Carbon Capture and Delay

As long as coal plants are still operating, it is a good idea to require them capture their carbon dioxide emissions. But those designing policies to hasten such practices must tread carefully, lest they unwittingly extend the life of dirtier energy sources.

NEW YORK – In May, the US Environmental Protection Agency proposed new power-plant rules that would effectively require every existing coal- or gas-fired plant in the United States either to capture and store most its carbon dioxide emissions, or to switch to burning low-emissions "green hydrogen." Yet it would be cheaper to replace America's more than 200 coal-fired plants with new solar or wind facilities, and then to do the same with its gas plants soon thereafter.

This claim will surely be met with cries of: "It's not that simple! You also have to account for the Earth's rotation, cloud cover, and a lack of wind." Indeed, one also must acknowledge ever-present NIMBYism, long-term energy contracts, and other complexities that stand in the way of immediately swapping coal for solar. But nobody is seriously suggesting

shutting down every fossil-fueled power plant everywhere all at once. The transition will take time.

Time, of course, is relative. Even the new EPA rules would be phased in gradually, with the real bite coming only in the next decade. But we can't wait for the EPA's rules to bite and force the changes, nor should we. And the "we," in this case, includes everyone from consumers to local energy regulators to utility executives and banks planning their investment decisions.

Carbon capture and storage (CCS) is a godsend, and green hydrogen has the potential to be one, too. But, looking to the next decade and beyond, we also will be deploying many other advanced climate-tech solutions, from better batteries to smarter grids. Given the urgency of the climate crisis and all the new technologies coming down the pike, it makes little sense to wait for the EPA's new rules to force changes years from now.

Power-plant economics are changing fast. In 2019, the think tank Energy Innovation published its first "coal cost crossover" report, which found that 62% of US coal plants were more expensive to run than to replace with local solar or wind generation. By 2021, that figure had risen to 72%; and as of earlier this year, it was 99%. With the exception of one coal plant in Wyoming, it would be cheaper to produce electricity with solar or wind, plus battery storage, than to keep the existing coal fleet up and running.

While the 2023 figure accounts for the expanded solar and wind tax credits under the Inflation Reduction Act, it does not include additional incentives like those provided by the IRA's loan program, which utilities can tap to help finance renewables. More to the point, it came before the new EPA proposals, raising the question of what effects these rules might have.

For the most part, the EPA's rule changes are standard regulatory fare, reflecting the need to pass muster with a Supreme Court that is intent on curtailing federal regulators' powers. Instead of allowing for flexibility in achieving carbon-reduction goals, the EPA is taking a more direct approach, essentially mandating that existing coal plants capture and store their released carbon. But especially in connection with generous IRA subsidies for CCS technology, US policymakers may be unwittingly throwing a lifeline to coal plants that would otherwise be economically unviable.

When considered in isolation, the EPA rule is clearly good for the environment and for public health, since it would significantly decrease particulate matter and ozone pollution. But assessments of CCS tend to get murky fast. Lest we forget, Donald Trump and his advisers were big fans of the technology, which they saw as a way "to help coal and still help the climate."

Since combining CCS with coal will always be more expensive than burning coal outright, mandating CCS, in theory, should indeed make coal even less competitive than it already is. But CCS mandates do not operate in a vacuum.

In practice, operating licenses for coal plants are not issued by the same people writing federal rules. These decisions are made at the state and local level, primarily through state-level public utility commissions that have many competing priorities. Even if they are committed to decarbonizing, one important goal is to keep the lights on. That goal, in turn, has all too often been interpreted as keeping current generation capacities profitable. When faced with new CCS mandates and accompanying subsidies, they may simply see an opportunity to maintain coal-plant profitability for longer.

How can federal policymakers get around this problem? Broadly speaking, the focus should be on pushing cheaper solar and wind power into the system, as that will force coal- and gas-

plant operators' hands. We also need better, nimbler planning and investment processes, to allow for grid-connection rights to be reassigned from coal plants to renewables that would be built in their stead. As matters stand, most US states do not give consumers a choice about how their electricity is generated. That needs to change.

As long as coal plants are still operating, it is a good idea to make them capture their CO_2 emissions. But that does not mean it is a good idea to be helping them continue to operate. The sooner that coal is replaced by renewables, the better it will be for the planet, consumers, and even utility companies.

Qatar's LNG projects will achieve significant

reductions in greenhouse gas emissions: Al-Kaabi

Qatar’s LNG projects will achieve significant reductions in greenhouse gas emissions through carbon capture and sequestration as well as the use of solar energy, noted HE the Minister of State for Energy Affairs Saad Sherida al-Kaabi.

