle of why the world's leading installer of clean energy is investing so much in the worst polluting – and increasingly expensive – fossil fuel shows the depth of Beijing's concern over the global squeeze in energy supplies. But it also reflects planning for a gradual relegation of coal's role, from prime power source to a widely available but often idle backup to China's rapidly expanding renewables fleet.

Work on at least 165 gigawatts of plants powered by coal should begin by the end of 2023, the National Development and Reform Commission told executives at a meeting in September, according to state-backed Jiemian News. The chairman of China Energy Engineering Corp, meanwhile, has forecast the country could add a total of 270 gigawatts in the five years to 2025 – more than currently exists in any other nation.

New coal permits have already increased, and while the final extent of the ramp-up isn't known, adding 270 gigawatts could cost 568bn to 766bn yuan (\$79bn to \$106bn), according to a calculation based on BloombergNEF data. Excluding China, the rest of the world's pipeline of coal power projects stands at about 101 gigawatts, data compiled by Global Energy Monitor show.

China's strategy is designed to avoid the pitfalls that have hobbled parts of the US and Europe, which stopped investing in fossil fuel production and infrastructure before renewables were ready to take over. That's led to an over-reliance on imports in some places, and in others a dependence on grids that can fall prey to the unreliability of sunshine and wind.

At the recent party congress, President Xi Jinping laid out how China's energy transition would be different by following "the principle of building the new before discarding the old."

In practice, that means adding both clean power and more coal to try and eliminate economy-crippling power shortages and create a buffer against volatile global fuel prices, while at the same time advancing the country's long-term climate goals.

As China's economy grows, it requires ever more power, and it has said it plans to peak coal consumption only by the middle of the decade.

But even as new plants are built, the intention is for them to be used less and less as they're displaced by increasing amounts of clean energy.

In the context of global energy insecurity, it's not surprising that China would ramp up its coal capacity, said Yan Qin, an analyst in Oslo, Norway, at Refinitiv. "But the push to add more clean energy to the grid hasn't slowed down, meaning that growing renewables will squeeze the running hours of coal plants," she said.

The plan carries big risks. Coal financiers are directing capital to investments that are almost designed to be stranded. If they protest because their projects are being underutilised, it could slow the decarbonisation of the planet's worst polluter. And the world's carbon budget is finite, which means that any coal burned at all in China increases the chances of missing targets to avoid catastrophic warming.

The NDRC's proposal is already facing some pushback from utilities and local lenders, according to a person familiar with the matter. Many coal power generators are losing money amid high fuel prices and aren't enthusiastic about funding and running plants that would only be used during times of peak demand, the person said, declining to be identified because the talks are private.

Still, it's clear that the regulator's tone on coal power has changed since last year's energy crisis, according to the person. More plants will be built in areas that are reliant on hydropower, and near the massive wind and solar farms being built in the desert interior, to ensure reliable supply when intermittent renewables generation stalls, the person said.

China is also making efforts to lessen the burden on coal power generators, in large part by leaning on miners to boost output to record levels and keep the Chinese market well below sky-high international prices. The government has also given

utilities leeway to charge higher rates to industrial customers. And, it's making progress in developing a mechanism that would compensate coal plants that sit idle while on backup duty, Refinitiv's Qin said.

In any case, the rate at which clean energy is added will probably be more instructive than power plant spending in determining when coal burning starts to dwindle, said Dave Jones, a lead analyst at the climate think tank Ember in London.

Once renewables are installed they're basically free to produce, which means they'll be prioritised over coal. The moment that new clean energy generation outpaces new power demand is when coal use begins to fall, he said.

China is by far the world's largest renewables market, and its expansion continues to accelerate. Spending in the first half of this year more than doubled to \$98bn, compared to \$12bn in the US. As wind, solar and hydropower all charted strong growth over the period, mostly coal-based thermal power generation dropped 3.5%.

Although the historic drought in the summer curtailed hydropower so much that coal is back on track for a year-on-year increase, it won't be long before new clean energy capacity puts the fuel into permanent decline, Jones said.

"There is so much wind and solar being built and generating clean electricity," he said. "As long as China's not inventing a whole new use for thousands of terrawatt-hours of power, then from a demand perspective it's got to be reducing coal power, because there's nowhere else for that electricity to go."