“In all, we aim to reduce the overall carbon intensity by about 30% compared to previous generation designs,” al-Kaabi said delivering the keynote address on the virtual mode at the 12th LNG Producer-Consumer Conference being held in Tokyo, Japan.

Al-Kaabi, who is also the President and CEO of QatarEnergy stressed the need for a clear roadmap with specific targets to achieve a fair and effective energy transition with a realistic and stable path towards the reduction of the global carbon footprint.

The minister said, “I would like everyone around the world calling for a speedy energy transition to consider that the world needs a fair and effective transition with a realistic and stable path, which wisely balances humans flourishing with environmental protection, it should not continue to only focus on the needs of the rich and well-developed countries but must prioritise the needs of developing countries.

“This highlights the need for a realistic and resolute energy transition, starting with a solid integration of natural gas in the energy mix of today and tomorrow. We strongly believe that Gas will be needed as a safer reliable base load in the energy mix for most nations for decades well beyond 2050.”

Highlighting the challenges facing the energy industry, Minister al-Kaabi said, “Lack of investments in the oil and gas upstream sector remain as an unresolved and unchallenged chronic problem, contributing to greater lack of clarity, volatility, and supply uncertainty. This lack of investment will likely cause increased instability for every region

around the world.”

In this context, al-Kaabi said, “Qatar is providing the world with the cleanest available hydrocarbon source of energy, which has met both the economic and environmental aspirations for a better future. By 2029, about 40% of all new global LNG supplies will be provided by QatarEnergy projects.

Minister al-Kaabi concluded his remarks by stressing the State of Qatar’s determination to work with its clients and partners to realise the full potential of LNG as a vital contributor to a realistic and responsible energy transition, and to continue to take concrete action across the entire spectrum of the energy industry to address the challenges of climate change.

The LNG Producer-Consumer Conference is a global annual dialogue, launched in 2012, organised by Japan’s Ministry of Economy, Trade and Industry, and the Asia Pacific Energy Research Centre.

It provides ministers, heads of international organizations, corporate executives, and other stakeholders with a venue to share the latest trends in the global LNG market and discussing opportunities and challenges with a view to its development.

Climate crisis won’t solve on its own: need to walk the talk

We need all governments to step up and agree to phase out unabated fossil-fuel use. We need reforms to make our financial institutions and systems fit for purpose. And we need to take climate action seriously

Last year in Berlin, the great Kenyan long-distance runner Eliud Kipchoge broke the world marathon record, clocking 02:01:09 and beating his previous time by 30 seconds. His success has made him a legend not only in Kenya but globally. It offers a useful lesson for everyone involved in the fight against climate change. Kipchoge’s winning strategy is rooted in the science of running (as well as 120 miles of hard work every week), and our own approach to the climate crisis must

involve the same level of commitment and focus.

As temperatures keep rising and emissions soar, the planet, too, continues to break (dangerous) new records. But with determination and follow-through, we – together with institutional partners and other governments – can start to run faster to get ahead of the climate crisis. Success will depend on following the latest science and mobilising a joint, broad-based effort of governments and citizens.

In March, the world's top climate experts and governments signed off on the latest Intergovernmental Panel on Climate Change synthesis report. Once again, the IPCC's message was stark: Humans have permanently changed the planet, and global warming is already killing people, destroying nature, and making the world poorer. Though African countries have contributed the least to the problem, they are bearing the brunt of the damage.

According to the International Energy Agency (IEA), Africa accounts for less than 3% of the world's energy-related carbon dioxide emissions, and 600mn Africans – an outrageous figure – still do not have access to electricity.

Climate change is a shared problem that the global community must solve by working together, especially given the disproportionate burden being placed on those who are least responsible. During his recent visit to Kenya, German Chancellor Olaf Scholz and I held talks on ways to address the climate crisis. Through the Germany-Kenya Climate and Development Partnership, our two countries have committed to deepen our collaboration on climate-resilient development and renewable energy, including by supporting green-hydrogen production and sustainable agriculture.

We are currently a long way from limiting global warming to 1.5C or even 2C, as envisaged by the Paris climate agreement. The climate crisis will not solve itself. On the contrary, we must ensure that global greenhouse-gas (GHG) emissions peak before 2025 at the latest, and then fall by at least 43% by 2030.

This is the year to drive that transformation. The United

Nations Climate Change Conference this November-December (COP28) offers an opportunity to accelerate the energy transition, supercharge the growth of renewables, and commit to phase out all fossil fuels – starting with coal.

Kenya is on track to meet these goals. We already generate 92% of our power from clean sources and we have committed to achieving a 100% clean electricity network by 2030. Similarly, renewables generated 46% of Germany's electricity in 2022 and the government has committed to increase that to 80% by 2030. Critically, these commitments will not only ensure clean power and a safer environment; they will also create jobs, attract investment, and make our economies more secure and resilient in the face of volatile oil and gas prices.

But it is important that we run this race as a team. According to the IEA, the global ratio of clean-energy investments to dirty-energy investments must increase sixfold by 2030 (from 1.5:1 to 9:1).

With a strong partnership between Africa, Europe, and the rest of the international community, Kenya, with its abundant resources, can make significant contributions to decarbonisation and the global transition to a net-zero economy. We must unlock climate finance and investment, so that we can harness our potential for green economic growth. But to do that, we will need to fix the current international financial system, which has proven inadequate for dealing fairly with multifaceted global crises, from the Covid-19 pandemic and the climate emergency to debt distress across the Global South.

Next month's Summit for a New Global Financial Pact, in Paris, provides an opportunity for Europe to galvanise support for reforming the international financial system. The international community must recognise our potential to help solve global problems and take steps to ensure win-win outcomes. That means providing access to affordable, adequate, and sustainable financing that is delivered in a timely manner.

As we reduce emissions, we also need to prepare our people and

our housing, agriculture, and food systems for rising temperatures and extreme weather events. Meeting the 2021 COP26 commitment to double global climate-adaptation financing by 2025 remains crucial for protecting people and nature. The latest IPCC report is clear: climate change and insufficient adaptation and mitigation efforts are reversing development gains and undermining economic stability.

But we also must remember that adaptation has limits, and that climate change is already threatening millions of peoples' lives today. As the IPCC shows, reducing GHG emissions by 43% this decade and stabilising global warming at or below 1.5C is still our best chance to keep the problem at a manageable scale. Kenya's climate summit in September will provide a key opportunity to showcase the continent's commitment, potential, and opportunities to deal with the climate crisis. We need all governments to step up and agree to phase out unabated fossil-fuel use. We need reforms to make our financial institutions and systems fit for purpose. And we need to take climate action seriously. In the words of Eliud Kipchoge, the key to success is to "walk your talk." – Project Syndicate

- *William Ruto is President of Kenya.*

The Climate Elephants in the Room

May 19, 2023PINELOPI KOUJIANOU GOLDBERG
As tempting as it is to rely on multilateralism to solve a shared global problem like climate change, the world simply does not have the time for such an approach. A far more pragmatic and effective strategy is to focus on the biggest polluters that contribute disproportionately to total greenhouse-gas emissions.

NEW HAVEN – Now that the falsehoods and obfuscation of climate denialism have finally been silenced, addressing climate change has become the world's top priority. But time is running out, and the International Monetary Fund warns that any further delays on implementing policies to mitigate global warming will only add to the economic cost of the transition to a low-emissions economy. Worse, we still lack a concrete, pragmatic strategy for tackling the problem. Although economists have made a robust case for why carbon taxes are the best solution, this option has proven politically infeasible, at least in those countries that account for some of the highest emissions (namely, the United States).

Commentators have also stressed that climate change is a shared problem involving important cross-border externalities that must be addressed through a multilateral approach to global coordination. But, as with carbon taxes, this argument has fallen on deaf ears. And, given the current geopolitical climate and the increasing fragmentation of the global economy, there is little hope that the message will get through anytime soon.

Having committed to assisting developing economies as they confront climate change, the World Bank finds itself limited by the country-based model underlying its financing

operations. It is earnestly weighing its options and considering how it could coordinate climate-related financing across borders. But while such efforts are well meaning and consistent with the spirit of multilateralism, they inevitably will delay concrete action. World Bank financing would have to be completely restructured, and coordinating action across multiple countries that have limited financial resources and often conflicting interests seems an impossible task. For example, while some developing economies are rich in fossil fuels, others are starved for energy sources.

Given these limitations, pragmatism dictates focusing on the biggest polluters. Global carbon dioxide emissions are concentrated among only a handful of countries and regions. China, the US, the European Union, Japan, and Russia collectively account for 63% of the total, and none of these top polluters is a low-income country anymore. China, the poorest of the group, represents around 30% of all emissions, making it by far the world's largest current polluter in absolute terms. But its government is taking steps to accelerate the transition to green energy – a winning strategy, given the country's abundance of rare earth metals.