No security without climate security



By Anne-Marie Slaughter/ Washington, DC

In July, CIA Director William Burns gave a 45-minute interview at the Aspen Security Forum. Only at the very end, following questions about the Russia-Ukraine war, China, Taiwan, Iran, and Afghanistan, was Burns asked what the CIA can do to identify where climate change is most likely to cause conflicts to erupt.

Burns's answer was unequivocal. First, he noted that climate change is "an important priority for the CIA and the US intelligence community." He then said that while he considers China "the biggest geopolitical challenge that our country faces in the 21st century," he also views climate change as the "biggest existential threat" to the United States.

Existential risk, as the Stanford Existential Risks Initiative defines it, is a risk that "could cause the collapse of human civilisation or even the extinction of the human species."

Burns probably had something less extreme in mind – perhaps a catastrophic event that would wreak irreparable harm and change life as we know it. But still, in this week-long forum dedicated to national and international security discussions, no panel focused specifically and entirely on climate change.

That's not unusual. As Burns pointed out, climate change does not fit the traditional definition of a national-security threat. As such, it falls within the jurisdiction of other government departments.

Yet if climate change poses an existential threat to the US, then the US defence apparatus must participate in the fight against it. Under Burns's leadership, the CIA has established a mission focused on helping "policymakers in the US government understand the consequences of climate change in

already fragile societies.” The National Security Council, the State Department, and the Pentagon all have units that focus on climate-change-related conflicts abroad. Still, what about the direct impact of climate change on the US? Generals, after all, do not stop fighting wars when the fighting spreads from foreign to American soil.

Science-fiction writers have no trouble bringing the future home to the present. For example, Omar El Akkad’s 2017 novel *American War* opens with a map of the US in 2075: Florida, New Orleans, New York City, Long Island, and Los Angeles are all underwater. Kim Stanley Robinson’s 2020 novel *The Ministry for the Future* begins with a heatwave in India that overwhelms the power grid and kills 20mn people.

In the scenario Robinson imagines, temperatures in Uttar Pradesh reach a “wet bulb temperature of 42 degrees centigrade.” An extreme scenario? Consider that in California’s recent heatwave, temperatures in the Bay area and Sacramento Valley reached 46.6C (115.9F) and that California prepared for brownouts and blackouts. As the thermometer breaks records, the prospect of hundreds of thousands of Americans dying in a heatwave does not seem far-fetched.

Perhaps the problem is that an existential “risk” is not yet an existential “threat,” whereas the war in Ukraine, Chinese militarism, and Iranian nuclear aspirations demand immediate attention. But tell that to the hurricane, fire, and flood victims who have suffered the consequences of catastrophic weather over the past decade. The Colorado River, Lake Mead, and the Great Salt Lake are disappearing now. Sea-level rise is already making itself felt in Norfolk and Miami. The future, as scientists keep telling us, is already here.

To be fair, Congress and President Joe Biden have done more than any previous administration. With the Inflation Reduction Act, Biden has secured a historic legislative victory that will enable the US to meet its international obligations to reduce carbon dioxide emissions. At the most recent United Nations climate change conference, Special Presidential Envoy John Kerry negotiated a crucial deal with the Chinese to allow

the world to move forward with its climate commitments.

Moreover, US national-security officials have their hands full. The risk that Russia will use a nuclear weapon in Ukraine is real and rising, and violating the nuclear taboo could draw Nato countries into a nuclear great-power war that could wipe out all of humanity. A nuclear conflict with China would be equally deadly, and Iran's acquisition of nuclear weapons would also lead to nuclear proliferation across the Middle East, effectively gutting the Nuclear Non-Proliferation Treaty and significantly increasing the risk of nuclear war and nuclear terrorism.

Still, the real measure of how much importance the American government attaches to a particular threat is the amount of time and money it invests in addressing it, and I doubt that Biden and his advisers spend more than 10% of their time on preparing for the impact of climate change. The issue is one of perspective: national-security officials operate in a world of geopolitics, competition, and co-operation among countries. They are trained to deter, prevent, and fight wars or to negotiate peace with other governments, not to deal with global threats that transcend national borders. As the adage goes, when all you have is a hammer, every problem looks like a nail.

Bill Burns got it right. Climate change is an existential threat, and the Biden administration and the US national-security establishment must treat it like one. Doing so would require reallocating substantial funds from the military to government agencies that focus on building domestic resilience and civil protection. It would also require creating new security agencies whose mandate would be to address global threats.