India, the third-largest emitter, currently accounts for approximately 7% of global CO_2 emissions, and its size and growth trajectory imply that it could easily surpass China as the leading polluter, barring stronger climate policies. In fact, when it comes to helping developing countries decarbonize, considerable progress could be made simply by targeting India alone. The big advantage of this strategy is that it would avoid the paralysis associated with attempts to adopt a multilateral approach in an increasingly fragmented world.

This does not mean that we should eschew projects aimed at climate mitigation or adaptation in other countries. But we would not need to wait until everyone is on board before doing

anything. Those insisting on a multilateral approach should learn from the experience of the ultimate multilateral institution: the World Trade Organization. Its requirement that every single provision in every multilateral agreement gain unanimous support has left it increasingly paralyzed, prompting demands for institutional reform.

Of course, India is not low-hanging fruit. It is rich in coal and has little incentive (beyond the health of its citizens) to hasten the transition to green energy. In focusing on India, we would need to employ the carrot, not the stick.

Since the stick generally takes the form of pressure to implement carbon taxation, it is a non-starter. A tax would be ineffective, because it would incite massive domestic opposition (as has been the case in the US). It would also be morally objectionable, because it is unfair to ask a lower-middle-income country to bear the burden of reducing CO_2 emissions when rich countries (like the US) have failed to do the same. Moreover, even if China and India are now two of the world's biggest polluters, they bear little responsibility for the past, cumulative emissions that led to the current climate crisis.

That leaves the carrot, which would come in the form of tax incentives or subsidies to support green energy. When paired with other policies, these can ease firms into adapting to higher environmental standards (such as those associated with a cap-and-trade program). But such policies are expensive, which means that tackling climate change will require richer countries to help finance them. Whether or not India becomes the new China, it is still in our power to ensure that it does not become the new outsize polluter.

https://www.project-syndicate.org/commentary/climate-change-prioritize-top-emitters-over-multilateralism-by-pinelopi-koujianou-goldberg-2023-05

Sustainable food – not more of it – needed as global hunger soars

LONDON – As global hunger swiftly rises – by more than a third last year – curbing it will require not growing more food but rethinking broader systems of trade and aid, farming's heavy reliance on fossil fuels, food waste and meat eating, experts said.

Farmers today grow sufficient crops to feed twice the current population – but but nearly a third of food produced globally is spoiled or thrown away, said Philip Lymbery, the chief executive of Compassion in World Farming International.

At the same time, grain that could feed billions of people is

instead fed to factory-raised food animals – suggesting a reduction in meat consumption is one clear way to cut hunger, he said at a conference on global food systems in London last week.

In Europe alone, 60% of grain is now grown for animal food, said Tim Benton, a food systems expert at the London-based think tank Chatham House, which raises questions about whether scarce land could be better used.

As global leaders look for ways to keep food available and affordable, and prevent rising hunger, “it’s not about food scarcity because there’s no food scarcity,” Lymbery noted.

Surging hunger

Globally, hunger is surging, with 258 million people in nearly 60 countries facing acute food insecurity last year, a 33% jump from 2021, according to the Global Report on Food Crises 2023, released in March.

Problems are growing not just in traditional aid recipient countries such as Yemen, Somalia and Afghanistan but also in nations from Nigeria to the Democratic Republic of Congo, it showed.

The report, backed by agencies from the U.N. World Food Program to the World Bank, found that climate change impacts – from floods in Pakistan to drought in the Horn of Africa – were key contributors to the surge.

But conflicts – including Russia’s invasion of Ukraine, which slashed wheat exports from Ukraine and drove up the prices of energy and fossil fuel-based fertilizers – also played a major role, particularly in contributing to rising food prices.

“We depend more and more on a small number of countries for production of the major crops we depend on,” said Olivier De Schutter, co-chair of IPES-Food, an international expert panel

on sustainable food systems.

That means when climate change slashes production in one or more key producers, or a conflict breaks out in one, “global supply chains are disrupted … (and) the whole global food system is impacted.”

In the wake of the Ukraine invasion, food costs also rose as speculators, hedge funds and a handful of big agribusiness companies that control most global food trade made profits, said De Schutter, who is also a U.N. special rapporteur on extreme poverty and human rights.

He suggested that finding ways to wean global agricultural production off its heavy reliance on fossil fuel-based fertilizers could be a key way to protect access to food from volatile oil and gas prices.

Helping poorer countries escape their often heavy debt burdens could also help them shore up their food security, allowing them to focus more on growing food for their own people rather than raising export crops to bring in the cash needed to service debt, De Schutter said.

Competing answers

Benton, of Chatham House, said two very different views of how to achieve future security are now competing.

In the first, the assumption that the world will need 50% more food by 2050 – in part to meet growing demand for meat and dairy as poor countries grow richer – demands much more intensive production from limited agricultural land.

That view assumes agriculture in the future will become much more technological and centralized, with heavy use of drones, satellites and the “internet of things” driving smarter production – and likely resulting in fewer farm jobs.

The second view, however, envisions farmers shifting to more ecologically friendly, smaller-scale and less fossil fuel-intensive agriculture, with food demand not growing significantly because food waste is cut and meat-intensive diets decline.

“Everybody agrees food system transformation is needed” – just not what kind, said Molly Anderson, a food studies professor at Middlebury College in the United States.

Seth Watkins, a farmer in the U.S. state of Iowa, said at last week’s food conference that he had seen first-hand how intensive farming systems were damaging soil health, raising questions about the long-term viability of farming, especially as climate change impacts worsen.

“Often (a focus on) technology holds us back from the sustainable solutions we need to fix our food system,” he said, calling for a switch to more environmentally friendly and low-carbon ways of producing food.

Decisions made now are crucial because “it’s our own regeneration or extinction we’re talking about,” Watkins said.

Susan Chomba, director of the Vital Landscapes in Africa program for the World Resources Institute, said efforts to cut food waste were particularly crucial as key farm resources from available land to water grow scarcer.

“No matter how much we try to produce, if we can’t address what is lost and wasted it’s a counterproductive process,” she said in an interview.

A range of powerful vested interests stand in the way of shifting food systems to effectively manage growing hunger, climate threats and ecological decline, the analysts said.

Worsening disinformation and a rise in authoritarian governments around the world also are acting as a brake on

change, they said.

But with hunger growing fast and new challenges appearing – from an expected drought-spawning El Nino weather pattern emerging this June to new conflict in Sudan, adding to humanitarian burdens – public discontent and pressures on politicians for change are also likely to increase.

“Because we’re not tackling the environmental crisis, the disruptions we see are going to get bigger and bigger,” warned Benton of Chatham House.

Climate change continues to causeuncertainties for

commodity prices

It can alter rainfall patterns, increase temperatures, and cause extremClimate played a major role in commodity prices last year and looks like doing so again in 2023.

Scorching heatwaves in the northern hemisphere hit production of wheat in the US and Europe in 2022, and climate change means that catastrophic weather events are becoming more frequent.

These include La Niña, which is stretching into an unprecedented third consecutive year and will be detrimental to maize and soybean production in the first half of 2023, in addition to other crops like sugar and coffee, according to Economist Intelligence Unit (EIU).

Wheat, which was heavily affected by war-related supply disruptions in 2022, faces significant climate risks. In the US large swathes of the southern plains remain under drought conditions, and crops are in unusually poor condition heading into winter dormancy. Extremely dry, occasionally frosty weather in Argentina is causing damage across major producing provinces there, but Russia and Australia are on course for a second consecutive year of bumper crops, which, for the moment, is alleviating concerns about production in the western hemisphere.

Weather will loom large in energy markets as well, EIU noted. Europe’s heatwave drove up demand last summer, causing gas and electricity prices to spike, especially as winds dropped to levels insufficient to generate enough power to meet Europe’s electricity needs while drought affected hydropower generation in many countries.

These dry conditions, together with rising water temperatures, also hit nuclear power generation.

In addition, the severity of Europe’s current energy crunch depends largely on how cold temperatures fall over the winter, not just in 2022/23 but in 2023/24 as well.

“The colder the winter, the more countries will have to draw

down stockpiles built up over 2022. Below-normal temperatures will not only raise the spectre of energy rationing, but also put upward pressure on prices over the summer as Europe scrambles to refill reserves—this time without Russian supplies," EIU said.

Obviously, climate change can have significant impacts on commodity prices by affecting their production, transportation, and demand for various goods.

Climate change can impact commodity prices by affecting crop yields, energy prices, water availability, and transportation costs.

It can alter rainfall patterns, increase temperatures, and cause extreme weather events like droughts and floods, which can reduce crop yields.

This can lead to lower supply and higher prices for commodities like wheat, corn, soybeans, and other agricultural products.

Climate change can also impact energy prices by affecting the production and transportation of oil, natural gas, and other energy resources.

For example, extreme weather events can disrupt oil and gas production and transportation infrastructure, leading to supply disruptions and higher prices.