Minimising the risk of climate change will not be easy, but we have no choice. To paraphrase Game of Thrones, a long and deadly summer is coming. If we do not rise to the challenge, many Americans will not survive. – Project Syndicate

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The high stakes of climate-risk accounting



By Gernot Wagner And Tom Brookes/ New York

Economists are supposed to be good at understanding risk. Decision-making in the face of uncertainty, after all, is the discipline's bread and butter. Yet at a time when real-world risks – geopolitical, macroeconomic, financial, public-health, and environmental – are piling up, many economists seem to be at a loss.

Although businesses and investors stand to make a lot of money if they can properly assess and navigate the current risk environment, no one seems to have a good explanation for why we are where we are. This is especially true in the case of climate change: It is now clear that the risks have been systematically underestimated, and thus mispriced, all along. One explanation for this is that market participants have failed to understand the size and the probability of the risk, because they have been thinking about the issue in the wrong way. The climate system is not like a casino with well-defined outcomes and probabilities. As a 1987 comment in *Nature* put it, changes within our planet's systems may bring all kinds of "unpleasant surprises." It is as if we were playing with decks of cards that include some unknown number of jokers. Moreover,

one also must account for the inherent conservatism of the science. Climate researchers, especially, tend to err on the side of caution.

A classic case is the quantification of sea-level rise. Broadly speaking, sea levels rise for three reasons: melting polar ice caps, melting inland glaciers, and the fact that warmer water takes up more space. But in the Intergovernmental Panel on Climate Change's reports in the early 2000s, the headline figures fully accounted only for melting glaciers and thermal expansion. Scientists of course knew that global warming would melt polar ice, and that this effect might be the most consequential of the three. But because the estimates for how much faster the poles would melt differed by so much at the time, they were excluded from the headline figures.

That omission has long since been corrected. But it is now economists who are lagging behind in quantifying the economic damages associated with rising seas and the many other interlinked risks and uncertainties accompanying climate change. Quantifying climate-related damage is painstaking work; and in an academic environment that prizes new ideas over what might seem like a mere "accounting" exercise, it is not the kind of work that brings much reward or recognition.

Nonetheless, economists going back to Simon Kuznets, the "father" of the gross domestic product, have been some of the leading critics of economic metrics that purport to represent overall well-being. GDP is central to macroeconomic analysis, but it leaves out many other important indicators, such as those measuring human and planetary health. Standing forests and clean air and water have no value in national-income accounting unless they enter the economy directly as factors of production.

Fortunately, an initiative by US President Joe Biden's administration aims to correct this shortcoming by developing a new set of "statistics for environmental-economic decisions." While this effort is not the first of its kind in the world, it is among the most ambitious. The goal is to supplement GDP with a far more comprehensive set of accounts,

and then to use this new metric to guide policy decisions. Such a change is long overdue. Climate change might not have grown into the problem that it has become if its damages had been incorporated into national accounts all along.

This points to a second, equally important reason why climate and other risks have been mispriced. It is one thing for scientists, economists, and informed members of the public to recognise that many risks and uncertainties are not priced; it is quite another to adopt policies that discourage businesses from pushing those risks onto society.

For business leaders, the top climate risk, according to a recent Federal Reserve Bank of San Francisco survey, is that climate change will influence “rules and regulations related to our business.” Executives correctly anticipate that policymakers will want them to pay for greenhouse-gas emissions and other negative externalities instead of being permitted to socialise those costs.

Such measures inevitably will fall into the realm of politics, but economists must not confuse their political preferences with sound policy. Those who are ideologically inclined to look to the “free” market as a guiding principle for organising society must recognise that a market can function well only when no externality is left unaccounted and unpaid for.

Another Biden administration accounting initiative could help here. The US Securities and Exchange Commission’s proposed rules for climate-related disclosures would compel companies to standardise and report both the impact of their operations on the climate and the risks that climate change poses to those operations. The SEC’s effort stops short of asking all polluters to pay for their own pollution; instead, it leaves it up to investors to decide what to do with the new information.

Economists must defend the pivotal role their advice plays in policymaking. The political forces and special interests that bear on this issue will skew their advice and skewer the advisers. But that must not become an excuse for inaction.

Intellectual honesty demands that economists and policymakers grapple with how new risks and uncertainties can and will affect outcomes.