Changes in rainfall patterns and increased water scarcity due to climate change can impact the availability of water for agricultural production and energy generation. This can result in higher prices for water-intensive commodities like meat, dairy, and processed foods.

Climate change can also affect transportation costs, particularly for goods that rely on sea or river transportation.

Rising sea levels and changes in ocean currents can disrupt shipping routes and increase shipping costs, which can lead to higher prices for imported goods.e weather events like droughts and floods, which can reduce crop yields

Fight over subsidies amid $200tn energy transition narrative

Biden’s $370bn plan to support businesses, leading the transition to a low-carbon economy, has riled some of the largest US trading partners

The global energy transition is estimated to bring close to $200tn in opportunities and its own series of challenges. Now a global green trade and subsidy war is accelerating

US President Joe Biden’s $370bn plan to support businesses, leading the transition to a low-carbon economy has riled some of America’s largest trading partners, who say the measures unfairly benefit US companies and harm free trade.

Now the European Union is striking back with state support for

industries that could generate as much as $1tn in green investments by 2030.

Asian allies are following suit, too.

Last August, Biden signed into law the US Inflation Reduction Act (IRA) to finance projects over the current decade and relies entirely on higher tax revenues, to the tune of $739bn.

The IRA offers tax credits and other incentives for the production of electric vehicles, renewable energy, sustainable aviation fuel and hydrogen.

European nations are upset at the IRA's raw protectionism. The biggest flash point is the consumer tax credit of up to $7,500 that is available only for electric vehicles assembled in North America.

Policymakers in Europe, Japan and South Korea worry that the law could lure investment to the US that might otherwise flow to their regions.

German carmaker Volkswagen, for example, opted in March to build a $2bn factory for its new electric Scout brand in South Carolina and picked a site in Canada for its first battery plant outside of Europe, describing the incentives on offer as akin to "a gold rush."

Japan's government initially complained that the US measures were "discriminatory" but Washington and Tokyo ultimately struck a deal to allow critical minerals sourced in Japan to qualify for the US subsidies.

South Korea's Hyundai Motor Co and its affiliate Kia Corp said the law puts them at a disadvantage because they don't have any EV plants in the US yet, though they soon will.

South Korea has announced its intention to jump into the fray with a 550tn won ($413bn) investment plan focused on public-private partnerships in chips, batteries, robots, EVs,

displays, biotechnology and other areas.

Europe is advancing its own subsidies and tax breaks. The proposed Net Zero Industry Act aims to spur the investments required to meet at least 40% of the EU's "clean technology" needs from within the bloc's own borders by the end of the decade.

The hope is that companies will prioritize manufacturing in Europe and resist the lure of Biden's tax breaks. The EU also passed a €43bn ($47.5bn) subsidy programme in April called the Chips Act to support advanced semiconductor manufacturing in the bloc.

When deep-pocketed governments attempt to outspend each other to produce national champions, companies in small and developing economies are usually impacted the most because their governments can't muster the same scale of funding.

Despite the global outcries, the chances of the current tensions evolving into a full-fledged trade war are seen less likely.

Biden has sought to dial down the tension, acknowledging the US law has some "glitches" and that there's room for tweaks to make it easier for European countries to participate.

He has said he wanted the legislation to be a "win-win" and that it had not been "designed to hurt China."

But Biden's law and the EU's initiatives are partially seen as a response to China. Their aim is to redirect global supply chains for clean-energy products away from China so that Beijing can't abuse its dominant position in some key raw materials.

This would be a radical shift for the EU especially, as it relies on China for 98% of its rare-earth minerals and magnets.

While greater funding for clean energy production and green technologies is essential, a fight over subsidies runs the risk of focusing too much on geography and not enough on the bigger picture.

Europe must tax brown and subsidise green

After years of global climate-policy leadership, the European Union is looking warily at the United States' sudden embrace of ambitious clean-energy subsidies. Ultimately, America's entry into the clean-energy race is good news for both the planet and Europe. But will US generosity toward its own companies under the recent Inflation Reduction Act (IRA) hollow out Europe's industrial base even further? Will dirty industries continue moving east and south as clean ones move

west across the Atlantic?

Europe must prevent this outcome. But how should EU leaders proceed?

Unlike in the US, European policymakers have long heeded the economists who suggest that carbon pricing is the best strategy for tackling climate change. That means making dirty energy more expensive, in line with the external costs that it imposes on society. Though the EU's Emissions Trading System is far from perfect, it now prices roughly half of Europe's carbon pollution at around €100 ($109) per tonne; and several national governments in the bloc have introduced their own carbon taxes. None of this is sufficient on its own. But Europe's carbon-pricing policies are clearly much better than America's incomplete state-level patchwork and its complete lack of a federal carbon price.

Now, US policymakers have seemingly taken the easy way out, subsidising clean energy instead of pricing dirty energy. But while giving handouts is politically easier than imposing taxes, there is in fact a strong economic argument for subsidies in this case. Yes, Economics 101 calls for pricing negative externalities, but Economics 102 calls for subsidising positive externalities that arise from learning by doing. The argument is simple: installing the thousandth, and especially the millionth, solar panel will be much faster and cheaper than installing the first, owing to all the efficiencies and improvements that have been developed along the way.

The same logic extends to research and development more broadly. Innovators deciding on how much to invest in R&D will generally spend less money than is socially optimal, because their decisions typically do not include the possibility that the result will create shoulders for others to stand on. That, too, calls for subsidies.

Policymakers from California to Germany have embraced the learning-by-doing logic with solar subsidy schemes that start high in the first year and decrease almost immediately thereafter. Germany's feed-in tariffs (payments to solar-

energy producers above the market price) started as high as €0.40 per kilowatt-hour for small rooftop solar units, but have since been scaled back to under €0.15. That tapering is appropriate, given how cheap solar power has become in recent years. It also demonstrates that the subsidies worked.

While solar feed-in tariffs have decreased, EU carbon prices have risen some tenfold, from as low as €10 per tonne. It is here that the EU's climate policy shines. European policymakers recognise that carbon pricing is crucial, and they have acted on that insight.

But neither carbon pricing nor subsidisation is enough on its own. Just as the US ought to take a page from Europe's book on carbon pricing, Europe should follow the US in pursuing green subsidies. Early economic analyses of the IRA calculate that the legislation's provisions, like its various tax credits for clean energy, create an implicit carbon price of around $12 per tonne – scarcely one-tenth of Europe's explicit one.

Whatever reasons Europe had for avoiding green subsidies in the past, European competitiveness and energy security demand that they be reconsidered in the context of the IRA. China currently produces the vast majority of the world's clean-energy technologies: including three-quarters of all solar panels and batteries sold globally, well over half of all wind turbines, and around half of all electric vehicles. In some clean technologies, like heat pumps, Europe is behind not only China but also North America, which produce 39% and 29%, respectively, compared to Europe's 16% share.

This import dependency translates into significant geopolitical vulnerabilities. Relying on China for solar panels may be less dangerous than depending on Russia for gas; but that hardly makes it prudent. The EU urgently needs to create new incentives for domestic manufacturers and invest in a more resilient clean-energy supply chain.

The IRA should be welcomed around the world. Of course, its immediate effect will be to boost US clean-energy investments, and it will inevitably rankle some foreign manufacturers and governments as it generates headlines around the world about

companies being lured to the US. But it is important to remember that just as economic growth is not a zero-sum game, neither is clean growth.

In a recent paper, Costas Arkolakis of Yale University and my Columbia Business School colleague Conor Walsh show that the IRA's subsidies will pay for themselves through increased global GDP, owing to the positive spillovers from learning-by-doing dynamics. The implication is that the EU and the rest of the world will ultimately benefit from the US subsidies. And Arkolakis and Walsh's analysis does not even account for the positive welfare effects of helping to address climate change. Add those in, and US clean-energy subsidies (or future European ones) look like a win-win-win.

The massive costs of unchecked climate change are already mounting and should be sufficient to show that much more needs to be done on both sides of the Atlantic, as well as around the world. For their part, US policymakers should recognise that their long-awaited clean-energy push would be strengthened enormously by additional measures to make polluters pay for the costs of their pollution.

The EU, meanwhile, must take the arguably easier step of ramping up its own clean-energy subsidies. It can and must afford to do so. The result will be a race to the top, with the global economy and the planet as clear winners – a truly rare occurrence in the annals of global economic competition. – Project Syndicate

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In defence of nature-based carbon markets

Voluntary markets for carbon offsets have recently come under fire, with critics questioning the efficacy of contracts that aim to reduce atmospheric carbon dioxide relative to what would have happened in the contract's absence. The biggest concerns are about "nature-based" projects involving various land-use changes – such as protecting forests, planting new ones (afforestation), and so forth.