Tallying what's known is hard enough. Accounting for hard-to-price risks and uncertainties like climatic tipping points is harder still. But recognising those risks and uncertainties makes clear that political action must come sooner rather than later. – Project Syndicate

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The EU's carbon border tax could hurt developing nations



By Miriam Gonzalez Durantez And Calli Obern/ Stanford

In July 2021, the European Commission did something that no other major governing body had ever attempted: It tied trade policy to climate policy. Reaching the European Union's goal of cutting net greenhouse-gas emissions by 55% by 2030 will require the EU to reduce emissions both at home and beyond its borders. To this end, the Commission's Fit for 55 initiative, a package of proposals aimed at meeting the bloc's emissions-reduction target, includes a carbon border adjustment mechanism (CBAM) – an import tax designed to corral other countries into tackling climate change.

The CBAM would tax imported goods sold in EU markets on the basis of their carbon content (the emissions required to

produce them), which depends on their material and energy inputs. The proposed levy is intended to address so-called carbon leakage, which occurs when businesses in the EU move production to non-member countries with less stringent emissions rules.

In other words, Europe would no longer ignore the climate effects of foreign goods. But while the measure could help to reduce emissions and level the competitive playing field for EU-based firms, the trade protectionism that it entails risks hurting developing countries.

The CBAM will initially apply to the highest-emitting industries most at risk of leakage – iron and steel, cement, fertilisers, aluminium, and electricity generation – and will likely be expanded to other sectors in the coming years. Currently, EU-made products in these industries are taxed under the domestic carbon price, but those from outside the bloc are not. If a country already has a domestic carbon price, the border tax will be lowered or waived; this is meant to encourage countries to tax carbon in their own markets. Those that cannot or will not institute a carbon tax will have to pay the full levy.

The EU tax will be phased in over the next four years. By 2023, importers will be required to report emissions embedded in the goods they import, though the tax on those emissions will not be imposed until 2026. The €1bn (\$1.1bn) of annual revenue expected from the CBAM, as well as the €9bn in annual revenue expected from the EU Emissions Trading System from 2023-2030 and taxes on multinational corporations, will support the Union's €750bn Covid-19 pandemic recovery fund. These new sources of revenue will embed EU priorities – including the green transition – in the bloc's budget for the first time.

Though not yet approved, the proposed tax is already influencing the decisions of policymakers and companies in the EU's trading partners. For example, Turkey and Indonesia plan to introduce carbon taxes to mitigate the CBAM's effects on their economies. Turkey is highly exposed, because the EU

accounts for 41% of its exports. Indonesia exports billions of euros' worth of palm oil and chemicals to the EU – goods that could fall under a broader border tax. Adopting a domestic carbon price will allow them to avoid some or all of the CBAM and keep the tax revenues instead of transferring them to the EU.

Meanwhile, some EU-based companies in industries such as computer hardware are looking to reshore manufacturing operations ahead of the CBAM's introduction. Their main motive does not reflect the cost of the tax so much as the likely complexity, bureaucracy, and unpredictability of the system. It is easier and cheaper for companies to relocate production to the EU and avoid the administrative hurdles that the CBAM could create.

Such shifts will be a win for the EU's economy and the environment. And Russia's invasion of Ukraine could accelerate the EU's efforts to achieve greater economic self-sufficiency, not least by reducing its dependence on energy-intensive imports of Russian iron and steel.

But developing economies, which often depend on manufactured products, will likely experience an outflow of activity as firms relocate to the EU. Rather than addressing only carbon leakage and leaving developing countries to adapt as best they can, the EU should allocate part of the revenue from the proposed CBAM to help foster a just green transition for poorer countries.

It is not easy or cheap to decarbonise energy-intensive goods like cement and steel. But the EU could prevent negative knock-on effects for developing economies – not only by waiting for lower-income countries to introduce their own carbon taxes (which will be a challenge given their limited administrative capability in the field), but also by supporting those that need the most help to reduce their emissions.

Such support could be provided by dedicating resources and technology to improve the efficiency of industrial processes, financing renewable energy projects, and exempting the poorest

countries from the CBAM where necessary. The EU should also dedicate part of the CBAM revenue to help developing countries adopt cleaner technologies – to produce greener cement in Vietnam or chemicals in Indonesia, for example – and thus reduce emissions in the long run.