But these instruments' imperfections are no secret. For well over two decades, ecologists and foresters have been working to develop more sophisticated methods to satisfy economists' faith in market instruments, and they have made good progress. Though offset schemes are still riddled with complexity, there is no question that they pay for something that matters.

Imagine seeing what the atmosphere sees. The Intergovernmental Panel on Climate Change's Sixth Assessment Report provides an

outline of the planet’s carbon cycle, which makes evident the fundamental role of plants’ conversion of CO2 into cellulose and back on a massive scale. Terrestrial photosynthesis alone draws down 113bn tonnes of carbon every year. By comparison, humanity added about 11bn tonnes of carbon to the atmosphere last year.

The problem, of course, is that humans’ cumulative contributions go in only one direction, whereas the carbon captured by vegetation is normally balanced by an equal, opposite flow from plant respiration and degradation. By interfering with the climate system, we have thrown this balance off, adding a net flow of about 5.9bn tonnes to the landscape and the ocean every year. In other words, the planet is drawing down only half of what we inject into the atmosphere.

Even a relatively small perturbation in this vast natural cycle can reach an enormous scale. That is why nature is such an attractive climate-mitigation option. Suppose we succeed in eliminating fossil-fuel combustion. Keeping global average temperatures within 1.5C or 2C of pre-industrial levels will still require substantial carbon removal. Estimates vary, but they are on the order of 200-300bn tonnes removed by plants before 2100.

Nor will the story end there. The atmosphere contains about 870bn tonnes of carbon in the form of CO2 (one-third of which has been added since industrialisation), and the carbon cycle connects that atmospheric stock to vast reservoirs. The largest is the ocean, which holds 900bn tonnes at the surface and another 37tn tonnes deeper below. Terrestrial vegetation and soils also hold about 2.15tn tonnes, and permafrost contains another 1.2tn. As far as the atmosphere is concerned, losses from any of these reservoirs could easily exceed the carbon we burn (from the 930bn tonnes that are sequestered in fossil fuels).

Far from being a secondary concern, managing the stocks and flows of carbon through the planet’s ecosystems is essential to keeping the entire Earth system in balance. But to carry

out that task, we will need to think differently about the landscape. Landscapes and seascapes are not just the backdrop to our life. They are public infrastructure, and like all infrastructure, they must be paid for and maintained.

Since the 19th century, however, we have known that paying for infrastructure by rewarding its marginal benefit (as offsets do for nature-based interventions) almost never covers the total cost. Because public-utility infrastructure like a highway or an airport tends not to command a high enough marginal value, taxation must cover the rest. Whom to tax then becomes the most important question.

To illustrate the point, consider Brazil, whose ecosystems contain some 60bn tonnes of carbon in above-ground biomass. One way to estimate how much this stock is worth is to assume that we value carbon at a given price, say, $50 per tonne (halfway between the price in the regulated European market and nature-based offsets in voluntary markets). In this scenario, Brazil is home to ecosystems worth $10tn, which is over six times the country's GDP and far greater than the value of its 13bn barrels of oil reserves.

Now, how much should the world pay Brazil to keep that forest in trust for everyone? Assuming a 2% fee on the value of the assets (a reasonable rate for most asset managers), the country ought to receive $200bn per year. On those terms, Brazil would almost certainly put a stop to deforestation in the Amazon.

But here we run into a sad truth. There is simply no evidence that the international community has any appetite to pay such sums. In 2022, total overseas direct assistance amounted to just $186bn. For years, rich countries have failed to honour a 2009 pledge of mobilising $100bn per year to help developing countries adapt to climate change.

By thinking of natural assets not as infrastructure but as service producers, we end up relying on the voluntary payments companies make at the margin in exchange for "offsetting" some other reduction that they cannot or will not carry out. But, for all this mechanism's shortcomings, at least it directs

some money – albeit a drop in the ocean – toward carbon-landscape management.

Of course, additional scrutiny of offsets is welcome for driving improvements. But it would be a fatal mistake to conclude that protecting forests or augmenting Earth's carbon sink is any less urgent than reducing fossil-fuel emissions. Nature-based offsets traded in voluntary carbon markets should be seen as merely a first step. In the end, we will need to do "all of the above": end fossil-fuel combustion, maintain ecosystems, and augment nature's capacity to draw down carbon, regardless of whether we can prove that such reductions would not have happened anyway.

The atmosphere does not care about our motivations, counterfactuals, or moral hazards. All it sees is carbon flowing in and out. Ecosystems store carbon and draw it from the atmosphere at scales that matter. All of us – taxpayers, consumers, and companies – must pay for this critical public good. – Project Syndicate

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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.