Europe sees itself as a global leader in the race to net-zero emissions. By helping to finance the developing world's green transition, the EU could mitigate the protectionist threat in its own climate agenda. – Project Syndicate

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The coming green hydrogen revolution



By Jean Baderschneider/ Washington, DC

Human-induced climate change is causing dangerous and widespread environmental disruption and affecting the lives of billions of people around the world. According to the Intergovernmental Panel on Climate Change, the world faces unavoidable climate hazards over the next two decades. But, with average annual global greenhouse-gas emissions reaching their highest levels in human history between 2010 and 2019, we are simply not doing enough to limit global warming to 1.5C.

The IPCC report released in April recommended that the world

rapidly reduce fossil-fuel supply and demand between now and 2050: by 95% in the case of coal, 60% for oil, and 45% for natural gas. But how can we possibly achieve such ambitious targets?

The answer is by switching to green hydrogen, which can be produced from all forms of renewable energy, including solar, wind, hydro, and geothermal. Green hydrogen is a zero-emissions fuel; when produced through electrolysis, the only “emission” is water. It is a practical and implementable solution that, by democratising energy, decarbonising heavy industry, and creating jobs globally, would help revolutionise the way we power our planet.

A rapid acceleration of the green-energy transition can also fundamentally alter the geopolitical landscape, since countries will no longer be powerful simply because of the fossil fuels they produce. In 2021, Russia provided 34% of Germany’s crude oil and 53% of the hard coal used by German power generators and steelmakers. Russian-piped natural gas was Germany’s largest source of gas imports in December 2021, accounting for 32% of supply. Since Russian President Vladimir Putin launched his horrific, unjust war in Ukraine in February, fossil-fuel exports to Europe have been earning Russia roughly \$1bn a day.

But since the start of the invasion in February, European Union countries in particular have moved quickly to reduce their energy dependence on Russia, recently agreeing to ban all seaborne imports of Russian oil. These new sanctions against Putin’s war machine could cut the amount of oil the EU buys from Russia by 90% this year. The United States has declared a complete ban on Russian oil, gas, and coal imports, while the United Kingdom is phasing out imports of Russian oil by the end of 2022.

These policies have sent fuel prices soaring. But sharply higher prices have also highlighted the opportunity to drive down energy costs by investing in renewables and the production of green hydrogen.

New research suggests that green hydrogen will be competitive

with fossil fuels over the next decade. The cost of green hydrogen is expected to decline significantly by 2025 and to fall to \$1 per kilogram by 2030 in favourable locations such as Australia. For comparison, grey hydrogen, which is made using polluting liquefied natural gas, currently costs around \$2 per kilogram.

Some advocate using LNG to “solve” the current energy-security crisis, but “natural gas” contains methane, and the IPCC says that we must reduce use of natural gas by almost 45% by 2050; adding more to the energy mix now would be a catastrophic mistake.

So, there is now a global race for green energy, and specifically for green hydrogen. Dozens of countries that have abundant renewable-energy sources can develop energy independence by producing green hydrogen at scale. And energy importers will not have to rely only on the few countries (such as Russia) that have a natural endowment of fossil fuels.

In a recent report, the International Renewable Energy Agency said that (green) hydrogen can bolster energy security in three main ways: by reducing import dependence, mitigating price volatility, and boosting energy systems’ flexibility and resilience through diversification. As technologies improve, the cost of green hydrogen will fall. We must do everything we can to accelerate this process.

Companies like Fortescue, where I am a board director, are investing significantly in green hydrogen and will help to replace Russian fossil fuels with green energy. Fortescue recently announced an agreement with Germany’s largest energy distributor, E.ON, to supply Europe with 5mn tonnes of green hydrogen a year by 2030 – the equivalent of one-third of the calorific value of the energy that Germany currently imports from Russia.

But while rapid changes in the energy and geopolitical landscape present a clear opportunity to address the energy and climate crises simultaneously by investing in green energy, there is a clear perception of unfairness when

developed countries claim that relatively low-emitting developing economies need to shut down fossil-fuel use. Why should they risk slowing their development to address a problem they played no part in causing?

It's a valid question. Policymakers will need to account for developing countries' interests during the green transition and enhance funding and incentives for them to move to clean energy as the basis of industrialisation.

The world is clearly at a fork in the road. We can remain locked into a costly, polluting future that is hideously inefficient and empowers only a handful of fossil-fuel-rich countries. Alternatively, we can choose a green revolution of low-cost energy for all that keeps our future secure from pollution, global warming, and dictators. Given that green energy has the power to democratise global supply as more countries achieve energy independence, the choice is not difficult. – Project Syndicate

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